AN INTERNATIONAL COMPARISON OF ENERGY AND CLIMATE CHANGE POLICIES IMPACTING ENERGY INTENSIVE INDUSTRIES IN SELECTED COUNTRIES

Final Report

11 JULY 2012

The Views expressed within this report are those of the authors and should not be treated as Government policy

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Executive Summary

Introduction

The UK Government is committed to reducing carbon emissions to 80% below 1990 levels by 2050. This will require significant abatement in energy intensive industries (EIIs). However, in the absence of a binding global deal to reduce emissions, different countries are pursuing carbon reduction policies at different rates. This has an impact on the competitiveness of domestic industries.

Having analysed the likely impacts of UK energy and climate change policies[1], the UK Government is interested in investigating the extent to which the same industries located in other countries also face similar energy and climate change policies, and the costs that these impose.

This research is designed to increase the Government's understanding of the policy frameworks towards EIIs in key countries. It represents an initial attempt to compile information on the energy cost impact of policies in other countries. Significant uncertainties remain however, particularly relating to future policy cost impacts and future levels of base electricity prices in other key countries. More research would help to further improve the robustness of comparisons between countries. Furthermore, it should be noted that the demand side impacts as a result of energy efficiency policies are not considered in this study.

In terms of energy prices, this report focuses on the impact of policies on electricity prices faced by those EIIs that purchase electricity from an energy supplier, rather than those that generate their own electricity on-site and who are therefore not subject to some of the policy costs. Unless there are explicit exemptions/discounts for EIIs, the report assumes that energy suppliers in all countries pass the policy costs they face fully on an equal cost per unit of supply basis to all their customers (i.e. households and businesses, including EIIs). In practise some EIIs may seek to negotiate lower costs.

Objectives

This project will examine the following EII sectors:

- Iron and steel
- Aluminium
- Cement
- Chemicals, in particular:
    - Chlor alkali
    - Fertiliser and

[1] DECC, *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011, http://www.decc.gov.uk/assets/decc/11/about-us/economics-social-research/3593-estimated-impacts-of-our-policies-on-energy-prices.pdf

- Industrial gases.

The countries to be included are:

- Non-EU countries:
  - China
  - India
  - Japan
  - Russia
  - Turkey
  - US
- EU countries:
  - Denmark
  - France
  - Germany
  - Italy
  - UK[2]

The objectives are to:

1. Qualitatively analyse the energy and climate change policies which impact EIIs in each country. This is to focus on policies[3] which create / reduce costs for EIIs via their energy bills (indirect costs) and direct policies affecting EIIs (direct costs). The former policies are of most interest to this study, particularly policies impacting on electricity prices.
2. Develop a quantitative metric of the impact of energy and climate change policies in each country, including the UK. This is to enable the comparison of these policies between countries, focussing on impacts in 2011, 2015 and 2020.

Analysis of energy and climate change policies

The data gathering of information on energy and climate change policies in each country was undertaken in the following stages:

1. First phase. In this initial phase we gathered readily available data from:
   a. General and multi-national sources: ICF's in-house GHG policy tracking system, IEA, Mure, Pew Centre on Global Climate Change, Australian

[2] For objective 2 only.

[3] Including fiscal, regulatory and financial levers. Note that the EU ETS is not within the scope of the first objective, but it is to be included in the work under the second objective.

Productivity Commission, Institute of Industrial Productivity[4] and Globe International[5];

b. Country specialists. Our specialists from China, India, Russia, Turkey, US and EU drew on in-house knowledge, access to country-specific information sources and in-country contacts to review and supplement the above information.

2. Review with the Steering Group. The information from the first phase of data gathering was reviewed with the Steering Group to highlight the key gaps and discuss how best to fill them.

3. Second phase. This phase was to fill in key gaps from the first phase and included: further searches of general and multi-national sources; further searches by country specialists; Steering Group information on data sources, particularly for EU countries; and climate change attachés in each country.

This study has not identified significant impacts on gas prices as a result of climate change policies and hence this study has focussed on impacts on electricity prices as well as direct impacts. It is worth noting, however, that for most of these industries in the UK gas is also an important production cost.

We present the findings of this analysis in Section 3.2, which includes for each country:

1. A table showing all the energy and climate change policies identified from the data gathering task.

2. A description of each of the key policies.

The **greenhouse gas policies** that have been analysed include:

- the emerging US regulations (GHG Permits / Tailoring Rule requiring Best Available Control Technology (BACT) and New Source Performance Standards (NSPS)),
- the US emissions trading schemes (RGGI and Californian Emission Trading Scheme),
- the pilot Chinese Emissions Trading Schemes, and
- the EU Emissions Trading System (EU ETS)[6].

Those countries of interest to this study that are so far without a mandatory CO2 emission trading scheme are aiming to achieve significant emissions reductions through **energy efficiency policies** including:

- Energy Efficiency Targets, e.g. 10,000 Enterprises Programme, Elimination of Backward Technology and Industrial Energy Performance Standards in China; Sectoral Energy Efficiency Targets in Japan; Federal Target Oriented

[4] 'Ten Key Messages for Effective Policy Packages, Sharing best practices in industrial energy efficiency policies', Institute of Industrial Productivity, 2011

[5] National Legislation Studies, available at http://www.globeinternational.info/

[6] in line with the project specification this is considered for objective 2 but not objective 1

Programme of the Russia Federation and Turkish Energy and Natural Resources Strategic Plan;

- Energy Efficiency Benchmarks in Japan and
- Trading Energy Saving Certificates (ESCerts) (Indian PAT scheme).

All countries except Russia have **renewable energy** feed-in tariffs or similar policies in place or planned shortly. In Germany and Japan, feed-in tariffs are substantially reduced for EII sectors. A variety of mechanisms are in place to further support achievement of renewable generation targets including supply / purchase requirements and a range of financial incentives to invest in and operate renewables projects.

China, Japan and India are increasing **energy taxes** as one of their tools to support achievement of energy intensity reduction targets as well as, in the case of India, to support investment in clean technology. Furthermore, in China, a set of punitive prices is available to the authorities when considering action against lack of compliance with energy targets. Energy taxes for EIIs in the EU Member States considered in this study are generally low due to significant re-imbursements.

Some wider **energy policies** for the countries of interest are expected to lead to noticeable electricity price impacts including the Amendment of the Atomic Power Action (nuclear phase out) in Germany and the Law on the New Organisation of Electricity Markets (ending regulated tariffs) in France. Part of the increase in prices expected under the latter policy is being mitigated for EII sectors under a special agreement (EXELTIUM project) whereby selected EII companies provide capital to support the development of new power generation capacity.

A summary of the key policies selected for each country is shown in the following table, broken down by type of policy.

Table 1-1: Selection of key policies

Policies	China	India	Japan	Russia	Turkey	US	Denmark	France	Germany	Italy	UK
GHG - trading[1]	♦					♦[2]	♦	♦	♦	♦	♦[3]
GHG – emission limits						♦[4]					
GHG – technology requirements						♦[5]					
Energy efficiency - trading		♦[6]									
Energy efficiency - standards & targets	♦[7]		♦[8]	♦[9]	♦[10]						
Energy efficiency - technology requirements	♦[11]	♦[12]			♦[13]						
Energy efficiency – end-use								♦[14]		♦[15]	
Energy efficiency - investment tax incentives		♦[16]	♦	♦[17], [18]		♦[19]					
Energy efficiency – other financial incentives					♦[20]				♦[21]	♦[22]	
RE - feed-in tariffs	♦[23]	♦[24]	♦[25]		♦[26]		♦	♦	♦[27]	♦[28]	♦
RE - supply requirements			♦[29]			♦[30]				♦[31]	♦[32]
RE - purchase requirements	♦[33]	♦[34]									
RE - investment tax incentives	♦[35]		♦			♦[36]					
RE – supply tax incentives						♦[37]					
RE – other financial incentives										♦[38]	
Fuel / energy taxes	♦[39]	♦[40]	♦[41]	♦	♦	♦	♦[42]	♦	♦[43]	♦	♦[44]
Energy policy								♦[45]	♦[46]	♦[47]	♦[48]

[1] EU ETS is included in the development of the metrics later in this report although is not included in the policy review task in Section 3
[2] State wide emissions trading schemes: Regional Climate Change Initiative (RGGI) and California Emissions Trading Scheme
[3] EU ETS plus Carbon Price Floor (CPF)
[4] New Source Performance Standards (NSPS) for Power Plants and Refineries
[5] Best Available Control Technology (BACT) under Tailoring Rule
[6] Perform Achieve Trade (PAT) scheme
[7] 10,000 Enterprises Programme, Industrial Energy Performance Standards
[8] Sectoral energy efficiency benchmarks
[9] Federal Target Oriented Programme of the Russian Federation
[10] National Climate Change Strategy
[11] Efficiency upgrade for coal burning industrial boilers and kilns; Elimination of Backward Technology
[12] IGCC and supercritical power plants
[13] Ministry of Energy and Natural Resources Strategic Plan
[14] White Certificate Trading for End-use Energy Efficiency – requires electricity and gas suppliers to help their customers save energy
[15] White Certificate Trading for End-use Energy Efficiency – requires electricity and gas suppliers to help their customers save energy
[16] Restructuring fertiliser subsidies
[17] Federal law # 261-FZ, Federal Tax Code
[18] Federal Tax Code
[19] Business Energy Investment Tax Credit (ITC)
[20] Support scheme for energy efficiency in industry
[21] CHP support – fixed price paid for electricity from CHP
[22] Industry 2015 – Industrial innovation projects, with co financing from the government for energy efficiency and renewable energy technologies
[23] Solar Feed-in Tariff, Wind Power Concession Programmeme
[24] RE tariff regulations, Generation based incentives for wind power
[25] RE Feed-in Tariff Law; New Purchase System for Solar Power-Generated Electricity
[26] Law No 6094 Amendment to the Renewable Law No 5346 of 2005
[27] 2009 Amendment of the Renewable Energy Sources Act (EEG)
[28] Finance Act 2008, Law 99 23/7/09; New feed-in premium for photovoltaic systems; Feed-in for solar thermodynamic energy
[29] Green Power: Renewable Portfolio Standards
[30] State wide Renewable Portfolio Standards (RPS)
[31] Green Certificates System – cap and trade mechanism, requiring Italian energy producers and importers to ensure a certain quota of electricity is from renewable sources
[32] Renewables Obligation (RO)
[33] New energy quota system
[34] Renewable Energy Certificate Trading Scheme
[35] Preferential tax policies for renewable energy
[36] Business Energy Investment Tax Credit (ITC)
[37] Renewable Electricity Production Tax Credit (PTC)
[38] Industry 2015 – Industrial innovation projects, with co financing from the government for energy efficiency and renewable energy technologies
[39] Differential electricity pricing
[40] National Clean Energy Fund – coal, lignite, peat
[41] Energy tax reform on fossil fuels (including coal, oil, LNG, LPG etc)
[42] Green tax package scheme
[43] Eco Tax changes as part of the Energy Concept of the Federal Government 2011
[44] Climate Change Levy (CCL) and discounts associated with Climate Change Agreements (CCAs)
[45] Law on new organisation of electricity markets, EXELTIUM
[46] Amendment of the Atomic Power Act: nuclear phase out
[47] National Energy Strategy 2008, revised 2010 and 2011
[48] Electricity Market Reform (EMR)

Development of metrics of the impact of energy and climate change policies

The criteria to be used in identifying suitable metrics for this study were agreed with the Steering Group during the inception phase and included:

- Simplicity
- Data availability
- Consistency
    - o across countries
    - o with industry approaches
- Transparency[7]
- Ability to consider future policies

Based on these criteria, the selected metrics were:

				Units
Indirect policy costs:	Policy cost affecting the power sector (£pa) / Electricity generation (MWh pa)	x	Cost pass through factor (%)	£/MWh
Indirect plus direct policy costs:	(Additional electricity costs (£pa) + Policy cost affecting EII sector directly (£pa)) / EII sector production (tpa)			£/t product
	(Additional electricity costs (£pa) + Policy cost affecting EII sector directly (£pa)) / EII GVA (£pa)			%

[7] It is important that methods underlying the metric and data can be understood

Section 4.1.2 of this report describes the methodologies and data sources used to derive the cost estimates that are included in the metrics. This study has sought to obtain the best available information on the costs of the key policies although in many cases such data is not available and detailed 'bottom-up' cost analysis has been outside the scope of this study. We have therefore developed indicative cost estimates using readily available data and a range of simplifying assumptions which should provide a good indication of the relative cost impacts across the target countries and sectors in order to support the comparison of the key energy and climate change policies.

The results for the indirect policy cost metrics are shown in the following figures, based on two different sets of EUA price assumptions. The main analysis (Figures 1-1a and 1-2a) uses the values quoted in DECC's document 'Carbon values used in DECC's energy modelling' (October 2011). The data in Figure 1-2a is also shown in tabular form in Table 1-2. A sensitivity is shown (Figures 1-1b and 1-2b) which uses market forecasts of EUA prices[8]. A comparison of the different sets of EUA prices (in 2010 prices[9]) is shown below:

	Values used in DECC's energy modelling	Market values[10]
2011	£13.1/t	£11.6/t
2015	£18.3/t	£13.0/t
2020	£27.7/t	£14.5/t

The different elements in the figures include:

- 'Base' – the electricity price applicable to the relevant sectors, excluding the impacts of energy and climate change policies[11]
- 'GHG' – the incremental cost of GHG policy measures e.g. EU ETS
- 'EE' – the incremental costs of Energy Efficiency policy measures
- 'RE' – the incremental costs of Renewable Energy policy measures
- 'ET' – the incremental costs of Energy Taxes
- 'Other' – the incremental costs of other policies including Energy policy

[8] UK indirect costs are not affected by this sensitivity due to the effect of the Carbon Price Floor

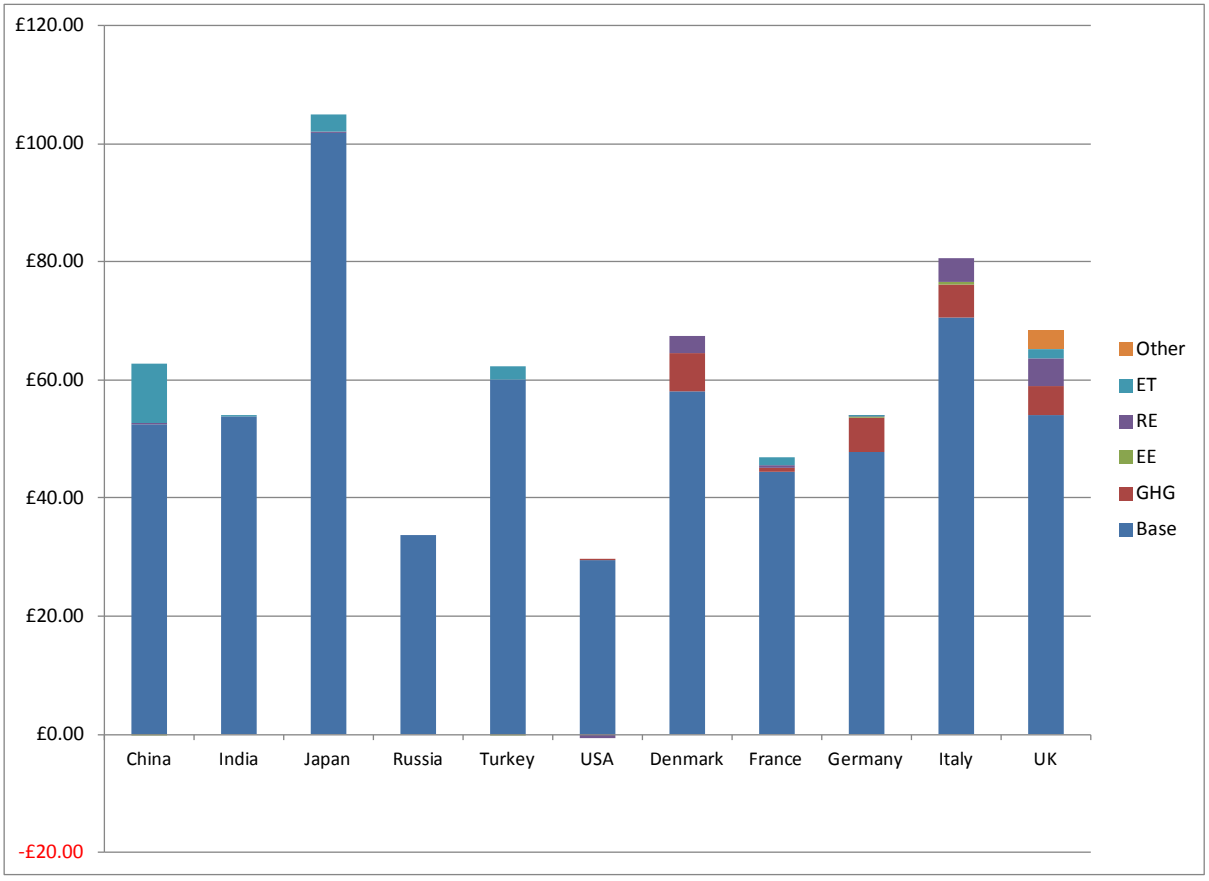
[9] Converted to 2010 prices using deflator index from HMT website using growth projections from Budget 2011.

[10] Based on the average daily closing price of contracts on the Intercontinental Exchange (ICE) over the period January 1st to November 23rd 2011. Values converted to £ at a conversion rate of €1 = £0.858. Note that there is no significant trading of contracts beyond 2014 so 2015 & 2020 values should be treated with caution.

[11] The base price was intended to exclude all taxes, climate change policy costs, renewable costs and energy policy costs. However, in some cases it has not been possible within the scope of this study to fully disentangle the elements which make up the total electricity price. Elements that are included within the base price include some or all energy taxes for countries outside the EU, except Turkey.

In their publication, 'Estimated impacts of energy and climate change policies on energy prices and bills', DECC present a range for the costs associated with renewable policies, given that, for example those industrial consumers that generate electricity on site will not be subject to some of these costs. The impacts presented for the UK throughout this report are estimates of the policy costs faced by those EIIs who purchase all their electricity from an energy supplier and face the full cost of all policies consistent with an equal cost per unit of supply across all electricity customers.

Figure 1-1a: Base electricity price and indicative incremental impacts in 2011 on electricity price of energy and climate change policies (£/MWh, 2010 prices)[12]



[12] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

Figure 1-1b: Base electricity price and indicative incremental impacts in 2011 on electricity price of energy and climate change policies (£/MWh, 2010 prices) – Sensitivity using market forecasts of EUA prices

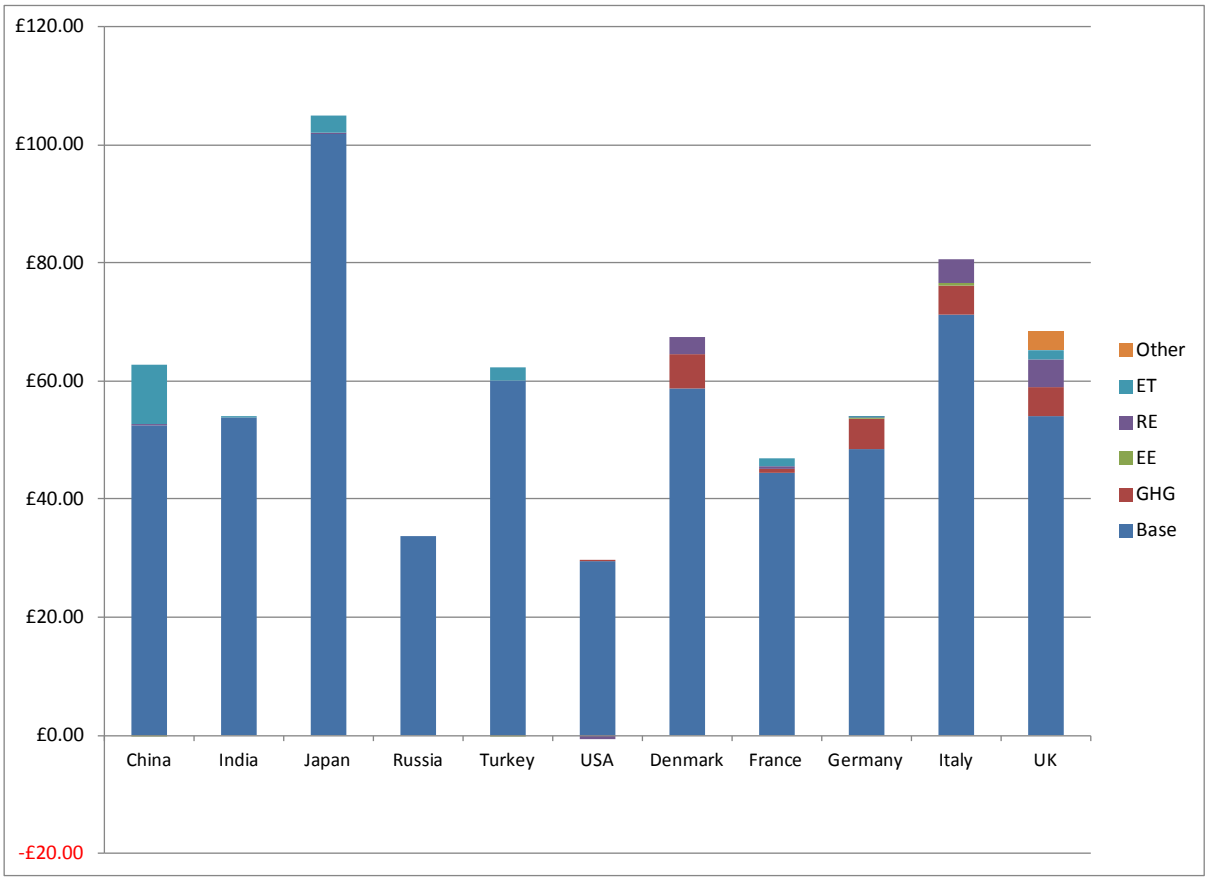
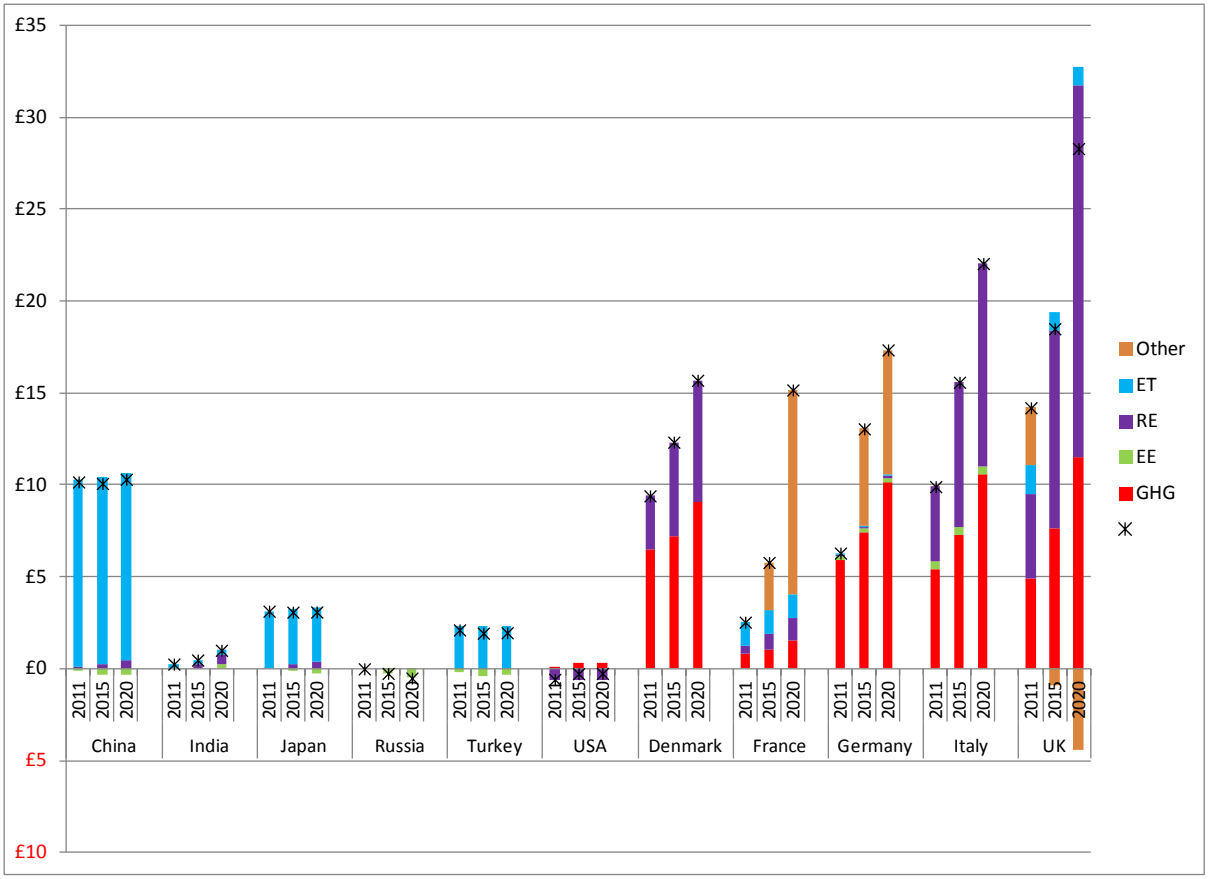


Figure 1-2a: Indicative incremental impacts in 2011, 2015 and 2020 on electricity price (£/MWh, 2010 prices) of energy and climate change policies[13]

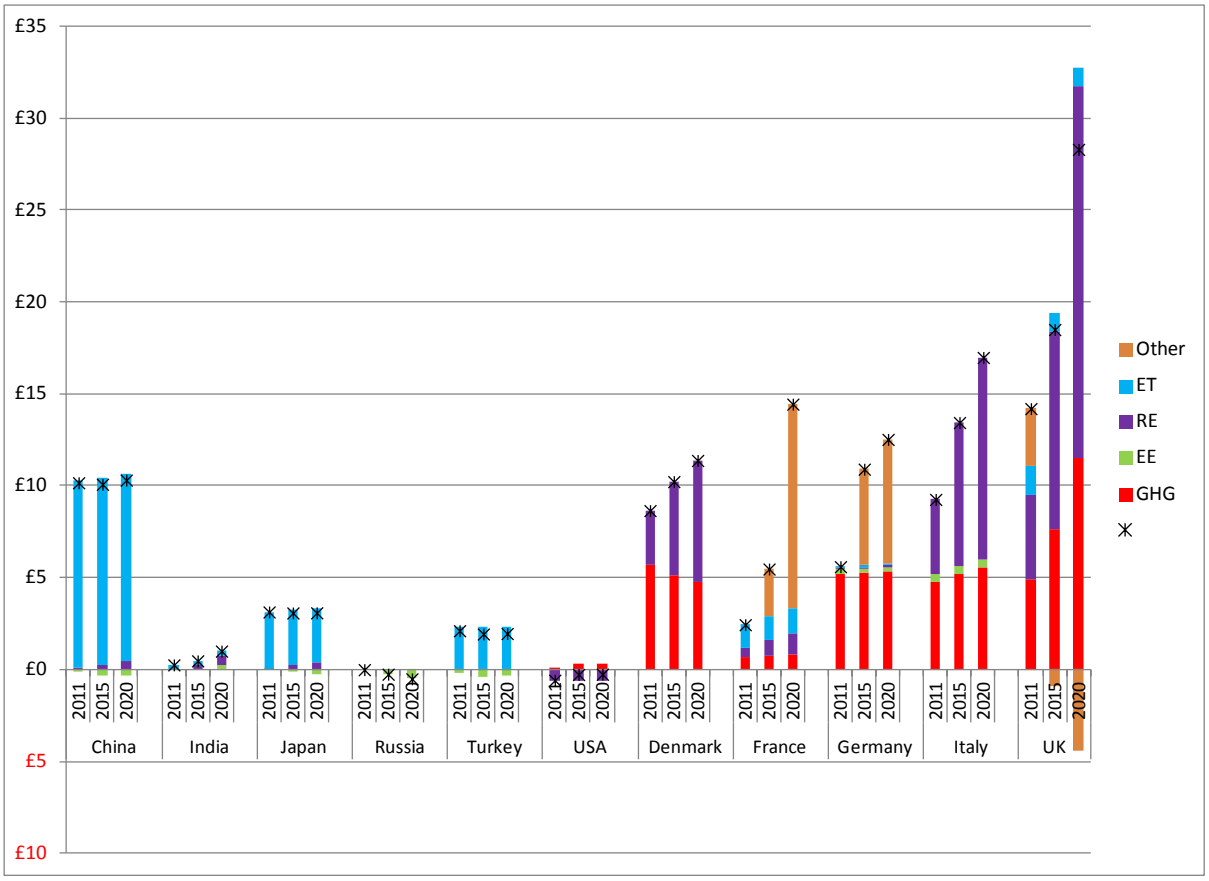


[13] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

Table 1-2: Indicative incremental impacts in 2011, 2015 and 2020 on electricity price (£/MWh, 2010 prices) of energy and climate change policies

Country	GHG trading & standards			Energy efficiency targets			Renewable energy feed-in tariffs & incentives			Energy taxes			Other			Total		
	2011	2015	2020	2011	2015	2020	2011	2015	2020	2011	2015	2020	2011	2015	2020	2011	2015	2020
China	0.0	0.0	0.0	-0.1	-0.4	-0.3	0.1	0.3	0.5	10.2	10.2	10.2	0.0	0.0	0.0	10.2	10.1	10.3
India	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.5	0.3	0.3	0.3	0.0	0.0	0.0	0.3	0.5	1.0
Japan	0.0	0.0	0.0	0.0	-0.1	-0.3	0.1	0.2	0.4	3.1	3.0	3.0	0.0	0.0	0.0	3.1	3.1	3.1
Russia	0.0	0.0	0.0	0.0	-0.2	-0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.5
Turkey	0.0	0.0	0.0	-0.2	-0.4	-0.4	0.0	0.0	0.0	2.3	2.3	2.3	0.0	0.0	0.0	2.1	1.9	2.0
USA	0.0	0.3	0.3	0.0	0.0	0.0	-0.6	-0.6	-0.6	0.0	0.0	0.0	0.0	0.0	0.0	-0.6	-0.3	-0.2
Denmark	6.4	7.2	9.1	0.0	0.0	0.0	3.0	5.1	6.6	0.0	0.0	0.0	0.0	0.0	0.0	9.4	12.3	15.7
France	0.8	1.1	1.5	0.0	0.0	0.0	0.5	0.9	1.2	1.3	1.3	1.3	0.0	2.6	11.1	2.5	5.8	15.2
Germany	5.9	7.4	10.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	5.2	6.8	6.3	13.1	17.3
Italy	5.4	7.3	10.6	0.4	0.4	0.4	4.1	7.9	11.1	0.0	0.0	0.0	0.0	0.0	0.0	9.9	15.6	22.0
UK	4.9	7.6	11.5	0.0	0.0	0.0	4.6	10.8	20.2	1.6	1.0	1.0	3.1	-0.9	-4.4	14.2	18.5	28.3

Figure 1-2b: Indicative incremental impacts in 2011, 2015 and 2020 on electricity price (£/MWh, 2010 prices) of energy and climate change policies – Sensitivity using market forecasts of EUA prices[14]



The following observations can be made from the development of metrics for indirect policy costs to EIIs expressed per unit of electricity, based on the DECC values for EUA prices:

- The UK has a base electricity price for EIIs within the range of the other EU Member States considered in this study (higher than France and Germany, lower than Italy and Denmark).
- Compared to the non-EU countries in this comparison, the UK's base electricity price for EIIs is significantly higher than prices in Russia and USA, is similar to prices in China and India, slightly lower than prices in Turkey and significantly lower than prices in Japan.
- Differences in base electricity prices between countries reflect several factors, including: different supply mixes, different transmission and distribution costs, different non-energy taxes, and different market structures. The reasons for these differences and future trends in base electricity prices are not the focus of this study but are important factors to understand when comparing energy costs between countries.

[14] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

- The UK has relatively high incremental policy costs mainly due to renewable energy costs[15] (in Germany for example, renewable energy costs for EIIs are very low due to the policy to limit added renewable energy costs to these installations) and also the UK carbon price floor (which is additional to the EU ETS which impacts all EU member states) – although it should be noted that in 2015 and 2020 the policies to support low carbon generation have a downward impact on UK wholesale electricity prices. A similar downward impact is likely to occur in other countries where low carbon generation is growing as a proportion of the electricity mix, but this effect has only been modelled for the UK due to data limitations. Moreover, this analysis does not take account of those measures announced by the Chancellor in the 2011 Autumn Statement to reduce the transitional impacts of policy on the costs for the most electricity-intensive industries[16]. The UK analysis corresponds to the top end of the range of renewables costs faced by EIIs in DECC's price and bill impacts publication[17], and therefore implicitly assumes that EIIs generate no electricity on site as such generation does not incur these costs. The assumption on the rate of cost pass-through to EIIs is less of an issue in some other EU countries, such as Germany, where renewable costs for EIIs are explicitly regulated.
- Energy taxes for EIIs in the EU Member States considered in this study are generally low due to significant re-imbursements that are possible. From the information that has been possible to obtain in this study, re-imbursements to EIIs appear most significant for Germany, Denmark and Italy, and are also relatively high for France. However, this is an area where further investigations would be necessary to provide a more categoric conclusion across the different Member States.
- The incremental costs for France and Germany also include the significant estimated impacts of electricity market reorganisation and nuclear energy phase out respectively. However, these should be treated with a note of caution given the significant uncertainties surrounding such estimates.
- All EU MSs are shown to have substantially higher incremental electricity costs caused by climate change and energy policies than most of the non-EU countries. Indirect EU ETS costs contribute significantly to this difference, with the exception of France which has relatively low EU ETS costs due to a smaller proportion of fossil fuel power generation capacity. Renewable energy costs are also shown to be higher in the EU MSs (especially the UK, Italy and Denmark) compared to outside the EU.
- The main contributor to incremental costs for the non-EU countries is higher electricity and fuel costs resulting from new and more stringent energy tax policies aimed at encouraging energy efficiency and low carbon technology.

[15] Note that the support costs associated with Electricity Market Reform are included in 'Renewables' category, whereas the impact of the policy on the wholesale price (merit order) is in the 'Other' category.

[16] The UK Government announced that it will implement a package of measures to reduce the transitional impacts of policy on the costs of electricity for the most electricity-intensive industries, beginning in 2013 and worth around £250 million over the Spending Review period.

[17] DECC, *Estimated impacts of energy and climate change policies on energy prices and bills*, 2 011, http://www.decc.gov.uk/assets/decc/11/about-us/economics-social-research/3593-estimated-impacts-of-our-policies-on-energy-prices.pdf

China is shown to have had the most significant recent increase in energy taxes of the non-EU countries considered, bringing incremental impacts of policy costs on electricity prices into a similar range as for the EU Member States. **It is noted that some energy taxes for these countries are embedded in the base electricity prices as it has not be possible to fully disentangle them.**

- The US, India and Russia have the lowest incremental cost impacts on electricity prices as a result of climate change and energy policies, according to the analysis in this study. For the US, this is due to the less stringent mandatory energy efficiency and GHG improvement requirements at national level, as well as the focus on tax credits and other incentives to encourage uptake of energy efficiency and renewable energy. However, cost impacts will vary significantly between different US states. For India and Russia there are significant energy efficiency policies but these do not have significant cost impacts on the power sector due to fuel cost savings.

The following observations can be made from the development of metrics for indirect plus direct policy costs to EIIs expressed per tonne of product, as shown in Figures 4-5 to 4-16 in Section 4. These are also on the basis of the DECC values for EUA prices:

- The EII sectors in the EU generally have significantly higher costs of energy and climate change policies per tonne of product in the 2015 and 2020 milestone years of this study, compared to the countries in this study that are outside the EU. These are largely driven by direct and indirect EU ETS costs as well as renewable policy costs (mainly UK, Italy and Denmark) and energy policy costs (mainly Germany and France).
- For the 2011 milestone year, direct EU ETS costs for sectors covered under Phase II are shown as negative due to a surplus of allowances. As such they have the ability to sell these allowances to buyers, eg the power sector, or bank for Phase III, thus smoothing out actual costs over time by reducing Phase II benefits and Phase III costs. For the purposes of this study we assume companies obtain the value of surplus allowances in the relevant year rather than making assumptions regarding banking.
- The situation changes in Phase III when more stringent allocations are imposed based on bottom-up benchmarks equivalent to the average of the top 10% GHG efficient installations. This results in allowances being less than industry's need in the 2015 and 2020 milestone years.
- Direct costs of EU ETS are generally lower than indirect costs except for the cement and fertiliser sectors, due to their significant reliance on fuel in comparison to electricity.
- Energy and climate change policies in Russia, China, India and Japan are shown to result in some substantial savings due to industrial energy efficiency measures, especially for the steel, cement and fertiliser sectors. This is backed up by regional fuel conservation supply curves for key sectors in this study showing that the annualised costs of achieving fuel savings are typically only a small fraction of the annual value of those fuel savings.

- Russia is shown as having particularly good scope for cost-effective energy savings due to the relative stringency of the new energy efficiency targets, the relatively energy intensive processes, and the limited uptake so far of energy efficiency measures due to low energy costs and limited policies.
- Detailed comparisons of added policy costs per tonne of production for sectors across countries would require a detailed assessment of the accuracy and consistency of production, energy consumption and other data across the countries. As such it is not possible to draw firm conclusions of this type from the current data. It should be noted that the relative incremental policy costs across the countries considered in this study will not necessarily follow the same pattern for the electricity price metrics compared to the sectoral production cost metrics due to differences in electricity consumption per unit of production and per unit of overall energy consumption.
- The GVA based metrics are less accurate than the production based ones as a number of sector / country combinations do not have GVA data at the level of detail corresponding to the scope of sectors in this study.

1. Introduction

1.1 Background

The UK Government is committed to reducing carbon emissions to 80% below 1990 levels by 2050. This will require significant abatement in energy intensive industries (EIIs). However, in the absence of a binding global deal to reduce emissions, different countries are pursuing carbon reduction policies at different rates. This has an impact on the competitiveness of domestic industries.

The 2008 Climate Change Act sets out a legally binding long-term framework to cut carbon emissions across the UK economy by setting a series of 5 year carbon budgets. This is supported by an array of energy and climate change polices including the Renewables Obligation (RO); the Climate Change Levy (CCL); the Assistance for Areas with High Electricity Distribution Costs; the Renewable Heat Incentive (RHI); the Carbon Reduction Commitment (CRC); and the Renewables Feed in Tariff (FiT). On top of that there is the EU Emissions Trading System (EU ETS), which requires its participants to achieve 21% reduction in net GHG emissions compared to a 2005 baseline (according to DECC, the EU ETS will cover about 48% of national CO_2 emissions from Phase III and is expected to deliver two-thirds of the first three UK carbon budgets under the Climate Change Act 2008)[18].

In March 2011, BIS in co-operation with the Treasury published "The Plan for Growth" which outlines four overarching ambitions for the UK economy, and sets benchmarks to measure the progress to achieve them. These goals include: creating the most competitive tax system in the G20; making the UK one of the best places in Europe to start, finance and grow a business (via *inter alia* improving the UK's ranking in major international indices of competitiveness; and lowering domestic regulatory burden); encouraging investment and exports as a route to a more balanced economy, and creating a more educated workforce that is the most flexible in Europe.

The EIIs[19] employ about 618,000 people across the UK (2% of UK total) and contribute about £49bn gross value added (GVA) (4% of UK total) according to 2008 data from BIS. EIIs also create indirect value and employment further down the product supply chain. Many of them are based in areas of relatively high unemployment.

EIIs in the UK are concerned that costs associated with complying with climate and energy policies make them uncompetitive with EIIs located in parts of the world currently without similar constraints, like China and India, for example as expressed by the Confederation of British Industry[20].

[18] DECC, *EU ETS Phase III (2013 – 2020)*, http://www.decc.gov.uk/en/content/cms/emissions/eu_ets/phase_iii/phase_iii.aspx

[19] using a definition of energy costs comprising 10% or more of a sector's GVA

[20] *'Green policies could end up throwing baby out with bath water'; Report urges tax exemption for energy-intensive firms*, http://www.cospp.com/news/2011/08/1474374163/green-policies-could-end-up-throwing-baby-out-with-bath-water-report-urges-tax-exemption-for-ener.htmlDECC, *Estimated impacts of energy and climate*

Having analysed the likely impacts of UK energy and climate change policies,[21] the UK Government is interested in investigating the extent to which the same industries located in other countries also face similar energy and climate change policies, and the costs that these impose.

1.2 Objectives and scope

This project will examine the following EII sectors:

- Iron and steel
- Aluminium
- Cement
- Chemicals, in particular:
    - Chlor alkali
    - Fertiliser and
    - Industrial gases.

The countries to be included are:

- Non-EU countries:
    - China
    - India
    - Japan
    - Russia
    - Turkey
    - US
- EU countries:
    - Denmark
    - France
    - Germany
    - Italy
    - UK[22]

change policies on energy prices and bills, 2011, http://www.decc.gov.uk/assets/decc/11/about-us/economics-social-research/3593-estimated-impacts-of-our-policies-on-energy-prices.pdf[22] For objective 2 only.

DECC, *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011, http://www.decc.gov.uk/assets/decc/11/about-us/economics-social-research/3593-estimated-impacts-of-our-policies-on-energy-prices.pdf[22] For objective 2 only.

[22] For objective 2 only.

The objectives are to:

1. Qualitatively analyse the energy and climate change policies which impact EIIs in each country. This is to focus on policies[23] which create / reduce costs for EIIs via their energy bills (indirect costs) and direct policies affecting EIIs (direct costs). The former policies are of most interest to this study, particularly policies impacting on electricity prices. Also of particular interest are policies that have special exemptions available to EIIs. . To put the impacts of policies on energy prices into context, brief notes are provided on the electricity and gas markets in each country.
2. Develop a quantitative metric of the impact of energy and climate change policies in each country, including the UK. This is to enable the comparison of these policies between countries. This is to focus on impacts in 2011, 2015 and 2020.

[23] Including fiscal, regulatory and financial levers. Note that the EU ETS is not within the scope of the first objective, but it is to be included in the work under the second objective.

2. Electricity and gas markets

To support and provide context for the assessment of the impacts of energy and climate change policies on energy prices, this section provides summary information on the electricity and gas markets in the target countries.

More detailed information is given in Appendix 2 for each target country, including overall descriptions and details of generation / production, transmission and distribution, and pricing.

The following table presents summary points related to electricity markets. In relation to cost pass through assumptions, where a specific figure is not quoted in this table, we have made a simplifying assumption that 100% pass through will occur with an assumption that costs are spread equally across all electricity users on an equal per unit basis. Clearly this is subject to a range of political, economic and technical factors that are not possible to fully explore within the scope of this study. However, given the trends observed in our analysis and the time horizon of interest, we believe this is a reasonable assumption.

Table 2-1: Summary details of electricity markets

Country	Generation	Transmission & Distribution	Pricing	Cost pass through
China	Govt dismantled the monopoly State Power Corporation (SPC) in 2002 into separate generation, transmission and services units. 5 state owned companies account for 50% of China's electricity Independent Power Producers (IPPs) account for much of the remainder.	Heavily state controlled. Govt plans to merge SPC's 12 regional grids into three large power grid networks by 2020. State Electricity Regulatory Commission (SERC) responsible for regulation and improving investment and competition to alleviate power shortages.	The National Development and Reform Commission (NDRC) determines and caps wholesale and retail electricity prices. Electricity producers and wholesale end-users such as industrial consumers can negotiate with each other directly. Nevertheless, the government still controls tariffs. See China Policy 4 (in Sec 3.2.3) for details of the Differential Electricity Pricing Policy.	Not automatic since prices are still controlled by government.
India	The central govt owns and operates 35% of total generation capacity, the private sector covers 25% and the remainder is owned by state governments. Due to high tariffs, power shortages, unreliability, and quality concerns, three quarters of businesses use on-site primary or backup generators.	Inter-regional transmission capacity stands at 22,400 MW and strengthening of the national grid and development of high voltage lines is under way. Over 80% of total energy consumption is distributed by the public sector.	Almost 87% of the power contracted today is tied up under long-term Power Purchase Agreements (PPA), with limited power sold under exchange. Since the inception of power exchanges in 2008, the average traded price in power exchange has moved from 7.5 Rs./KWh, to around 3.2 to 3.5 Rs./kWh.	If on-site generation, cost pass through would be automatic; if purchased from utility, cost pass through is not automatic since pricing mechanism is highly regulated

Country	Generation	Transmission & Distribution	Pricing	Cost pass through
Japan	10 privately-owned, integrated power companies that act as regional monopolies account for about 85% of Japan's installed generating capacity. Remainder generated by industrial facilities.	These companies also control the country's regional transmission and distribution infrastructure.	End-use retail prices have been among the highest in OECD countries, but recently have edged a bit lower. Price differences between the ten vertically integrated utilities (VIUs) have decreased substantially.	Prices determined by market, 100% pass through assumed with assumption that costs are spread equally across all electricity users on an equal per unit basis. Capped cost pass through for renewable energy
Russia	Wholesale generating companies (OGK) specialise in electricity generation, and territorial generating companies (TGK), produce electricity and heat. Thermal power sector recently privatised, however nuclear and hydropower remain under state control.	Russia has 8 separate regional power systems; seven are connected to an integrated power system. The Far East region is not connected. The Federal Grid Company (FGC), which is more than 70 percent govt owned, controls most of the transmission and distribution in Russia.	Except for 15% of the wholesale market, electricity and heat prices and contract requirements are subject to govt regulation. Govt has used its control of electricity tariffs to manage inflation and maintain short-term economic competitiveness, with prices based on social and political considerations.	Cost pass through determined by government

Country	Generation	Transmission & Distribution	Pricing	Cost pass through
Turkey	Govt plans to privatise a significant share of state-owned generation assets. By law, the market share of any privately owned company is limited to 20% of total capacity in the previous year.	TEIAS owns and operates the transmission system. It also operates the electricity market and is legally unbundled.	Until end of 2012, a uniform national retail tariff, which is approved by the regulatory authority EMRA, is applied for all distribution companies. From the beginning of 2013, the price cap would be set by individual distribution companies and subjected to EMRA's approval. Wholesale tariffs are already cost-based.	Currently, cost pass through is determined by the regulatory authority but will be determined by the market from 2013, with an assumed 100% pass through with assumption that costs are spread equally across all electricity users on an equal per unit basis..
US	The structure of the industry is complex and fragmented, with little government presence. Generation is dominated by traditional utilities, while Independent Power Producers (IPPs) account for less than a third. During restructuring in the early 2000s, electric utilities divested and sold many generating units to IPPs.	Transmission networks are owned by private or public utilities, and operated either by vertically integrated utilities, or by independent system operators (ISOs) which may combine several networks to form a regional transmission operator (RTO).	The state regulatory commissions have authority to regulate retail rates. Many states have acted to allow competition in the retail market by allowing their consumers a choice of suppliers. In general, the states with the highest tariffs, such as California and states in the North-East, have done the most to promote competition to apply downward pressure on prices.	Prices determined by market, 100% pass through assumed with assumption that costs are spread equally across all electricity users on an equal per unit basis.

Country	Generation	Transmission & Distribution	Pricing	Cost pass through
Denmark	Sector dominated by two generating companies. The wholesale market is integrated with the Nordic power market.	The Danish state-owned Transmission Service Operator for electricity and gas is responsible for all operation and maintenance of the transmission system.	Since 2003, all electricity consumers can purchase electricity from the open market. Retail prices are made up of i) electrical energy, ii) transmission and distribution grid charges, iii) the Public Service Obligation (PSO) and iv) taxes. See Sec 3.2.9 'Denmark Policy 4' for details of reduced energy taxes to EIIs.	Prices determined by market, 100% pass through assumed with assumption that costs are spread equally across all electricity users on an equal per unit basis.

Country	Generation	Transmission & Distribution	Pricing	Cost pass through
France	Generation sector is highly concentrated. EDF accounted for 88% of total generation in 2007. The State has a majority ownership of EDF (85%). The Programmation Pluriannuelle des Investissements (PPI) identifies investment needs in electricity generating capacity for energy security.	The French transmission network is 100% owned and operated by the French transmission system operator, RTE a subsidiary of EDF. The distribution network is majority-owned by ERDF, a subsidiary 100% owned by EDF.	There are different types of contracts at regulated tariff or at market prices. According to law, regulated tariffs cover the full costs. In recent years, the wholesale market price has increased substantially, whereas the tariffs, based on average costs, have remained relatively stable. As a result, certain users are currently enjoying tariffs significantly below the wholesale market price. Changes are expected via the Law on New Organisation of Electricity Markets (see Sec 3.2.10 Policy 3). See Appendix 2 for details of energy tax exemptions for EIIs.	Prices determined by market, 100% pass through assumed with assumption that costs are spread equally across all electricity users on an equal per unit basis.

Country	Generation	Transmission & Distribution	Pricing	Cost pass through
Germany	Four large electricity companies account for 75% of generation in the country. The remainder comes from independent generators, industry self-generators selling back to the grid and industry producing for its own use.	The Big Four own and operate their own transmission systems via legally unbundled companies. They provide non-discriminatory third-party access to their networks to all generators. They also co-ordinate their operations and have formal agreements between one another governing their interactions.	All customers are free to choose their own suppliers with price controls maintained for the smallest consumers. For large industrial consumers, the price is based on wholesale prices and transmission tariffs. Electricity taxes are generally higher than in most other EU countries however significant rebates are available to EIIs (see Sec 3.2.11 Policy 4 for details).	Prices determined by market, 100% pass through assumed with assumption that costs are spread equally across all electricity users on an equal per unit basis. Capped cost pass through for renewable energy.
Italy	The electricity sector, historically dominated by Enel, was unbundled in 2005. Despite government measures to reduce the stature of Enel in the generation market, it remains Italy's largest power generator (with 21% direct government ownership and 10% indirect).	Terna is the primary owner and operator of the transmission grid. Terna is responsible for the transmission and dispatching of energy throughout Italy. It is a public limited company, and 30% of its shares are held by Cassa Depositi e Prestiti, the largely state-owned Italian bank.	The retail electricity market in Italy was fully liberalised in 2007. Electricity prices remain among the highest in the EU. Prices are formed on basis of wholesale prices, bilateral contracts, transmission and distribution tariffs (where relevant) and taxation. See Appendix 2 for details of energy tax exemptions for EIIs.	Prices determined by market, 100% pass through assumed with assumption that costs are spread equally across all electricity users on an equal per unit basis.

Country	Generation	Transmission & Distribution	Pricing	Cost pass through
UK	The largest power producer is EDF Energy, which controls most nuclear capacity and generates one sixth of the total electricity supply. Other important generating companies include E.ON UK, RWE-npower, Centrica, Scottish and Southern Energy and ScottishPower.	The National Grid owns the England and Wales transmission system and holds a licence for operating the Great Britain transmission system. The Scottish transmission system is owned by Scottish Power and Scottish and Southern Energy. Northern Ireland Electricity (NIE) operates the grid in Northern Ireland.	The UK has a privatised electricity sector, where generators and distributors trade electricity on a wholesale market.	Prices determined by market, 100% pass through assumed with assumption that costs are spread equally across all electricity users on an equal per unit basis.

The following table presents summary points related to the gas markets in the key countries.

Table 2-2: Summary details of gas markets

Country	Overall Description	Production	Transmission & Distribution	Pricing
China	The natural gas sector is dominated by three state-owned oil and gas companies: CNPC, Sinopec, and CNOOC.	Natural gas is not a major energy source in China; therefore it is expected to continue importing it in the future. China has potential wealth in unconventional gas resources and although it faces economic and logistical challenges in extracting this, govt support and foreign participation is spurring production.	China has a fragmented natural gas pipeline network though the government is investing in integrating local gas distribution networks and plans to construct 14,400 miles of new pipelines between 2009 and 2015.	Prices regulated based on regional pipeline infrastructure development and industry customer class and have generally remained below market rates. In 2010, the NDRC raised the onshore wellhead prices by 25 percent, and some Chinese cities have raised end-user prices in the industrial and power sectors.
India	The ownership structure is currently a mix of state-owned and privately held companies. The Government has ownership in the dominant gas sector companies and its role in the sector remains significant. The sector is regulated primarily through the Ministry of Petroleum & Natural Gas (MoPNG).	India's natural gas supply comes from domestic production and LNG imports. Natural gas production in 2010-2011 is targeted at about 52.1 BCM with the substantial increase coming from KG basin. The GOI's utilisation policy allocates gas to certain critical sectors.	India's natural gas pipeline network is organised under three companies; these companies have existing systems mainly in western India. The largest of the pipeline transmission companies is GAIL (India) Ltd. GAIL's share of gas in the transmission business is 79% and it holds 70% of the market share in gas marketing.	Prices are regulated by the govt. Wholesale price is regulated at the point of supply: end use prices are the sum of the supply, transportation, distribution costs, and taxes. LNG imports are determined in bilateral negotiations and typically priced with reference to the Japanese Customs-cleared Crude Price. There is also no secondary or resale market for gas.

Country	Overall Description	Production	Transmission & Distribution	Pricing
Japan	The 1995 and 1999 reforms helped open the gas sector to greater competition encouraging the entrance of private companies. Inpex and other companies created from the former Japan National Oil Company are the primary actors in Japan's domestic natural gas sector.	Japan has limited gas reserves and is highly reliant on LNG imports. Inpex, Mitsubishi, Mitsui, and various other Japanese companies are actively involved in domestic as well as overseas natural gas exploration and production.	Japan has a limited domestic natural gas pipeline transmission system. Reasons for this include geographical constraints and previous regulations that limited investment in the sector. Osaka Gas, Tokyo Gas, and Toho Gas are Japan's largest retail natural gas companies, accounting for 75 percent of the retail market.	Natural gas prices are high owing to reliance on LNG imports and costly shipping costs. Prices to households and commercial enterprises are expensive due to complicated transmission and distribution structure. Industrial prices are lower because they can access high pressure transmission pipelines, so they incur only transmission charges. Electric utilities have the lowest gas prices because they receive gas deliveries in their own LNG terminals.

Country	Overall Description	Production	Transmission & Distribution	Pricing
Russia	The gas industry is dominated by Gazprom who produces 84% of Russia's gas and controls all gas exports to Europe. The state owns a major share in the company.	Gazprom dominates Russia's upstream, producing 90 percent of its total natural gas output. It also controls more than 65 percent of proven reserves, and controls additional reserves through joint ventures with other companies. The upstream remains limited to independent producers and other companies, including Russian oil majors.	Gazprom also dominates Russia's natural gas pipeline system. Of the nine major pipelines in Russia, seven are export pipelines. The Yamal-Europe I, Northern Lights, Soyuz, and Bratstvo pipelines carry gas to Eastern and Western European markets. They have a combined capacity of 4 Tcf. Blue Stream, North Caucasus, and Mozdok-Gazi-Magomed pipelines connect Russia's production areas to consumers in Turkey and Former Soviet Union republics in the east.	In 2007, Regulation # 333 stipulated steps towards liberalising the price setting mechanism in Russia. From 2011 the market price formula will be based on equal profitability of gas supplies to domestic and foreign markets. The 2009 crisis led the govt to set a transition period (2011-2013) during which reduction factors would be used in the price setting formula, to limit the price levels. Complete transition to the market price formula is due to take effect in 2014.
Turkey	Gas sector regulated by the Energy Markets Regulatory Authority (EMRA). Sector dominated by state-owned Petroleum Pipeline Corporation (BOTAS), although majority of the market is open to competition.	Turkey imports more than 98% of its gas needs. In 2009, 52% of gas came from Russia, followed by Azerbaijan (15%), Algeria (14%), Iran (16%) and Nigeria (3%)	Transmission grid is owned and operated by BOTAS, the TSO.	Turkey is moving to a fully cost-reflective tariff structure. Since 2008, wholesale prices are freely set between the buyer and the seller. Retail prices remain regulated by EMRA.

Country	Overall Description	Production	Transmission & Distribution	Pricing
US	Deregulation of gas production prices and restructuring of natural gas market have increased market efficiency by ensuring price signals are quickly and transparently transmitted between producers and consumers, and regional markets are more integrated.	Production, transmission and distribution are usually separate entities. Since 2005 productive capacity has been increasing due to rapid development of shale gas resources. This has been driven by a period of higher prices which triggered renewed interest in developing non-conventional gas resources.	Public ownership is only found in gas distribution. They account for 7% of all domestic gas sales. There are 1,400 local gas distribution utilities in all. There are 950 publicly-owned natural gas distribution systems that are regulated by local authorities. Since 1992, a new form of company has emerged which arrange for a "package" of marketing gas supply, sales and transportation services. There are now 250 unregulated independent natural gas marketers, and 900 companies operating pipelines.	No federal excise tax is levied on natural gas sales, even though some states levy excise tax. Wholesale natural gas prices over the last several years have been volatile. Prices have been driven by high crude oil prices, a weak natural gas production response despite record drilling levels, continued strong demand, and vulnerability to major supply disruptions. However, the recent development of shale gas resources is affecting gas production economics through significant new supplies of natural gas at moderate prices.

Country	Overall Description	Production	Transmission & Distribution	Pricing
Denmark	The Natural Gas Supply Act regulates the natural gas industry except the production of natural gas. It ensures that gas supply takes into consideration security of supply, the national economy, the environment and consumer protection. Gas market is characterised by a few large players but is still developing.	Denmark produces more than what it requires domestically. As such, it is a net exporter (mostly to Sweden and Germany).	There are four distribution companies, namely Naturgas Fyn A/S, HNG I/S, Naturgas Midt-Nord I/S and DONG Distribution A/S. Access to their pipelines is open to all third parties at tariffs and terms that are subject to approval by the regulator.	While ex-tax gas prices in Denmark are roughly equal to those found in other EU countries, the final retail price faced by consumers is the highest in the IEA given the high taxes.
France	France has fully implemented the EU directive which expedites legal unbundling of the gas network transmission operator. The co-existence of regulated tariffs and free market prices along with the govt control over access to storage presents challenges.	In 2008, France produced 0.9 bcm of gas. Net imports were 44 bcm. The government forecasts that all domestic production will cease by 2013.	GRTgaz operates, maintains, and develops 87% of the gas transmission grid in France. The GDF Suez Group has the largest gas transport network in Europe and is managed by specialised subsidiaries in France, Belgium, Germany and Austria. Distribution networks are owned by local communities.	Regulated tariffs relate to subscription customers at about 1,500 industrial sites. The tariff structure proposed by the regulator reflects revenue required by the trans-mission operator to cover its operating & investment costs. Industrial users with consumption levels above 4GWh per year are subject to regulated tariffs of sale by subscription.

Country	Overall Description	Production	Transmission & Distribution	Pricing
Germany	German gas industry structure is complex because the system was organised to aggregate demand so that gas could be marketed in Germany, rather than to create an efficient, competitive market.	Germany has good access to natural gas supplies from the North Sea, the Netherlands and Russia as well as from indigenous production. Germany has the third-largest gas reserves in the EU, and currently produces about 18% of demand domestically.	E.ON Ruhrgas and RWE have recently created midstream companies that handle imports and trading and serve their regional distributors. Regional utilities, in turn take gas from the main pipeline systems owned by the three key players at the first level: E.ON Ruhrgas AG (55% by volume), Verbundnetz Gas AG (VNG, 10%) and Wingas GmbH (11%). These supra-regional utilities source the gas under long-term take-or-pay contracts from abroad or from domestic production sites owned largely by ExxonMobil and Shell.	Gas pricing is based on the “market value” principle that the customer should pay no more and no less than the cost of the competing fuel, which is either gas oil or fuel oil. Thus, prices for gas are directly linked to oil. Natural gas prices to industrial consumers are set on a quarterly basis relative to the average of the previous six or nine months of prices for fuel oil and gas oil. Price of natural gas to industrial consumers comprises the cost of supply through either long term contracts or the wholesale price, network use charges and taxation.

Country	Overall Description	Production	Transmission & Distribution	Pricing
Italy	Italy is Europe's third-largest natural gas producer after the UK and Germany.	Natural gas production is dominated by the Eni group, which produces 85% of domestic gas.	The transmission system is owned by Snam Rete Gas, the main transmission operator, a functionally and legally unbundled entity, owned by Eni. Ownership of the distribution networks remains fragmented among approximately 275 active distributors.	Retail gas prices among the highest in Europe. Energy taxes are also relatively high. In 2007, there were 312 suppliers authorised by the Ministry of Economic Development to engage in retail sales of natural gas.
UK	Private companies control the UK natural gas sector, including production, distribution, and transmission. The largest gas distributor in the UK is Centrica.	The UK produced 2.1 Tcf of natural gas in 2009, falling more than 16 percent compared with the previous year. The largest concentration of natural gas is the Shearwater-Elgin area of the Southern Gas Basin. The area contains five gas fields. Most of the leading oil companies in the UK are also the leading natural gas producers, including BP, Shell, and ConocoPhillips.	The gas transportation system throughout Great Britain is operated by the National Grid. The high-pressure network consists of 6,800 miles of pipelines, 25 compressor stations and seven coastal terminals. For the low-pressure gas distribution lines, there are eight gas distribution networks that are owned by four gas distribution companies.	Retail gas prices have risen substantially in recent years. Industrial customers are more directly exposed to the wholesale market so typically see effects of gas price changes quicker than residential customers.

This study has not identified significant impacts on gas prices as a result of climate change policies and hence this study has focussed on impacts on electricity prices as well as direct impacts. It is worth noting, however, that for most of these industries in the UK gas is also an important production cost.

3. Qualitative analysis of energy and climate change policies towards key sectors in each country

3.1 Methodology

3.1.1 Data gathering

The data gathering of information on energy and climate change policies in each country was undertaken in the following stages:

1. First phase. In this initial phase we gathered readily available data from:
   a. General and multi-national sources:
      i. ICF's in-house GHG policy tracking system,
      ii. IEA policy database[24],
      iii. Mure policy database[25]
      iv. Pew Centre on Global Climate Change,
      v. Emission Reduction Policies and Carbon Prices in Key Economies, by Australian Productivity Commission
      vi. Institute of Industrial Productivity[26] and
      vii. Globe International[27].
   b. Country specialists. Our specialists from China, India, Russia, Turkey, US and EU drew on in-house knowledge, access to country-specific information sources and in-country contacts to review and supplement the above information.

2. Review with the Steering Group. The information from the first phase of data gathering was reviewed with the Steering Group to highlight the key gaps and discuss how best to fill them.

3. Second phase. This phase was to fill in key gaps from the first phase and included the following information sources:
   a. Further searches of general and multi-national sources
   b. Further searches by country specialists

[24] http://www.iea.org/textbase/pm/index.html

[25] http://www.isisrome.com/mure/

[26] 'Ten K ey Messages f or E ffective P olicy P ackages, S haring be st pr actices i n i ndustrial en ergy ef ficiency policies', Institute of Industrial Productivity, 2011

[27] National Legislation Studies, available at http://www.globeinternational.info/

c. Steering Group information on data sources, particularly for EU countries

d. Climate change attachés in each country.

3.1.2 Selection of key policies

Inevitably a large number of policies were identified from the data gathering task. A screening process was undertaken to identify the key policies to be taken forward for the qualitative analysis of policies and the quantitative development of metrics.

Key policies to be taken forward were those which individually were estimated to contribute:

- A medium to large proportion of the total energy and climate change policy costs to EIIs; and
- A low proportion of the total energy and climate change policy costs to EIIs, but may be important to the cumulative effect of policies or may be subject to relatively high uncertainty (noting that further information might be obtained during the development of quantitative metrics).

This process was based on judgement of the project team, followed by a review by the Steering Group. However, given the general lack of readily available information on the cost impacts of these policies, the process is clearly subject to uncertainty.

Our starting point for each country was to try to identify five existing policies and three new policies. In practice, the number of key policies varied considerably, depending on the status of policy development in each country - in particular the extent to which overarching framework policies, plans, strategies and goals had been translated into specific policies, targets and implementation plans. Our focus has been on specific rather than framework policies, although where we have identified information on framework policies this is reported in Appendix 1. Information on other policies that were not selected for further analysis is also reported in Appendix 1.

The first table in each of the country sections from Section 3.2.3 onwards indicates all the policies that have been identified during the data gathering task, with an indication given for whether they are considered to be key policies for inclusion in the qualitative analysis and the development of quantitative metrics.

Note that for the EU Member States the EU ETS was not to be covered in the qualitative analysis of policies, but is covered in the development of quantitative metrics.

3.2 Analysis of key policies

3.2.1 Introduction

The following information is presented for each country:

- A table showing all the energy and climate change policies identified from the data gathering task. Each table shows for each policy:
  - Status – whether the policy is already in force now (Existing) or whether the policy is not yet in force (New)
  - Type – whether the policy relates to GHG emissions (GHG), energy efficiency (EE), renewable energy (RE), energy tax, etc; and what type of policy it is, e.g. trading, technology standards, targets, incentives, prices, taxes etc
  - Enforcement – whether the policy is mandatory or voluntary. Policies that are purely voluntary and impose energy or emission targets / standards on industry have tended to be excluded as it is assumed that companies would only opt in if the benefits outweighed the costs. However, policies that offer financial incentives (i.e. which are also voluntary) have tended to be included if the incentive could be significant.
  - Target sectors – which sector(s) the policy applies to. Electricity and gas sectors are relevant for indirect cost impacts.
  - Cost impacts – this is a qualitative estimate of the relative contribution of the individual policy to the total energy and climate change policy costs for EIIs. Where available, information backing up this estimate is given in the analysis of key policies (shown in next sections) and the screened out policies (shown in Appendix 1).
  - Inclusion status – whether the policy has been taken forward for qualitative analysis and development of quantitative metrics. Details of the approach to screening policies are given in the previous section.

- A description of each of the key policies. Each description includes:
  - Policy name
  - Status – as above, plus details of when it was introduced and when it takes effect
  - Sector coverage – as above
    - Aim and key provisions / targets – the main provisions of the policy in terms of targets on GHG emissions, energy efficiency, uptake of renewable energy etc, as well as any key details on how it operates.
    - Exemptions available to EIIs – details of any less stringent requirements or exemptions for EIIs
    - Who pays for the policy – i.e. industry, government etc
    - Extent to which objectives have been met – any available information on the effectiveness in practice of the policy
    - Estimation of cost impacts – see Section 4 for details of the cost estimation methods that have been applied. Costs are presented in 2010 real prices. Negative figures indicate a cost reduction (when looking at the electricity price) or a saving to the sector (when looking at EIIs).
    - Sources of information

3.2.2 Overview of key policies

The **greenhouse gas policies** that have been analysed include:

- the emerging US regulations (GHG Permits / Tailoring Rule requiring Best Available Control Technology (BACT) and New Source Performance Standards (NSPS)),
- the US emissions trading schemes (RGGI and Californian Emission Trading Scheme),
- the pilot Chinese Emissions Trading Schemes, and
- the EU Emissions Trading System (EU ETS)[28].

Those countries of interest to this study that are so far without a mandatory CO2 emission trading scheme are aiming to achieve significant emissions reductions through **energy efficiency policies** including:

- Energy Efficiency Targets, e.g. 10,000 Enterprises Programme, Elimination of Backward Technology and Industrial Energy Performance Standards in China; Sectoral Energy Efficiency Targets in Japan; Federal Target Oriented Programme of the Russia Federation and Turkish Energy and Natural Resources Strategic Plan;
- Energy Efficiency Benchmarks in Japan and
- Trading Energy Saving Certificates (ESCerts) (Indian PAT scheme).

All countries except Russia have **renewable energy** feed-in tariffs or similar policies in place or planned shortly. In Germany and Japan, feed-in tariffs are substantially reduced for EII sectors. A variety of mechanisms are in place to further support achievement of renewable generation targets including supply / purchase requirements and a range of financial incentives to invest in and operate renewables projects.

China, Japan and India are increasing **energy taxes** as one of their tools to support achievement of energy intensity reduction targets as well as, in the case of India, to support investment in clean technology. Furthermore, in China, a set of punitive prices is available to the authorities when considering action against lack of compliance with energy targets. Energy taxes for EIIs in the EU Member States considered in this study are generally low due to significant re-imbursements.

Some wider **energy policies** for the countries of interest are expected to lead to noticeable electricity price impacts including the Amendment of the Atomic Power Action (nuclear phase out) in Germany and the Law on the New Organisation of Electricity Markets (ending regulated tariffs) in France. Part of the increase in prices expected under the latter policy is being mitigated for EII sectors under a special agreement (EXELTIUM project) whereby the selected EII companies provide capital to support the development of new power generation capacity.

A summary of the key policies selected for each country is shown in the following table, broken down by type of policy.

[28] in line with the project specification this is considered for objective 2 but not objective 1

Table 3-1: Selection of key policies

Policies	China	India	Japan	Russia	Turkey	US	Denmark	France	Germany	Italy	UK
GHG - trading[1]	♦					♦[2]	♦	♦	♦	♦	♦[3]
GHG – emission limits						♦[4]					
GHG – technology requirements						♦[5]					
Energy efficiency - trading		♦[6]									
Energy efficiency - standards & targets	♦[7]		♦[8]	♦[9]	♦[10]						
Energy efficiency - technology requirements	♦[11]	♦[12]			♦[13]						
Energy efficiency – end-use								♦[14]		♦[15]	
Energy efficiency - investment tax incentives		♦[16]	♦	♦[17], [18]		♦[19]					
Energy efficiency – other financial incentives					♦[20]				♦[21]	♦[22]	
RE - feed-in tariffs	♦[23]	♦[24]	♦[25]		♦[26]		♦	♦	♦[27]	♦[28]	♦
RE - supply requirements			♦[29]			♦[30]				♦[31]	♦[32]
RE - purchase requirements	♦[33]	♦[34]									
RE - investment tax incentives	♦[35]		♦			♦[36]					
RE – supply tax incentives						♦[37]					
RE – other financial incentives										♦[38]	
Energy taxes	♦[39]	♦[40]	♦[41]	♦	♦	♦	♦[42]	♦	♦[43]	♦	♦[44]
Energy policy								♦[45]	♦[46]	♦[47]	♦[48]

[1] EU ETS is included in the development of the metrics later in this report although is not included in the policy review task in Section 3
[2] State wide emissions trading schemes: Regional Climate Change Initiative (RGGI) and California Emissions Trading Scheme
[3] EU ETS and Carbon Price Floor (CPF)
[4] New Source Performance Standards (NSPS) for Power Plants and Refineries
[5] Best Available Control Technology (BACT) under Tailoring Rule
[6] Perform Achieve Trade (PAT) scheme
[7] 10,000 Enterprises Programme, Industrial Energy Performance Standards
[8] Sectoral energy efficiency benchmarks
[9] Federal Target Oriented Programme of the Russian Federation
[10] National Climate Change Strategy
[11] Efficiency upgrade for coal burning industrial boilers and kilns; Elimination of Backward Technology
[12] IGCC and supercritical power plants
[13] Ministry of Energy and Natural Resources Strategic Plan
[14] White Certificate Trading for End-use Energy Efficiency – requires electricity and gas suppliers to help their customers save energy
[15] White Certificate Trading for End-use Energy Efficiency – requires electricity and gas suppliers to help their customers save energy
[16] Restructuring fertiliser subsidies
[17] Federal law # 261-FZ, Federal Tax Code
[18] Federal Tax Code
[19] Business Energy Investment Tax Credit (ITC)
[20] Support scheme for energy efficiency in industry
[21] CHP support – fixed price paid for electricity from CHP
[22] Industry 2015 – Industrial innovation projects, with co financing from the government for energy efficiency and renewable energy technologies
[23] Solar Feed-in Tariff, Wind Power Concession Programme
[24] RE tariff regulations, Generation based incentives for wind power
[25] RE Feed-in Tariff Law; New Purchase System for Solar Power-Generated Electricity
[26] Law No 6094 Amendment to the Renewable Law No 5346 of 2005
[27] 2009 Amendment of the Renewable Energy Sources Act (EEG)
[28] Finance Act 2008, Law 99 23/7/09; New feed-in premium for photovoltaic systems; Feed-in for s olar thermodynamic energy
[29] Green Power: Renewable Portfolio Standards
[30] State wide Renewable Portfolio Standards (RPS)
[31] Green Certificates System – cap and trade mechanism, requiring Italian energy producers and importers to ensure a certain quota of electricity is from renewable sources
[32] Renewables Obligation (RO)
[33] New energy quota system
[34] Renewable Energy Certificate Trading Scheme
[35]Preferential tax policies for renewable energy
[36] Business Energy Investment Tax Credit (ITC)
[37] Renewable Electricity Production Tax Credit (PTC)
[38] Industry 2015 – Industrial innovation projects, with co financing from the government for energy efficiency and renewable energy technologies
[39] Differential electricity pricing
[40] National Clean Energy Fund – coal, lignite, peat
[41] Energy tax reform on fossil fuels (including coal, oil, LNG, LPG etc)
[42] Green tax package scheme
[43] Eco Tax changes as part of the Energy Concept of the Federal Government 2011
[44] Climate Change Levy (CCL) and discounts associated with Climate Change Agreements (CCAs)
[45] Law on new organisation of electricity markets, EXELTIUM
[46] Amendment of the Atomic Power Act: nuclear phase out
[47] National Energy Strategy 2008, revised 2010 and 2011
[48] Electricity Market Reform (EMR)

3.2.3 China

Table 3-2: Assessment Table - China

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Cost Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
1. 10,000 Enterprises Programme (formerly 1,000 Programme)	Existing / New	EE targets	Mandatory	Y		Y	Y	Y	Y	Y	Y	M	M	M	Y
2. Efficiency Upgrade for Boilers and Kilns	Existing	EE targets	Mandatory	Y		Y	Y	Y	Y	Y		L/M	L/M	L/M	Y
3. Elimination of Backward Technology	Existing	EE techn-ology	Mandatory	Y		Y	Y	Y		Y		L/M	L/M	L/M	Y
4. Differential Electricity Pricing	Existing	Energy tax	Mandatory			Y	Y	Y	Y	Y	Y	L/M	L/M	L/M	Y
5. Pilot Carbon Trading	New	GHG trading	Mandatory	Y	Y	Y	Y	Y	Y	Y	Y	N/A	L	L/M	Y
6. Industrial Energy Performance Standards	Existing	EE targets	Mandatory	Y		Y	Y	Y	Y	Y	Y	L/M	L/M	L/M	Y
7. Renewable Energy Law /Renewable Energy Develop-ment Targets	Existing	RE targets	Mandatory	Y								L/M	L/M	L/M	Y†
8. Solar Feed-in Tariff	Existing	RE pricing	Mandatory	Y								L/M	L/M	L/M	Y†
9. New energy quota system	New	RE targets	Mandatory			Y	Y	Y	Y	Y	Y	L/M	L/M	L/M	Y†
10. Wind Power Concession Programme	Existing	RE pricing	Mandatory	Y								L/M	L/M	L/M	Y†
11. Preferential	Existing	RE	Mandatory	Y								N/A	L/M	L/M	Y†

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Cost Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
Tax Policies for Renewable Energy		incen-tive													
12. Energy Intensity Reduction Target	Existing	EE target	Framework policy	Y	Y	Y	Y		Y	Y	Y	N/A	N/A	N/A	N
13. Expansion of Local Cogeneration (CHP)	Existing	EE target	Mandatory	Y								L	L	L	N
14. Energy Service Companies	Exiting	EE incen-tives	Voluntary	Y								L	L	L	N
15. Carbon Capture and Use Policies	Existing	GHG techn-ology	Voluntary	Y								L	L	L	N
16. Energy and electricity price reform	New	Energy prices	Mandatory	Y								N/A	L	L	N
17. China Corporate Energy Conservation and GHG Manage-ment Programme	Existing	EE & GHG Manage-ment	Voluntary	Y	Y			Y	Y	Y	Y	L	L	L	N
18. Demand Side Management (DSM) Implement-ation Measures	Existing	EE Demand side	Mandatory	Y								L	L	L	N

† Part of RE Targets

Policy 1	**10,000 Enterprise Programme** (formerly 1,000 Enterprise Programme - Reducing Energy Consumption of the 1000 Largest Industrial Enterprises in China)
Status	In Force. 10,000 Enterprise Programme is just starting. An inter-ministerial group of agencies launched the 1,000 Enterprises Programme in 2006. Mandatory
Sector coverage	The Programme requires that energy savings be undertaken by the largest energy intensive enterprises in the iron and steel, nonferrous metals, coal mining, electric power generation, petroleum and petrochemicals, chemical industry, building / construction materials, textiles, and pulp and paper industries. Enterprises with annual energy consumption of >180,000 tce (tonnes of coal equivalent) (5.3PJ) or above were required to participate in the 1,000 Enterprises Programme. In the 12th Five Year Plan (FYP, 2011 to 2015) this scheme has been expanded to 10,000 enterprises, mostly high energy consuming ones in the power, steel, cement and refining sectors. The 10,000 Enterprises Programme will apply to enterprises will annual energy consumption of >10,000 tce.
Aim and key provisions / targets	The target for the 10,000 Enterprises Programme is a reduction in cumulative energy consumption of 250 Mtce (Million tonnes of coal equivalent) by 2015 relative to 2010 (or 750 to 1125 million tonnes of CO2). Each of the enterprises will follow the general requirements that applied to the original 1,000 enterprises. This will require companies to implement energy audits and benchmarking, establish enterprise energy management system, expand energy manager pilots, carry out energy usage reporting mechanisms, accelerate retrofitting and elevate energy management levels. Local administrators should assess enterprise energy saving targets in those 10,000 enterprises every year and publicly disclose results. For those who did not achieve their annual targets, energy audits will be mandated and rectification should be carried out before a certain deadline. State-Owned Key Enterprises should accept the supervision of local energy departments and spearhead energy reduction efforts within its industry. Further details of the policy will be submitted by the government in late 2011. Note that in this study we have not made any assumptions about potentially more stringent targets after the end of the 12th FYP. It is assumed that measures to comply with the targets under the 12th FYP will stay in place.
Exemptions available to EIIs	No

Who pays for the policy	Power sector and industry pay, although the annualised capital costs of investment in energy efficiency techniques are expected to be outweighed by annual savings in fuel costs.
Extent to which objectives met	The 1,000 Enterprise Programme was targeted to achieve 100 Mtce in cumulative energy savings from 2006 - 2010, or approximately 300 - 450 million tons of CO2. Key points from a recent review of the Top 1,000 Programme are: • Reported savings were 20Mtce in 2006 and 38Mtce in 2007. • In Nov 2009 NDRC announced that the Top 1,000 Programme had reached its target energy savings of 100Mtce. • The enterprises invested over 50 billion RMB ($6.6bn) in technology innovation and implemented over 8,000 energy saving projects in 2007. Corresponding investments in 2008 were reported to be 90 billion RMB ($13.5bn). • Overall it is difficult to assess how much of the reported savings are due to the activities and policies associated with the Top 1000 Programme and how much would have occurred in the absence of the programme. • There is no third party review or verification of the reported results at the enterprise, sector, provincial or national level. • The Programme goal represented only 15% of total required energy savings in the 11th FYP, yet the Top 1,000 enterprises represent the highest energy consumption in the economy.
Other key details	Originally the 1,000 Enterprise Programme covered 1,004 companies, which has decreased to 998 since programme implementation started in 2007. These enterprises comprise 33% of overall nation-wide energy consumption, and approximately 47% of industrial energy consumption.

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100%						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.00					
		2015	-0.25					
		2020	-0.23					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0.0	0.0	0.0	0.0	0.0	0.0
		2015	-84	-94	-48	-12	-7	-14
		2020	-102	-102	-44	-14	-8	-15
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0.0	0.0	0.0	0.0	0.0	0.0
		2015	-2577	-157	-2058	-86	-1072	0
		2020	-2577	-157	-2058	-86	-1072	0

Source EPA Final Report Task I and II 01 2010

'Assessment of China's Energy Saving and Emission Reduction Accomplishments and Opportunities During the 11th Five Year Plan', Price et al, Energy Policy, Vol 39, Issue 4, April 2011

12th Five Year emission reduction comprehensive work scenario issued by State Council.

Policy 2	Efficiency Upgrade for Coal-burning Industrial Boilers and Kilns
Status	In Force (announced 2004, effective 2006) Mandatory
Sector coverage	General (boilers & kilns)
Aim and key provisions / targets	China's NDRC announced three measures to reduce the nation's kiln and boiler consumption of coal by 70 million tons: • selection of high-quality coal, lump coal, and sulphur-fixed coal; • renovation of medium-sized and small boilers and kilns with advanced techniques such as circulating fluidised bed (CFB) and pulverised coal firing; • establishment of a scientific management and operation system. Within the 11th Five-Year Plan (FYP) (2006 - 2010), these measures were expected to raise the efficiency coal-burning boilers and kilns by 5 and 2 percentage points, saving 25 million and 10 million tons of coal. In the 12 th FYP (2011-2015) measures include implementing key energy reduction projects such as boiler and furnace retrofitting, motor system energy saving, energy system optimisation, and waste heat and waste pressure utilisation. Further measures include implementing technology commercialisation demonstration as well as energy reduction capacity building. By 2015, the operational efficiency of industrial boilers and furnaces should increase by a further 5 and 2 percentage points respectively (compared to 2010) and that of electric motor systems should increase by 2-3 percentage points.
Exemptions available to EIIs	No
Who pays for the policy	Power sector pays, although the annualised capital costs of investment in energy efficiency techniques are expected to be outweighed by annual savings in fuel costs.
Extent to which objectives met	Some information available for 10,000 Enterprises Programme
Other key details	China now uses 500,000 medium-sized and small boilers, with an average capacity of only 2.5 ton per hour, a designed efficiency of 72 to 80 percent and an actual efficiency around 65 percent. 90 percent of them are coal-burning, consuming 350 to 400 million tons each year, of which 70 million tons can be saved.

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100%						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	-0.11					
		2015	-0.10					
		2020	-0.10					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	-29	-34	-25	-5	-3	-5
		2015	-35	-39	-20	-5	-3	-6
		2020	-47	-47	-20	-6	-4	-7
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	0	0	0	0	0	0
		2020	0	0	0	0	0	0

Source http://www.iea.org/textbase/pm/?mode=cc&id=2516&action=detail
http://www.drcnet.com.cn/DRCNET.Channel.Web/
12th Five Year emission reduction comprehensive work scenario issued by State Council

Policy 3	**Elimination of Backward Technology**
Status	In Force (2007) / Mandatory
Sector coverage	Power/Cement/Steel/Aluminium/Others
Aim and key provisions / targets	Starting in early 2007, the NDRC issued orders to retire small and inefficient plants in various industrial sub-sectors. As in the 11th FYP period, the target in each industry in the 12th FYP will be to eliminate excess production capacity. Iron, steel, nonferrous metals and building materials are especially singled out. The process is set to change, however, with 'red' and 'black-list' factories to be selected on efficiency performance as well as on excess capacity grounds. Against this backdrop, continued consolidation of industrial sectors is expected through aggressive rounds of mergers and acquisitions. Steel, for example, is projected to consolidate towards the ten largest companies controlling 60% of production (currently consolidated at 44%). Generators wishing to construct new coal-fired power plants can only do so once smaller and older facilities are fully decommissioned. China's plan was to close 70GW of outdated thermal power station capacity over the 2006-2010 period. All coal-fired power plants of less than 50MW capacity, and those with capacity between 50 and 100MW that have been in operation for over 20 years were required to close by 2010. Generators with unit coal consumption 10% or more above the provincial average or 15% above the national average are also targeted for closure. In the cement sector, all plants with an annual capacity under 200,000 tonnes were to be closed by the end of 2008, and 250 million tonnes (Mt) of outdated and inefficient capacity to be retired by 2010. In the steel sector, outdated and inefficient pig iron capacity was to be reduced by 100 Mt and steel capacity by 55 Mt, both by 2010. In addition, all blast furnaces below 300 m3 must be closed by 2010. Steel-making furnaces with less than 20 tonnes capacity and blast furnaces below 100m3 were to be closed by 2007. NDRC has established reduction quotas at the provincial and regional levels, for which provincial officials are held responsible through agreements signed with the central government. In total, 2,087 companies in 18 industries are involved in the list of retirement of inefficient plants. The industries cover electricity, iron, steel, coke, calcium carbide, iron alloy, aluminium, cement, plate glass, paper, alcohol, monosodium glutamate, citric acid, copper smelting, lead smelting, zinc smelting, tanning, dyeing, chemical fibre and heavy metal polluting industries.
Exemptions available to	No

EIIs

Who pays for the policy	Industry itself will be impacted financially by plant closures although compensation can be provided to facilitate and accelerate this process. The compensation is from central government and local government. Central government decide the scope of companies, products etc to be covered by this policy and based on the stipulation of central government, local governments decide the amount of the award criteria according to the local actual conditions of specific projects. The detailed compensations are different across the different local governments. There are no actual published figures of the amount of compensation paid under this scheme. Given that demand is growing and this policy reduces supply, a key focus of compensation is to incentivise new investment; combine companies together to achieve better economies of scale; establishment of new product lines etc.
Extent to which objectives met	Compared to the overall programme goal in the 11th FYP of 118Mtce net energy savings in final energy, it appears that the programme had saved an estimated 76% of the total goal in the first three years, which was ahead of schedule. In the power sector alone, until May 2010, 64 GW of thermal power station capacity has been taken offline. The closure of inefficient plants will continue, with 8GW expected to be phased out during 2011.
Estimated cost impacts	There is no readily available data to quantify the cost impacts of this policy. Qualitatively there will be potentially significant cost impacts in the short and medium term from closure of plants and investing in new plants, although this will be balanced in the long term by the benefits of less energy intensive and more competitive industry and greater economies of scale.
Source	http://www.iea.org/textbase/pm/?mode=cc&id=4306&action=detail The Climate Group, commissioned by HSBC. Delivering Low Carbon Growth – A Guide to China's 12th Five Year Plan 'Assessment of China's Energy Saving and Emission Reduction Accomplishments and Opportunities During the 11th Five Year Plan', Price et al, Energy Policy, Vol 39, Issue 4, April 2011

Policy 4	Differential electricity pricing
Status	In Force (2010) Mandatory
Sector coverage	General
Aim and key provisions / targets	Chinese government is encouraging energy efficiency in industries through differential and punitive electricity pricing. *Differential electricity pricing:* From June 2010, the central government increased the gap of differential electricity prices to the main 8 industries: electrolytic aluminium, ferroalloy, calcium carbide, caustic soda, cement, steel, phosphorus and zinc smelting. To restrain the development of high energy consumption enterprises, the standard defined two types of enterprises: Restricted enterprises and Eliminated enterprises. For restricted enterprises, the differential electricity price is +0.1RMB/kWh (in 2010) [This is the assumed price impact of this policy]; and for eliminated enterprises, the differential electricity price is +0.3RMB/kWh (about 30 to 50% over the standard electricity prices to industries). Furthermore, local governments are allowed to increase electricity price on the high energy consuming enterprises further based on this standard. By the end of 2010 the central government announced 22 industries' standard quotas of energy consumption. *Punitive electricity pricing:* It is mentioned in the 12th Five Year Plan, for enterprises whose unit energy (electricity) consumption are over the national or local standard, they will be punished on electricity pricing. For example, in Zhejiang province, the local government selected 239 enterprises from 44 industries as objects of punitive electricity pricing. For enterprises whose electricity consumption are more than double the standard, the punitive electricity price is increased by 0.3RMB/kWh; those whose electricity consumption is over the standard and within double the standard, the punitive electricity price is increase 0.1RMB/kWh. After that, from June 2010, over 2400 energy consumption enterprises were continually punished. It's considered a strong punishment, because for some industries the cost of electricity is about 30% of the whole product cost.
Exemptions available to EIIs	No
Who pays for the policy	Industry

Extent to which objectives met This depends on the degree of implementation. The available information gives evidence of implementation.

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	10.17					
		2015	10.17					
		2020	10.17					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	2555	3028	2229	426	252	473
		2015	3403	3839	1951	507	300	563
		2020	4577	4559	1949	606	359	673
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	0	0	0	0	0	0
		2020	0	0	0	0	0	0

Source The Climate Group. China's Clean Revolution II: Opportunities for a low carbon future.

Central Government documentation on differential electricity pricing

Policy 5	Domestic Carbon Trading Programme
Status	Planned (pilot scheme in 2013, national scheme in 2015) / Mandatory
Sector coverage	General (potentially all target BIS industrial sectors)
Aim and key provisions / targets	China will launch carbon trading between now and 2015 as a way to further help China meet its target to improve energy efficiency by 2020. Two targets for 2015 are set in the 12th FYP to prepare for this – to reduce emissions intensity by 17% and energy-intensity by 16%, against 2010 levels[29]. China is currently assessing the relative benefits of sector-specific and economy-wide carbon trading schemes through an examination of the experience of the EU and other regions as well as through domestic pilot carbon trading projects. China started planning for a series of pilot projects in 2011 in high-emission provinces or energy intensive sectors (such as electric power, chemicals and oil). Five cities and two provinces have been selected to potentially be involved in carbon trading. Those chosen will be expected to establish targets and measures to cut carbon intensity. Pilot trading schemes in the cities of Beijing, Chongqing, Shanghai[30], Tianjin and Shenzhen and the provinces of Hubei and Guangdong[31] will be launched by 2013. The purpose of the pilot schemes is to explore the establishment of related systems, set the rules of the game and improve the system mechanism as much as possible, rather than to expand the scope of participations. The schemes would expand to a national level by 2015. Emission targets for each of the regions have not yet been released to the public. There is no clear indication about the situation by 2020 yet, although some key points are as follows: • Chinese Government's commitment of carbon emissions per unit of GDP in 2020 is decreasing 40% to 45% compared to 2005 levels. That implies China has a huge carbon trading opportunity in the market. • In the 11th Five-Year period, China mainly relied on administrative approaches to complete the task of energy saving. For example, to achieve the target that energy consumption per unit GDP reduced 20% by 2010, 1,000 energy intensive enterprises signed with the central government for the responsibilities like energy conservation. But the cost-effectiveness of such administrative measures is likely to decrease as smaller installations are covered by the expansion of the

[29] The target for the 11th Five Year Plan (2006 to 2010) was 19%, making an overall 32% reduction from 2006 to 2015.

[30] Shanghai has announced that it will measure emissions and energy use from it's large industry in preparation for launching a pilot emissions trading scheme

[31] The province of Guangdong has already developed plans to create a cap and trade scheme between 11 of its cities to meet emission targets.

	1,000 Enterprises Programme and the no and low cost energy efficiency measures are more likely to have been taken up (i.e. the 'low hanging fruit'). As such, achieving emission reduction targets whilst minimising costs becomes more of a challenge and raises the interest in market based measures. • China's carbon emissions trading market is undoubtedly still in the exploratory stage. In 2008, China's first three environmental rights trading institutions were set up in Beijing, Tianjin, Shanghai. In January 2011, the first carbon trading market settled in Shenzhen.
Exemptions available to EIIs	No
Who pays for the policy	Industry
Extent to which objectives met	Policy not yet implemented
Estimated cost impacts	Due to the uncertainty regarding the geographic / sectoral scope, the level of the cap, the type of allocation method(s) it is not possible to estimate the costs of this policy at this stage. The main policies currently focused on achievement of the energy intensity targets are described elsewhere in this section. In practice, emissions trading in China is likely to have a low impact initially and is not expected to contribute to much reduction by 2015 as it will be introduced gradually over a number of years. Depending on the geographical scope of the scheme and the stringency of the emissions caps, the scheme could have a medium cost impact by 2020.
Source:	http://in.reuters.com/article/2010/08/12/idINIndia-50793720100812 http://www.pointcarbon.com/polopoly_fs/1.1561908!CMNA20110722.pdf http://www.eenews.net/climatewire/2011/07/19/7 http://www.pointcarbon.com/news/1.1543598 http://www.pointcarbon.com/news/1.1549370; and http://www.eenews.net/climatewire/2011/09/14/4 The Climate Group, commissioned by HSBC. Delivering Low Carbon Growth – A Guide to China's 12th Five Year Plan

Policy 6	Industrial Energy Performance Standards
Status	In Force (as of 2007) Mandatory
Sector coverage	Energy intensive industries including: cement, crude steel, caustic soda, copper, ferroalloy, coke, calcium carbide, ceramics, zinc, lead, yellow phosphorus, synthetic ammonia, flat glass, magnesium, copper-alloy, nickel, electrolyzed aluminum, tin, antimony, carbon materials, aluminum alloy and electricity from coal-fired power stations.
Aim and key provisions / targets	Industrial energy performance standards implemented by NDRC set maximum levels of energy consumption per tonne of final product, eg x tce per tonne of cement / clinker, etc. These apply to existing plants and newly constructed plants, taking into account different types of raw materials, fuels, and capacities. There are 22 standards in all. Aside from the mandatory standards a set of voluntary, more advanced, “reach standards” have been established. Monitoring and evaluation will have three phases: self-evaluation, local supervision, and national-level spot checking. There is some degree of interaction and reinforcement across the different energy efficiency programmes including the 10,000 Enterprises Programme (Policy 1), Efficiency Upgrade for Boilers and Kilns (Policy 2), Elimination of Backward Technology (Policy 3), Differential Electricity Pricing (Policy 4), etc, which all combine to support the achievement of national and sectoral energy efficiency goals.
Exemptions available to EIIs	No
Who pays for the policy	Industry pays in the short-term but may benefit in the long-term
Extent to which objectives met	Information is not readily available
Estimated cost impacts	The estimated cost impacts of this policy are not readily available. There will clearly be some short and medium term cost impacts although in the long term this policy should lead to reduced costs due to greater energy efficiency and hence improved competitiveness.
Source	http://www.iea.org/textbase/pm/?mode=cc&id=4308&action=detail Price, L., 2010. Information for Development of a Country Factsheet on Industrial Energy Efficiency Policies and Programs in China. Berkeley, CA: Lawrence Berkeley National Laboratory. General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ), and the Standardization Administration of China

(SAC), 2007. The Norm of Energy Consumption Per Unit of Product of Cement, GB 16780-2007. Beijing: Standard Press of China

General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ), and the Standardization Administration of China (SAC), 2007. The norm of energy consumption per unit product of major procedure of crude steel manufacturing process, GB GB 21256-2007. Beijing: Standard Press of China

Policy 7	Renewable Energy Law
Status	In force (effective from 2006, revised 2009) Mandatory (penalties apply)
Sector coverage	Power sector
Aim and key provisions / targets	***Renewable Energy Law*** The Renewable Energy Law is a framework policy which lays out the general conditions for renewable energy to become a more important energy source in the People's Republic of China. It was issued in February 2005, took effect on January 1, 2006, and is an important part of the CNCCP. It covers all modern forms of renewable energy, i.e. wind, solar, water, biomass, geothermal and ocean energy. Renewable energy becomes the preferential area for energy development under this law. Furthermore, research and development and the industrial development of renewable energy is listed as the preferential area for hi-tech industrial development in the national programme. Renewable power generation projects will have to obtain an administrative permit to proceed with project development; should there be more than one application for the same project licence, an open tendering process will be held. Project developers that have obtained an administrative permit will be guaranteed a connection to the power and gas grid. All output can be sold at guaranteed prices to the grid company, where prices will be determined by the price authorities of the State Council. Grid operators will be able to recover extra costs associated with this regime through their own selling prices. Energy authorities of local people's governments shall prepare renewable energy development plans specifically for rural areas with specific financial support. Standards for renewable energy technologies will be set by the standardisation authorities of the State Council. In case of breaches of the law by government entities, or grid, gas pipeline or fuel companies, penalties can be imposed by the relevant superior government authority. ***Renewable Energy Development Targets*** According to the Renewable Energy Law, the State Council is responsible for overall implementation and management for the development and utilisation of renewable energy at the national level. It sets mid- and long-term targets for the total volume of renewable energy development, and, on the basis of this, will prepare national plans for the implementation of these targets. In drawing up these targets and plans, it will cooperate with the regional and local people's governments to reflect regional differences in the final plans. The targets include:

Wind

- to build 30 large-scale wind farms each with more than 100MW by 2010;
- the achieve on-grid wind capacity of 10 GW by 2010;
- to increase on-grid wind turbine capacity to 20 GW by 2015 and 30 GW by 2020 ;

Biomass

- to achieve biomass and waste fueled generation of more than 5.5 GW by 2010;
- to provide for 24 million cubic metres of biogas utilisation by 2020.
- double the 2006 figure of total bioenergy generation by 2010 and increase capacity by up to 14 times by 2020

Solar

- to provide for solar heating to the amount of 30 million square metres by 2020; and
- 300 MW by 2010 and upgrading the 2020 target of 1.8 GW to 20 GW

Overall

- to increase the share of energy from renewable sources in the total primary energy consumption to 10% in 2010 and 15% in 2020 , up from 7.5% in 2005.

Under the 12th FYP the renewable capacity targets have been increased to:

Wind

- 44GW in 2010, 100GW in 2015 and 200GW in 2020
- Solar
- 900MW in 2010, 10GW in 2015 and 50GW in 2020

Exemptions available to EIIs

Information not available

Who pays for the policy

Electricity consumers

Extent to which objectives met

According to officially reported figures, the 2020 overall target for renewable energy has already been achieved – the percentage of installed renewable capacity exceeds 20% of total installed capacity. This is due almost entirely to the prevalence of large hydroelectric power, which the CNCCP states will remain an important measure to promote a less carbon intensive energy mix in China. However, wind capacity is increasing rapidly, with a doubling of installed capacity from 2006-2007, and a tripling from 2007-2008.

Experts predict that the target of 30 GW of cumulative installed wind capacity by 2020 will be achieved by 2012, eight years ahead of schedule. Noticing the rapid growth in the wind power industry, the NDRC is increasing its targets as indicated above. However, it is

noted that by the end of 2009 one third of wind power capacity was not connected to the central electricity network due to the costs of connection. Work is ongoing to improve these connections.

Overall estimated cost impacts of RE policies:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100%						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.11					
		2015	0.27					
		2020	0.48					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	29	34	25	5	3	5
		2015	90	102	52	13	8	15
		2020	214	213	91	28	17	32
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	0	0	0	0	0	0
		2020	0	0	0	0	0	0

Source see page 24 of the following,
http://www.pc.gov.au/__data/assets/pdf_file/0005/109832/04-carbon-prices-chapter2.pdf
www.gov.cn/english/special/115y_index.htm
China Greentech Report
EPA Final Report Task I and II 01 2010

Policy 8	Solar Feed-in Tariff (Specific policy under the Renewable Energy Law)
Status	In-force (as of 2011) / Mandatory
Sector coverage	Power sector
Aim and key provisions / targets	China's nationwide solar feed-in tariff went into effect in August 2011. Solar project developers can now sell solar generated electricity at a price of 15 cents per kilowatt-hour. And in some cases, depending on the timing and location of solar projects, the price is slightly higher (up to 18 cents). Up to now, China lacked efficient financial incentives to nurture its solar energy use. In many cases, analysts say, project developers here could barely break even, let alone get a decent investment return. However, with the newly issued feed-in tariff that guarantees a payback time in a matter of seven years and cash yields for nearly another two decades, developers in China are having a greater desire to harness the sun. China hopes that these subsidies will double its current solar capacity by the end of 2011.
Exemptions available to EIIs	No information available
Who pays for the policy	Electricity consumers
Extent to which objectives met	"Although the feed-in tariff is given nationwide, it is only profitable in western China which is rich in sunlight resources," said Lin Boqiang, an energy expert at Xiamen University. "Most of China's future solar projects will be built there as a result, but that region lacks industries and population big enough to consume power that those projects generate. And so, much of the electricity has to be sent thousands of miles away to the power-hungry eastern China." "Thanks to the feed-in tariff, China's solar market may grow very quickly in the next two or three years," Lin said. "But then it will probably get stuck with grid connection just like the case of wind power."
Estimated cost impacts	See Policy 7
Source	http://www.eenews.net/climatewire/2011/09/14/1 and http://www.google.com/search?q=china+solar+feed+in+tariff&sourceid=ie7&rls=com.microsoft:en-us:IE-SearchBox&ie=&oe=.

Policy 9	**New energy quota system (Specific policy under Renewable Energy Law)**
Status	Planned / Mandatory
Sector coverage	Power sector, EII sectors
Aim and key provisions / targets	A quota system, already included in the Renewable Energy Law, is expected to be fully implemented during the 12th FYP period to meet the new-energy target. The quota will be based on regional development and will require energy intensive industries to acquire a certain percentage of electricity from new-energy sources as well as power companies to meet a percentage of generation capacity from 'new energy'. The details of this system have not yet been published. This is thought to be a particularly important policy under the 12 FYP.
Exemptions available to EIIs	No
Who pays for the policy	Electricity consumers
Extent to which objectives met	Not yet implemented
Estimated cost impacts	See Policy 7
Source	The Climate Group, commissioned by HSBC. Delivering Low Carbon Growth – A Guide to China's 12th Five Year Plan

Policy 10	Wind Power Concession Programme (Specific policy under the Renewable Energy Law)
Status	In Force (2003) / Mandatory, for applicable projects
Sector coverage	Power sector
Aim and key provisions / targets	Domestic and international companies are invited to bid for relatively large-scale potential projects (100-200MW). Successful bidders are selected according to the price per kWh of wind electricity proposed and the share of domestic components utilised in the wind farm. The wind concession lasts for 25 years and the bid price is guaranteed as a feed-in tariff for the first 30,000 full load hours achieved (for a 100 MW project, this amounts to approximately 3 billion kWh). Depending on the site's wind resource, this could cover about 10-15 years. After 30,000 full load hours, the project owner will receive the average local feed-in-tariff on the power market at that time. Two projects have so far been awarded, one in Rudong, Jiangsu, and one in Huilai, Guangdong. These two projects required 50% domestic content in turbines. The former achieved a price of 0.43 RMB, the latter 0.5 RMB per kWh (USD 0.051 and USD 0.06 respectively). In the course of this project, Vestas is planning to open a blade factory in mainland China. In 2004, the Chinese Government has offered three more concession projects of 100-200MW in size, one in each in Jiangsu, Inner Mongolia, and Jilin. These concession projects will require 70% domestic content and together will result in 650 MW of added capacity. The NDRC expects to award a total of 20 such projects by 2010, contributing to the overall aim to reach 20000MW installed capacity in 2020. The official information indicates feed-in tariff levels divided into four tiers ranging from 0.51 to 0.61 RMB/kWh. Areas with the least abundant wind resources receive the highest tariff and areas with the most abundant resources receive the lowest tariff.
Exemptions available to EIIs	No information available
Who pays for the policy	Electricity consumers
Extent to which objectives met	See above. In the implementation of wind power concession projects in the past few years, China's wind power capacity growth has been equivalent to the total size of the construction of wind power in first 20 years.
Other key details	It is estimated that the % of electricity generation that is wind is 1% (2010) and 8% (2020).
Estimated	See Policy 7

cost impacts	
Source	http://www.iea.org/textbase/pm/?mode=cc&id=2248&action=detail www.sdpc.gov.cn "Improve the wind power feed-in tariff policy", National Development and Reform Commission of China, August 2009

Policy 11	**Preferential Tax Policies for Renewable Energy**
Status	In Force (as of 2003, expansion 2007) Mandatory
Sector coverage	Power sector
Aim and key provisions / targets	As of 2003, foreign investment in both biogas and wind energy production also benefits from a reduced income tax rate of 15%, as opposed to 33%. Renewable energy enterprises and bio-energy development projects can also request income tax reduction or exemptions. In addition wind turbines and their main components, as well as photovoltaic modules, benefit from preferential customs duty rates. As of September 2007, the Chinese government was developing a series of preferential tax policies to encourage the development of energy conservation and renewable energy. The new incentives include income tax cuts for the producers and consumers of renewable energy, as well as a reduction of the import tax for "green" equipment.
Exemptions available to EIIs	No information available
Who pays for the policy	Government
Extent to which objectives met	See above
Estimated cost impacts	See Policy 7
Source	http://www.iea.org/textbase/pm/?mode=cc&id=3837&action=detail

3.2.4 India

Table 3-3: Assessment Table - India

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Cost Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
1. Perform, Achieve and Trade (PAT) under NMEEE	New	EE trading	Mandatory	Y		Y	Y	Y	Y	Y		N/A	L	L/M	Y
2. IGCC and super-critical technology for new plants in power sector	New	GHG techn-ology	Mandatory	Y								L	M	M	Y
3. Feed-in-Tariff regulations	Existing	RE prices	Mandatory	Y								L	L/M	L/M	Y[+]
4. REC scheme	Existing	RE targets	Mandatory	Y								L	L/M	L/M	Y[+]
5. National Clean Energy Fund	Existing	Energy tax	Mandatory	Y		Y	Y	Y	Y	Y	Y	L/M	L/M	L/M	Y
6. National Solar Mission	Existing	RE targets	Frame-work	Y								N/A	N/A	N/A	Y[+]
7. National Electricity Policy, National Tariff Policy	Existing	Energy	Frame-work	Y	Y	Y	Y	Y	Y	Y	Y	N/A	N/A	N/A	N
8. Integrated energy policy	Existing	Energy	Frame-work	Y	Y							N/A	N/A	N/A	N
9. Energy Conservation Act 2001	Existing	Energy	Mandatory	Y	Y	Y	Y	Y	Y	Y		L	L	L	N
10. Generation based incentive for wind power	Existing	RE incen-tives	Mandatory	Y								L	L	L	N

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Cost Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
11. Capital subsidy for Biomass and Small Hydro	Existing	RE incen-tives	Voluntary	Y								L	L	L	N
12. Mandatory washing of coal	Existing	Energy	Mandatory	Y		Y	Y	Y	Y	Y		L	L	L	N
13. Natural gas use in fertiliser	New	Energy	Mandatory		Y					Y		L	L	L	N

† Part of RE targets

Policy 1	Perform, Achieve, and Trade (PAT)
Status	In Force 2011 Mandatory
Sector coverage	Power, Steel, Cement, Fertiliser, Aluminium, Chemicals, Textiles, Paper & Pulp
Aim and key provisions / targets	The Perform, Achieve, and Trade (PAT) Scheme, developed by India's Bureau of Energy Efficiency (BEE), sets specific energy consumption targets for EIIs. Eight major sectors of the Indian economy are covered by PAT in its first phase, April 2011 through March 2014 – power, iron and steel, cement, fertiliser, pulp and paper, aluminium, textiles and chlor-alkali. All together, the industrial sectors covered by the PAT scheme account for nearly 60% of India's nationwide energy consumption. The target for the PAT scheme will be stated in the form of the percentage reduction of Specific Energy Consumption (SEC) from the value in the base year to that in the target year. Savings for the first commitment period of 3 years (2011-2014) are targeted at 10 million metric tons of oil equivalent (mMTOE). This corresponds to a 4.3% reduction in energy consumption per sector, with savings targets of 6.9 mMTOE in power sector and 3.1 mMTOE in the industrial sector. The baseline SEC and targets will be determined for the successive cycles depending on the targets achieved in the first cycle. Energy Saving Certificates (ESCerts) would be issued to those exceeding their performance goals and in turn could be sold to those who fail to meet their targets. Trading of credits, ESCerts will not begin until 2014. Note that in this study we have not made any assumptions about potentially more stringent targets after the end of the first commitment period (2011-2014). It is assumed that measures to comply with this policy under the first commitment period will stay in place.
Exemptions available to EIIs	No
Who pays for the policy	Power sector and industry pay, although the annualised capital costs of investment in energy efficiency techniques are expected to be outweighed by annual savings in fuel costs.
Extent to which objectives met	Not yet implemented
Other key details	Other key features of the PAT Scheme are as follows – • Within each sector, a number of individual industrial units (plants or factories) called "Designated Consumers" (DCs) have been issued energy consumption targets;

- There are currently 563 Designated Consumers in the programme;
- Within each sector the individual targets depend on relative efficiency, i.e. if the unit is already more efficient than most, it may be issued a 2-3% reduction target, while if it is highly inefficient, it may be issued a 6-7% reduction target;
- When industrial units achieve and surpass the target, they can sell their excess in the form of Energy Savings Certificates (ESCerts), and if industrial units fail to achieve their targets, they must purchase the appropriate number of ESCerts to "meet" their energy savings;
- The face value of each ESCert is 1 Metric Ton of Oil Equivalent;
- Trading is limited to DCs, and no outside entities like ESCOs or financial institutions can purchase and sell ESCerts;
- ESCerts can be banked for a future year within the compliance period (2011-2013);
- Measuring, monitoring, reporting and verification (MRV) will take place in the last year of the compliance period, i.e. from March 2013 to March 2014, by auditors certified by BEE;
- In case of default and non-compliance, a unit will be fined a penalty of 1 million Rupees (Rs. 10 Lakhs). Penalties are uniform across all sectors, even though compliance costs vary.

Experts estimate that if PAT is successful, it alone could help India meet half of its emissions intensity targets announced at Copenhagen, i.e. a reduction of 20-25% by 2020, based on a 2005 baseline.

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.00					
		2015	-0.15					
		2020	-0.14					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	-13	-5	-3	-1	-1	-3
		2020	-17	-5	-4	-1	-1	-3
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	-208	-9	-141	-6	-169	0
		2020	-208	-9	-141	-6	-169	0

Source Bureau of Energy Efficiency, India

General Overview of PAT: http://www.india.gov.in/allimpfrms/alldocs/15659.pdf.

http://switchboard.nrdc.org/blogs/ajaiswal/perform_achieve_and_trade_a_ne.html

http://switchboard.nrdc.org/blogs/sreddy/ambitious_energy_efficiency_pe.html

http://www.nytimes.com/2011/05/30/business/global/30green.html

Policy 2	IGCC and supercritical technology for new plants in power sector
Status	Planned Mandatory
Sector coverage	Power sector
Aim and key provisions / targets	The Indian government is planning to announce a new national mission under its National Action Plan on Climate Change (NAPCC). The new mission is likely to focus on the power sector and aims to promote new and more efficient technologies like super-critical power plants and integrated gasification combined cycle (IGCC). The ultimate aim of the mission is to reduce the carbon emissions emitted every unit of power generated. India continues to depend heavily on thermal power plants, with coal, gas and oil-based power plants contributing about 70% of the total installed capacity. Coal-based power generation capacity in the country is currently about 95 GW and is expected to rise to 230 GW by 2020 which would require an annual coal supply of about 1 billion tons. In order to meet the rising power demand and meet the target reduce carbon emissions output per unit, the government aims to base new generation capacity on super-critical and IGCC technology. Between 2012 and 2017, 60% of the thermal power capacity added would be based on super-critical technology (instead of conventional coal) while 100% thermal power capacity to be added during the 2018-2023 will be super-critical.
Exemptions available to EIIs	No
Who pays for the policy	Industry and electricity consumers
Extent to which objectives met	Not yet implemented

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100%						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.00					
		2015	0.18					
		2020	0.38					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	16	5	4	1	1	4
		2020	46	13	10	2	3	9
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	0	0	0	0	0	0
		2020	0	0	0	0	0	0

Source http://www.climate-connect.co.uk/Home/?q=node/687

Policy 3	Renewable Energy Tariff regulations
Status	In Force (2009 revised 2010) Mandatory
Sector coverage	Electricity
Aim and key provisions / targets	The CERC issued regulations in September 2009 providing guidelines on how feed-in tariff rates for renewable energy projects are to be calculated, for projects that the Commission would set tariffs for. The regulations cover all renewable energy technologies, and are to be reviewed every three years, though the first review will take place in March 2010, while benchmark capital costs for solar PV and solar thermal projects are to be reviewed every year. The tariff will be determined by taking into account the following fixed-cost components: a) return on equity; b) interest on loan capital; c) depreciation; d) interest on working capital; e) operation and maintenance expenses. The regulations specify the financial principles or assumptions of each component, some of which are technology specific (e.g. capital costs, interest on working capital). They also allow for project-specific tariffs to be determined for certain types of projects (e.g. municipal solid waste, hybrid solar thermal, certain solar PV and solar thermal), with relevant guidelines. The discount rate used in determining the tariff will be the average weighted cost of capital. The tariffs are defined as the levelised cost of energy, and are derived from the specific useful life of each technology. The feed-in tariff period for most renewable energy technologies is 13 years, extended to 35 years in the case of small hydro (below 5MW) and 25 years for solar PV and solar thermal. The regulations specify the capital and operation and maintenance costs per MWh for several technologies: wind, small hydro, solar PV, solar thermal, non-fossil fuel based cogeneration, and biomass-based power projects. Capital costs are adjusted yearly through an indexation mechanism. For wind power, the tariff will also vary based on resource intensity. Four bands of wind power density in watts/m2 give distinct capacity factors to be used in determining the feed-in tariff, as follows: • 200-250 W/m²: 20%. Levelised Total Tariff FY2011-12 of INR 5.33/kWh • 250-300 W/m²: 23%. Levelised Total Tariff FY2011-12 of INR 4.63/kWh • 300-400 W/m²: 27%. Levelised Total Tariff FY2011-12 of INR 3.95/kWh • >400 W/m²: 30%. Levelised Total Tariff FY2011-12 of INR 3.55/kWh In 2009, levelised Total Tariff FY2010-11for Solar power generation

	have been established as follows: • INR 17.91/kWh for solar PV projects whose PPA was signed on or before 31st of March 2011 • INR 15.31/kWh for Solar Thermal projects whose PPA signed on or before 31st of March 2011 In November 2010, the CERC adjusted levelised Total Tariffs allocated to solar power projects as follows: • INR 15.39/kWh for solar PV projects whose PPA was signed after 31st of March 2011 FY 2011-12. • INR 15.04/kWh for solar thermal projects whose PPA was signed after 31st of March 2011 FY 2011-12.
Exemptions available to EIIs	No information available
Who pays for the policy	Electricity consumers
Extent to which objectives met	Information not available

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100%						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.00					
		2015	0.19					
		2020	0.51					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	17	6	4	1	1	4
		2020	62	18	13	3	4	12
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	0	0	0	0	0	0
		2020	0	0	0	0	0	0

Source http://www.iea.org/textbase/pm/?mode=cc&id=4427&action=detail
www.cercind.gov.in/index.html

Policy 4	Renewable Energy Certificate (REC) Trading scheme
Status	In force Mandatory
Sector coverage	Electricity, Industrial
Aim and key provisions / targets	Under the National Action Plan for Climate Change, India has set a target for 15% generation from renewables by 2020. Renewable purchase targets (RPO) will be given to power distribution utilities, open access customers (mainly industries) and captive power customers. So industries will also get covered in this scheme. India has established a renewable energy certificate trading scheme for wind, solar, and biomass power plants.
Exemptions available to EIIs	No
Who pays for the policy	Power sector and electricity consumers
Extent to which objectives met	Information not readily available
Estimated cost impacts	Cost impacts of achieving RE targets assuming the stated feed-in tariffs are presented above (Policy 3)
Source	Central Electricity Regulatory Commission, India http://www.nytimes.com/2011/05/30/business/global/30green.html.

Policy 5	National Clean Energy Fund
Status	In force (2010) Mandatory
Sector coverage	Coal
Aim and key provisions / targets	The Clean Energy Tax will impose a levy of Rs.50 (~USD 1) per tonne of coal, lignite or peat, which are domestically produced or imported. The tax revenue is hypothecated to a National Clean Energy Fund established to fund research and development in clean energy technology and environmental remediation programmes. The NCEF was approved in a 2010 Finance bill, and was more recently approved by the Cabinet Committee on Economic Affairs. However, implementation has not yet started. Coal is not currently being taxed.
Exemptions available to EIIs	No
Who pays for the policy	Coal consumers
Extent to which objectives met	Not yet implemented

Estimated cost impacts

See table below. Indian power producers used 375 million tons of domestic and imported coal, according to the government's economic survey. The new levy could help raise about 25 billion rupees, according to Emergent Ventures. According to Townshend et al (2011) the expected earnings from this tax are expected to be around USD 500m for the financial year 2010-11.

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.26					
		2015	0.26					
		2020	0.26					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	18	6	5	1	1	4
		2015	23	8	6	1	2	5
		2020	31	9	7	1	2	6
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	0	0	0	0	0	0
		2020	0	0	0	0	0	0

Source

http://zeenews.india.com/news/nation/ccea-approves-establishing-national-clean-energy-fund_698128.html.

http://www.bloomberg.com/news/2011-03-03/india-lagging-on-channeling-coal-tax-for-clean-energy-solar-lobby-says.html

http://www.businessweek.com/news/2010-02-26/india-to-start-national-clean-energy-fund-by-taxing-coal-use.html.

Townshend, T, et al, (2011) 'Legislating Climate Change on a National Level', Environment: Science and Policy for Sustainable Development, 53:5, 5-17

Policy 6	National Solar Mission
Status	In force Mandatory
Sector coverage	Electricity
Aim and key provisions / targets	National Solar Mission aims to set up 20,000 MW of solar power by 2022. The mission is divided in 3 phases and interim targets have been set up for each of the phases. There are specific goals for increasing use of solar thermal technologies in urban areas, industry and commercial establishments. The deployment across the application segments is envisaged as follows:

S. No.	Application segment	Target for Phase 1 (2010-13)	Target for Phase 2 (2013-17)	Target for Phase 3 (2017-22)
1.	Solar collectors	7 million sq meters	15 million sq meters	20 million sq meters
2.	Off grid solar applications	200 MW	1000 MW	2000 MW
3.	Utility grid power, including roof top	1,000-2000 MW	4000-10,000 MW	20000 MW

	The mission also sets the objective of establishing a solar research centre, increased international collaboration on technology development, strengthening of domestic manufacturing capacity, and increased government funding and international support. The plan's long-term aim is to make solar competitive with fossil-based energy.
Exemptions available to EIIs	No
Who pays for the policy	Power sector and electricity consumers
Extent to which objectives met	Mission is still at an early stage to assess this
Estimated cost impacts	Cost impacts of achieving RE targets assuming the stated feed-in tariffs are presented above (Policy 3)
Source	Ministry of New and Renewable Energy, India; http://www.iea.org/textbase/pm/?mode=cc&id=4161&action=detail; www.pmindia.nic.in/Pg01-52.pdf http://india.gov.in/allimpfrms/alldocs/15657.pdf

3.2.5 Japan

Table 3-4: Assessment Table - Japan

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Cost Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
1. Sectoral EE targets	Existing	EE targets	Mandatory	Y		Y	Y	Y	Y	Y	Y	L/M	L/M	L/M	Y
2. Financial and Tax Incentives for Industry	Existing	EE incen-tives	Voluntary	Y	Y	Y	Y	Y	Y	Y	Y	L/M	L/M	L/M	Y
3. Renewable Feed-In Tariff	New	RE pricing	Mandatory	Y								N/A	L/M	L/M	Y†
4. Green Power: Renewable Portfolio Standards	Existing	RE target	Mandatory	Y								L/M	L/M	L/M	Y†
5. New 2010 Renewable Energy Targets	Existing	RE targets	Mandatory	Y								L/M	L/M	L/M	Y†
6. Energy Tax Reform on Fossil Fuels	Existing	Energy tax	Mandatory	Y		Y	Y	Y	Y	Y	Y	L/M	L/M	L/M	Y
7. New National Energy Strategy	Existing	Energy	Framework	Y	Y	Y	Y	Y	Y	Y	Y	N/A	N/A	N/A	N
8. GHG Reporting Standards	Existing	GHG report-ing	Mandatory	Y	Y	Y	Y	Y	Y	Y	Y	L	L	L	N
9. Subsidies-Driven Voluntary Emissions Trading Scheme (J VETS)	Existing	GHG trading	Voluntary									N/A	N/A	N/A	N

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Cost Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
10. Keidanren Scheme for Achieving a Low Carbon Society	Existing	GHG trading	Voluntary	Y	Y	Y	Y	Y	Y	Y	Y	L	L	L	N
11. Subsidies for Japanese Firms Promoting Emissions Reductions in Developing Nations	New	GHG incen-tives	Voluntary	Y	Y	Y	Y	Y	Y	Y	Y	L	L	L	N
12. Emission Credit Scheme for Small and Medium Sized Companies	Existing	GHG incen-tives	Voluntary									N/A	N/A	N/A	N

† Part of RE targets

Policy 1	Sectoral Energy Efficiency Targets
Status	In Force (passed 2008, some implementation 2009) Mandatory
Sector coverage	Certain EII sectors
Aim and key provisions / targets	This policy is brought in under the Act on the Rational Use of Energy (Energy Conservation Act), which is the pillar of Japanese energy conservation policies. The Act was enacted in 1979 in the light of the oil shock and covers all sectors as follows: Energy management in manufacturing, commercial and transportation sectors; energy efficiency standards for vehicles and appliances (Top Runner Programme); energy efficiency standards for houses and buildings. In 2008 the act was revised to strengthen measures to enhance energy efficiency, including those for the commercial sector. Also in this revision, sectoral approaches used in domestic regulation were introduced, to be implemented as of April 2009. Each factory and workplace is required to achieve annually on average 1% reduction or more in energy intensity. As an alternative, there are benchmarks for the following energy-intensive sectors – iron and steel, cement, and electricity suppliers (Coverage is expected to be expanded to other sectors in the future). These must be met in the medium and long-term (so 2015 and 2020). Targets have initially been set and are based on the energy efficiency level of the best performing companies (top 10 to 20%) in each sub-sector[32]. Companies covered by the scheme must submit yearly reports on the status of the benchmarking indicator, in addition to the ratio of energy intensity reduction and on the implementation of an energy management system. Based on the companies' reports, the government may take necessary measures when it sees substantial lack of efforts in reference to the targets. The measures include guidance, publication of the company's name, and order (with a fine imposed when the company does not adhere to the order). The indicator's average value and standard deviation for each sub-sector will also be published by the government based on company reports. The names of companies performing well beyond the target will be also published.
Exemptions available to EIIs	No
Who pays for the policy	Power sector and industry pay, although the annualised capital costs of investment in energy efficiency techniques are expected to be outweighed by annual savings in fuel costs.

[32] The actual targets for the three main industrial sectors – I&S, cement, and power (can be found on slides 11, 14, 16), see, http://www.ceps.eu/files/task_force/2009/07/6AkihiroMATSUTA.pdf. Discussion of proposed benchmarks for other industrial sectors can be found at: http://www.ceps.eu/files/task_force/2009/07/6AkihiroMATSUTA.pdf. See also, the general summary description at: http://www.iea.org/textbase/pm/?mode=cc&id=4394&action=detail.

Extent to which objectives met Information not yet available

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.00					
		2015	-0.14					
		2020	-0.27					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	-6	-0.01	-1	-1	-0.06	-1
		2020	-11	-0.02	-2	-3	-0.13	-2
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	-262	-0.03	-48	-13	-14	0.00
		2020	-523	-0.07	-96	-25	-28	0.00

Source http://www.iea.org/textbase/pm/?mode=cc&id=4394&action=detail
www.asiaeec-col.eccj.or.jp/contents02.html
See also foot notes

Policy 2	Financial and tax incentives for industry
Status	In Force (1975, revised 2006) Voluntary
Sector coverage	General all industrial sectors
Aim and key provisions / targets	Various financial and fiscal incentives have been put in place to encourage energy conservation and efficiency in industry since the mid-1970s. A "Special depreciation system to promote equipment facilitating the rational use of energy resources" was established in 1975. This government-affiliated institution provides low-interest loans for financing the introduction of energy conservation and efficiency systems in industry. As a result, investment by companies in these types of systems increased. From the 1990s onwards, direct financial assistance measures were implemented to develop and introduce state-of-the-art energy-efficient and oil alternative equipment. Furthermore, a tax incentive scheme (Tax Scheme for Promoting Investment in the Reform of the Energy Demand-Supply Structure) was provided for businesses investing in specified energy conservation and efficient equipment, providing a special depreciation rate of 30% of the acquisition cost. For small businesses, the special depreciation rate is coupled with a 7% tax deduction off the acquisition cost. A new scheme was established from April 2011. This scheme was established to promote "Green investment" of such equipment as the latest highly efficient and low carbon technologies and renewable energy facilities, etc. Specific details on current loan programmes and other financial incentives for industry in Japan are contained in the Asia Energy Efficiency Conservation Collaboration Centre Handbook (see source below).
Exemptions available to EIIs	n/a
Who pays for the policy	Government pays Industry benefits
Extent to which objectives met	"Assistance projects for businesses' rational use of energy", running since 1998, amounted to 1 165 projects totalling JPY 71.7 billion by the end of FY 2006. It is estimated that these resulted in yearly energy savings of 2.46 million kL (crude oil equivalent).
Estimated cost impacts	Information on the total value of the incentives is not readily available.

Source Pages 21 to 23 of the following document,http://www.asiaeec-col.eccj.or.jp/databook/2010/pdf/handbook10_all.pdf
http://www.asiaeec-col.eccj.or.jp/brochure/pdf/qanda.pdf
http://www.iea.org/textbase/pm/?mode=cc&id=4029&action=detail
www.enecho.meti.go.jp/enekakuosirase.htm

Policy 3	Renewable Feed-In Tariff
Status	Planned (begins July 2012) Mandatory
Sector coverage	Power sector
Aim and key provisions / targets	On August 26, 2011, Japan passed a renewable feed-in tariff law. The law will take effect in July 2012 and advocates a target of 30 GW of renewable energy development in the next 10 years. The feed-in tariffs will cover solar photovoltaic (PV), wind, biomass, geothermal and small hydroelectric generation. The tariffs will utilise cost recovery from utility ratepayers, with a reduction for heavy industrial users. The programme will be reviewed every three years. The law will create a special parliamentary committee to determine details of the programme, including setting specific tariffs." This policy was just passed in August 2011 and many of the details have not been worked out yet. The METI has not determined FIT rates and the period yet. It is expected that for non-photovoltaics the rate will be in the range of 15 to 20 yen/kWh (assumed to be 20 yen) and the purchase period will be in the range of 15-20 years (more likely to be 20 years). For photovoltaics, no information is currently available on feed-in tariffs. For the purposes of this assessment photovoltaic feed-in tariffs are assumed to be the same as non-photovoltaics and renewable energy costs in 2011 are assumed to equate to these tariffs.
Exemptions available to EIIs	A reduction in the surcharge of 80% or more is to be provided to business facilities whose annual electricity usage amount exceeds an amount to be set forth in the Implementing Regulations, upon application by a business operator whose ratio of electricity usage (in kWh) to sales volume (per 1000 yen) (i) exceeds 8 times the average ratio in the manufacturing industry (if a manufacturer) or (ii) exceeds the average ratio in the non-manufacturing industry (if a non-manufacturer) by a factor to be determined in the Implementing Regulations.
Who pays for the policy	Electricity consumers pay
Extent to which objectives met	Not yet started

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.06					
		2015	0.21					
		2020	0.41					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	2	0	0	1	0	0
		2015	8	0.02	1	2	0.10	2
		2020	16	0.03	3	4	0.19	4
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	0	0	0	0	0	0
		2020	0	0	0	0	0	0

Source

http://thinkgeoenergy.com/archives/8474

http://www.meti.go.jp/english/policy/energy_environment/renewable/pdf/summary201109.pdf

http://www.davis.ca/publication/The-Bill-Concerning-the-Introduction-of-System-for-Purchasing-Total-Amount-of-Renewable-Energy-has-Passed-September-2011.pdf

http://www.mofo.com/files/Uploads/Images/110913-Outline-of-Japans-Feed-In-Tariff-Law-for-Renewable-Electric-Energy.pdf

Policy 4	Green Power: Renewable Portfolio Standards (RPS) - 2007
Status	In Force (as of April 2003) Mandatory
Sector coverage	n/a
Aim and key provisions / targets	The RPS (Renewables Portfolio Standard) System is aimed at furthering the use of new energy by annually imposing an obligation on electricity retailers to use a certain amount of electricity from new energy. This amount is established according to retailed electricity quantities, to ensure the stability and suitability of energy supply based on the "Special Measures Law Concerning the Use of New Energy by Electric Utilities". Electricity retailers may choose to meet their obligations from the following options: 1) By generating electricity from renewable sources itself. 2) By purchasing the new energy electricity from another party 3) By purchasing "New Energy Certificates" from another party. Energy included in the Renewable Portfolio Standard include solar generation; wind generation; biomass; medium and small-sized hydro generation (stations up to 1MW capacity); and geothermal generation.
Exemptions available to EIIs	No
Who pays for the policy	Electricity retailers and consumers
Extent to which objectives met	Information not readily available
Estimated cost impacts	It is estimated that the additional costs borne by retail suppliers, calculated using the derived supply amount and the renewable energy credit price, will reach 93 billion yen (U.S.$845 million) in 2010. This raises the retail price by 0.16 yen per kWh (0.1 US cents per kWh), excluding the cost for reinforcement of the power system (Nishio and Asano 2003). In Japan there is a price cap of 11 yen per kWh on the price of renewable credits. Retailers who are not able to purchase credits for that price are exempt from fines.

Source

http://www.iea.org/textbase/pm/?mode=cc&id=3591&action=detail

Nishio, K and H. Asano. 2003. "The Amount of Renewable Energy and Additional Costs under the Renewable Portfolio Standards in Japan". Central Research Institute of Electric Power Industry. CRIEPI report. Y02014 (in Japanese). Summary English version available at: [http://criepi.denken.or.jp/en/e_publication/a2003/03seika4.pdf] (27 August 2004).

Policy 5	New 2010 Renewable Energy Targets
Status	In Force (1996, revised 2008 and 2010) Mandatory
Sector coverage	Power sector
Aim and key provisions / targets	In 1996, the Japanese government set a target of around 3% (or 19.1m kl Oil Equivalent) of new energies in the total primary energy supply by financial year 2010 (excluding hydro electric and geothermal energy). In 2008, this target has been set to be considered as upper case in 2010, and also set a new target of 15.1 m kl oil equivalent is set as a lower case. The 2010 targets for each new energy sources in oil equivalent are as follows (in million kl of oil equivalent); • PV: lower case target of 7.3 and upper case target of 11.8 (from 4.2 in 2006) • Wind: lower case target of 10.1 and upper case target of 13.4 m (from 6.1 in 2006) • Waste+Biomass Power Generation: lower case target of 44.9 and upper case target of 58.6 (from 29.1 in 2006) • Biomass in heat utilisation: lower case target of 28.2 and upper case target of 30.8 (from 15.6 in 2006) • Other renewable heat utilisation: lower case target of 65.5 and upper case target of 76.4 m kl (from 7.1 in 2006)
Exemptions available to EIIs	No
Who pays for the policy	Electricity consumers
Extent to which objectives met	Information not readily available
Estimated cost impacts	Information not readily available – see Policy 3 for cost impacts of renewables feed-in tariff
Source	http://www.iea.org/textbase/pm/?mode=cc&id=4248&action=detail www.meti.go.jp

Policy 6	Energy Tax Reform on Fossil Fuels
Status	In Force (since 2003, recent tax increases announced) Mandatory
Sector coverage	n/a - is a tax on fuels
Aim and key provisions / targets	The Ministry of Economy, Trade and Industry (METI) implemented the revision of the Energy Tax on fossil fuels. This revision is to equalise tax burden and take account of the amount of carbon dioxide emitted in energy use. • Tax on petroleum will remain unchanged; • The tax on LNG and LPG will be increased; • A new tax on coal will be introduced. (Coal used as a raw material in the manufacture of steel and other products would be excluded). The energy tax reform aims to fund measures to combat global warming and to promote alternative energy sources and conservation. In addition, reduction of the Power Resources Development Promotion Tax is also conducted. The Japanese Government has announced that the Petroleum and Coal tax — a pre-existing (revenue) tax on crude oil and petroleum products — will be increased in stages over the next four years based on the 'emissions content' of fossil fuel inputs. Japan currently taxes oil at ¥2,040 a kiloliter, LNG and LPG at ¥1,080 a metric ton, and coal at ¥700 a ton. As part of the 'Special Provision on Taxation for Global Warming Countermeasure' the rates will be gradually increased in the five years ending in March 2016 by 37.25% for oil, 72.2% for LNG and LPG, and 95.7% for coal (by around 790 yen per kiloliter; taxes on liquefied natural gas will increase by about 810 yen per ton; and coal taxes will rise by roughly 700 yen per ton). *Update*: Japan's tax commission introduced an environment tax from October 2011 to help curb greenhouse gas emissions, the Nikkei business daily said, a move seen boosting annual revenue by about 240 billion yen ($2.9 billion) in four years. The panel called for a gradual increase in the tax on fuels to avoid imposing a sharp increase in tax burdens, and expects to raise 40 billion yen in the first year, the Nikkei said without citing sources. Once the levy is fully in place, the environment ministry expects the tax burden for each household to grow by 1,207 yen a year, the Nikkei said.
Exemptions available to EIIs	Coal used as a raw material in the manufacture of steel and other products would be excluded.

Who pays for the policy Energy consumers

Extent to which objectives met Assumed to be in line with implementation of other tax policies

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	3.08					
		2015	3.01					
		2020	2.96					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	120	0.23	19	27	1	23
		2015	119	0.25	21	31	1	27
		2020	117	0.25	24	31	1	27
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	0	0	0	0	0	0
		2020	0	0	0	0	0	0

Source http://www.pc.gov.au/__data/assets/pdf_file/0011/109919/10-carbon-prices-appendixb.pdf and

See, page 19 of the following, http://www.pc.gov.au/__data/assets/pdf_file/0005/109832/04-carbon-prices-chapter2.pdf

http://www.iea.org/textbase/pm/?mode=cc&id=1408&action=detail

Broad environmental tax on fuels, see: http://www.chinadaily.com.cn/world/2010-12/09/content_11675539.htm

http://e.nikkei.com/e/fr/tnks/Nni20101216D16JF825.htm.

3.2.6 Russia

Table 3-5: Assessment Table - Russia

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Cost Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
1. Federal target-oriented Programme of the Russian Federation "Energy saving and increase of energy efficiency for the period till 2020"	Existing	EE targets	Mandatory	Y	Y	Y	Y	Y	Y	Y	Y	L/M	L/M	L/M	Y
2. Federal law # 261-FZ "On energy conservation improvement of energy efficiency and modifications in certain regulations of the Russian Federation"	Existing	EE incen-tives	Voluntary	Y	Y	Y	Y	Y	Y	Y	Y	L/M	L/M	L/M	Y
3. Federal Tax Code	Existing	EE incen-tives	Mandatory	Y	Y	Y	Y	Y	Y	Y	Y	L/M	L/M	L/M	Y
4. Federal law on electric power	Existing	Energy	Mandatory	Y								N/A	N/A	N/A	N

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Cost Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
5. Federal law # 69-FZ "On gas supply in the Russian Federation"	Existing	Energy	Mandatory		Y							N/A	N/A	N/A	N
6. Federal law # 81-FZ "On state regulation of coal production and use, on social protection of coal industry employees"	Existing	Energy	Mandatory	Y								N/A	N/A	N/A	N
7. Overall Climate Change Doctrine	Existing	GHG general	Framework	Y	Y	Y	Y	Y	Y	Y	Y	N/A	N/A	N/A	N
8. The Integrated Plan of Implementation of the Climate Doctrine of the Russian Federation for the period up to 2020	Existing	GHG general	Framework	Y	Y	Y	Y	Y	Y	Y	Y	N/A	N/A	N/A	N
9. Energy Strategy to 2020	Existing	RE targets	Voluntary	Y								L	L	L	N

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Cost Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
10. Information System in sphere of energy saving and increase of energy performance	Existing	EE support-ing system	Mandatory	Y	Y	Y	Y	Y	Y	Y	Y	L	L	L	N

† Coal

Policy 1	Federal target-oriented Programme of the Russian Federation "Energy saving and increase of energy efficiency for the period till 2020"
Status	In force (2010) Mandatory
Sector coverage	General (all sectors)
Aim and key provisions / targets	The main goals of the Programme approved by the Decree #2446-p as of 27.12.2010 are: • Imposing mandatory targets for energy savings compared to business as usual performance • Co-financing of the best regional energy efficiency programmes • Guaranteeing to the enterprises of granting credits for projects in the field of energy efficiency increase (in frames of the long-term target agreements) • Creation of the State information system in field of energy efficiency increase (monitoring), training for responsible personnel (executive authorities, budget and commercial organisations, public), awareness raising • Methodological support of energy efficiency. The Russian Energy Agency (REA) is responsible for management of the Programme. The main macroeconomic indicators of the outcomes of the programme are: • software to reduce energy intensity of gross domestic product due to implementation of the Programme is not less than 7.4 per cent for stage I (2011 - 2015) and by 13.5 percent over the life of the Programme (2011 - 2020); • providing an annual saving of primary energy through the implementation of the Programme in an amount not less than 100 million tons of oil equivalent by the end of Phase I (2016) and 195 million tons of oil equivalent by the end of Phase II (to 2021); • providing a total energy savings amounting to 334 million tons of oil equivalent at stage I (2011 - 2015) and 1124 million tons of fuel over the life of the Programme (2011 - 2020). Target sectors: • electricity industry • industry • others *Industry:* The implementation of technical measures for energy conservation and energy efficiency in the industry will achieve: • annual savings of primary energy of 34.33 million tons of oil equivalent by the end of Phase I (2016), and 50.75 million tons of oil equivalent

by the end of Phase II (to 2021);

- total saving of primary energy of 110.35 million tons of oil equivalent at stage I (2011 - 2015) and 333.25 million tons of fuel over the life of the Programme (2011 - 2020).

It is not clear how this target is split across different industrial sub-sectors. For the purposes of this study we have assumed that 50% of the target applies to the sectors covered by this study.

Electricity sector:

The implementation activities of the sub programme will provide:

- a lower average operating specific fuel consumption of electricity supply from thermal power plants up to 318 g of standard fuel / kWh in 2015 to 300 grams of coal equivalent / kWh in 2020.
- reduction of losses in electric networks of up to 8 - 9 percent in 2020.
- annual savings of primary energy of 25.32 million tons of oil equivalent by the end of Phase I (2016), and 58.05 million tons of oil equivalent by the end of Phase II (to 2021) and total primary energy savings in the amount of 82.45 million tons of oil equivalent at stage I (2011 - 2015) and 312.81 million tons of fuel over the life of the Programme (2011 - 2020).

Exemptions available to EIIs	No
Who pays for the policy	Power sector and industry pay, although the annualised capital costs of investment in energy efficiency techniques are expected to be outweighed by annual savings in fuel costs.
Extent to which objectives met	Programme is just being implemented

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.00					
		2015	-0.25					
		2020	-0.50					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	-16	-19	-2	-1	-2	-2
		2020	-36	-38	-4	-1	-3	-3
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	-960	-88	-221	-10	-625	0
		2020	-1440	-132	-332	-15	-938	0
Source	**Source:** http://minenergo.gov.ru/activity/energoeffektivnost/problem/							

Policy 2	**Federal law # 261-FZ "On energy conservation, improvement of energy efficiency and modifications in certain regulations of the Russian Federation"**
Status	In force / Voluntary
Sector coverage	All
Aim and key provisions / targets	Federal law # 261-FZ "On energy conservation, improvement of energy efficiency and modifications in certain regulations of the Russian Federation," contains a range of energy efficiency policies. Specifically related to energy efficiency are various economic instruments to encourage investment in energy efficiency. These include: • An investment tax credit • Accelerated amortisation (depreciation) • Provision of state guarantees to ensure loans for energy efficiency projects. Other measures include: • Information on energy efficiency classification has to be provided for all goods produced within Russia and imported (electrical appliances and computers). • Buildings and constructions must comply with energy efficiency requirements specified by an authorised executive body in accordance with the federal regulation. • By January 1 2011, buildings and constructions that use energy resources were supposed to be equipped with water, natural gas, heat and electricity meters. • Performance measures applied to the evaluation of executive bodies of the Russian Federation shall include energy conservation and energy efficiency measures. • Starting January 1 2010, budget and autonomous organisations that provide services to the state/municipal governments were to receive allotments based on the amount of consumed (in 2009) energy resources (by type) reduced by 15% within a 5-year period with a 3% annual reduction of such amount. • Organisations transmitting energy resources can include expenses on reducing losses of energy resources during transmission in their planned gross revenue accounted for in regulated prices (tariffs) for the transmission of energy resources (within a 5-year period). • Organisations involved in regulated activities (when prices (tariffs) are regulated) can withhold the savings produced by energy saving measures.
Exemptions available to EIIs	No

Who pays for the policy	Government pays for the economic instruments
Extent to which objectives met	Information not readily available
Estimated cost impacts	Details are not available on the total amount of financial support available under this policy. However, detailed information is available at a project specific level.
Source	In-house knowledge

Policy 3	Federal Tax Code
Status	In force / Mandatory
Sector coverage	All
Aim and key provisions / targets	Investment tax credits can be allocated to organisations that carry out R&D or modernise their production in order to increase environmental protection and/or improve energy efficiency of their production. An investment tax credit (for the period from 1 year to 5 years) for income tax, regional and municipal taxes is given on the loan amount, representing 100% of the equipment. The organisation which received an investment tax credit, may reduce its payments on the relevant income tax during the term of the agreement on the investment tax credit, but not exceeding 50% the size of the tax payments as defined by the general rules without regard to the availability of contracts for the investment tax credit.Interest on the loan amount = ½ - ¾ of the refinancing rate of the Russian Federation.
Exemptions available to EIIs	No
Who pays for the policy	Government pays
Extent to which objectives met	Information not readily available
Estimated cost impacts	Detailed information is available on the tax credit but information is not available on the total amount of funding available to support this programme.
Source	In-house staff knowledge

Policy 4	Federal law on electric power
Status	Existing / Mandatory
Sector coverage	Power
Aim and key provisions / targets	State regulation of prices (tariffs). On the wholesale market, the mark-up on the equilibrium wholesale price is regulated by the state if the energy is generated on the equipment that uses renewable energy sources and it depends on target values set within the government policy for improving energy efficiency. Government investment policy: • Aimed at promoting energy conservation, attracting private

	investments and strengthening state control over investment efficiency in case of natural monopolies. • Creating economic stimuli for introducing new efficient technologies, including small-scale and non-conventional power generation. Note that there is no feed-in tariff system available for renewable energy.
Exemptions available to EIIs	No
Who pays for the policy	Not applicable
Extent to which objectives met	Information not readily available
Estimated cost impacts	Information not readily available.
Source	http://minenergo.gov.ru/activity/energoeffektivnost/problem/

3.2.7 Turkey

Table 3-6: Assessment Table - Turkey

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Cost Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
1. The Republic of Turkey Ministry of Energy and Natural Resources Strategic Plan (2010-2014)	Existing	EE & RE targets	Mandatory	Y								L/M	L/M	L/M	Y
2. National Climate Change Strategy (2010-2020)	Existing	GHG & RE targets	Mandatory	Y	Y	Y	Y	Y	Y	Y	Y	L/M	L/M	L/M	Y
3. Support Scheme for Energy Efficiency in Industry	Existing	EE incen-tives	Voluntary			Y	Y	Y	Y	Y	Y	L/M	L/M	L/M	Y
4. Electricity Energy Market and Supply Security Strategy Paper	Existing	RE targets	Mandatory	Y								L/M	L/M	L/M	Y
5. Law No. 6094 Amendment to the Renewable Law No. 5346 of 2005	Existing	RE prices	Mandatory	Y								L/M	L/M	L/M	Y
6. Draft Energy Efficiency Strategy Document	New	GHG & EE	Framework	Y	Y	Y	Y	Y	Y	Y	Y	N/A	N/A	N/A	N
7. Energy Efficiency Law – No 5627	Existing	EE	Framework	Y		Y	Y	Y	Y	Y	Y	N/A	N/A	N/A	N

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Cost Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
8. Monitoring Energy Efficiency in Sectors	Existing	EE monitoring	Mandatory			Y	Y	Y	Y	Y	Y	L	L	L	N
9. Regulation Regarding Power Generation (including micro cogeneration) without Requiring Licensing	Existing	Energy	Voluntary	Y								N/A	N/A	N/A	N

Policy 1	**The Republic of Turkey Ministry of Energy and Natural Resources Strategic Plan (2010-2014)**
Status	In force (May 2010) / Mandatory
Sector coverage	Electricity, Environment, Natural Resources, Renewables
Aim and key provisions / targets	The Ministry of Energy and Natural Resources, within the perspective of the energy and natural resources policy of our country, prepared its Strategic Plan covering the period between 2010 and 2014. Relevant theme and aims are detailed below. **Strategic Theme 1: Energy Supply Security** **AIM -2** ***Increasing the share of the renewable energy resources within the energy supply*** ***Target 2.1*** The hydroelectricity plans of 5,000 MW capacity, the construction of which has started, will be completed by 2013. ***Target 2.2*** The wind plant installed capacity, which has been 802.8 MW as of 2009 will be increased up to 10,000 MW by the year 2015. ***Target 2.3*** The installed capacity for the geothermal plant, which has been 77.2 MW as of 2009, will be increased up to 300 MW until 2015. **AIM -3** ***Increasing Energy Efficiency*** Without affecting the social and economic development targets, the precautions to reduce energy consumption will be applied and studies will be conducted for increasing energy efficiency in the electricity energy production facilities and the transmission and distribution networks, and spreading high efficiency cogeneration applications. Within the scope of the conducted and planned studies, the primary energy density is planned to be reduced by 2023 at the rate of 20 percent compared to the amount in 2008. ***Target 3.1*** Within framework of the energy efficiency studies in process, 10 percent of reduction in comparison to the year 2008 will be secured by the year 2015. ***Performance Indicator:*** • Rate of decrease in energy density ***Target 3.2*** The completion of the maintenance, rehabilitation and modernisation studies conducted for increasing the efficiency and production capacity through the use of new technologies in the existing state owned electricity production plants by the end of 2014 will be secured. ***Performance Indicator:*** • State Owned Electricity Production Plant, the maintenance,

rehabilitation and modernisation of which have been planned.

Strategic Theme 3: Environment

AIM -7

Minimising the negative environmental impacts of the activities in the energy and natural resources area

Target 7.1 After the year 2014, reduction will be achieved in the rise of greenhouse gas emission arising from the energy sector operations.

Performance Indicator:

- The change in the rising speed of the total greenhouse gas emissions due to operations of energy (%)

Exemptions available to EIIs	No
Who pays for the policy	Unclear if such details have been established yet
Extent to which objectives met	Not yet implemented

Estimated cost impacts – Power Sector EE targets:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	-0.20					
		2015	-0.38					
		2020	-0.35					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	-7	-0.14	-1.47	-0.08	-0.01	-0.18
		2015	-14	-0.29	-2.86	-0.16	-0.02	-0.37
		2020	-14	-0.32	-3.09	-0.16	-0.02	-0.38
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	0	0	0	0	0	0
		2020	0	0	0	0	0	0

Source www.enerji.gov.tr

Policy 2	National Climate Change Strategy (2010-2020)
Status	In force (May 2010) Mandatory
Sector coverage	Energy and industry sectors
Aim and key provisions / targets	Turkey has developed the National Climate Change Strategy in order to contribute to global efforts to reduce the impacts of climate change, taking into account its own special circumstances and capacity. The Strategy includes a set of objectives to be implemented in the short-term (within one year), the mid-term (undertaken or completed within 1 to 3 years), and long-term (undertaken over a 10 year period). The Strategy will guide the actions to tackle climate change during the period 2010-2020 and will be updated as necessary, in light of emerging national or international developments. Key goals relevant to this study include: **Energy:** **Short Term** • All domestic resources, primarily hydro and wind, will be used at maximum levels, using cleaner production technologies and best available techniques, in line with energy security and climate change goals and within the framework of internal and external financing opportunities. **Medium Term** • Use of low and zero greenhouse gas emission technologies, primarily renewable energy and clean coal technologies, as well as nuclear energy, shall be fostered; R&D activities on clean technologies and energy resources shall be carried out and domestic industries shall be supported in these ventures. • Use of new and alternative fuels in increasing levels shall be supported together with market incentives and penetration strategies for this purpose. • Rehabilitation of existing thermal power plants shall be finalised; and more efficient operation of hydroelectric power plants shall be pursued. **Long Term** • By 2020, energy intensity shall be decreased with reference to 2004 levels. • The share of renewable energy in total electricity generation shall be increased up to 30% by 2023. In this framework, our technical and economic hydro potential will be fully utilised, wind electricity generation capacity will be raised to 20,000 MW and geothermal electricity generation capacity will be raised to 600 MW, Electricity generation from solar energy will be supported. • Greenhouse gas emissions from electricity generation are

envisaged to be 7% less than what they would have been in the Reference Scenario by 2020

Industry:

Short Term (1 Year)

- Intensive climate change awareness raising activities will be carried out for the industrialists and consumers and handbooks/guidelines will be published.
- The process of hiring energy managers in all industrial facilities with annual energy consumption of more than 1,000 TEP shall be finalised and efficient operation of this system shall be ensured.

Medium Term (1-3 Years)

- Voluntary agreements that encourage the implementation of management instruments enabling the monitoring of greenhouse gas emissions, without any capital investment or operating cost, such as energy management systems, greenhouse gas inventory reporting systems and benchmarking systems, as well as incentive mechanisms like climate pioneers programme" will be developed in industry,
- All industrial facilities with annual energy consumption of more than 5,000 TEP will conduct annual energy studies.
- Heat recovery options in industry, engine speed control systems, and industrial cogeneration systems shall be stimulated and encouraged.
- Replacement of resources used in industry with cleaner production resources and use of alternative materials will be encouraged.
- Importance will be attached to research and development activities and technology transfer, and industrialists shall be encouraged in this direction.

Long Term (3-10 Years)

- Incentive mechanisms will be introduced to promote cleaner production, climate-friendly and innovative technologies; and effective operation of inspection and enforcement mechanisms will be ensured.
- As climate change is among the most important environmental and economic problems affecting the international competitiveness of national industry in the existing international conjuncture, various other measures and policies will be implemented, as appropriate, within the context of the Industry Strategy Paper of Turkey (2010-2013) and the Science and Technology Policies, in close cooperation with the industrial sector.
- The determined saving potential shall be realised at maximum levels by the year 2020, through energy efficiency practices in the industry sector.

Exemptions No

available to EIIs	
Who pays for the policy	Specific details not available
Extent to which objectives met	Not yet implemented
Estimated cost impacts	See Policy 5 for cost of renewable energy
Source	www.iklim.cob.gov.tr

Policy 3	Support Scheme for Energy Efficiency in Industry
Status	In Force (2008) Voluntary
Sector coverage	EIIs
Aim and key provisions / targets	In October 2008, By-Laws on Improving Energy Efficiency for the Utilisation of Energy Resources and Energy implementing the provisions of the 2007 Energy Efficiency Law were adopted to support energy efficiency projects and voluntary agreements in industrial establishments. The General Directorate of Electric Power Resources, Survey and Development Administration (EIE) provides investment support for energy efficiency projects with a maximum payback period of five years. The investment support covers 20% of project costs up to a maximum of TRY 500,000. For industrial establishments that have undertaken a voluntary agreement to reduce their energy intensity by 10% on average over a period of 3 years, the EIE will reimburse up to 20% of their energy costs (to a maximum of TRY 100,000) for the 1st year. By the end of 2010, 32 energy efficiency projects had been supported and implementation of 13 projects had been completed. In addition, 22 Voluntary Agreements had been made with industrial establishments aimed at reducing their energy intensity by an average of at least 10% for three years. In order to support SMEs, the Administration for Supporting and Developing Small and Medium Sized Enterprises (KOSGEB) subsidises up to 70% of the costs of energy efficiency training, study and consulting services procured by SMEs. The principles and procedures applicable to this practice have been set out in a regulation dated 18 October 2008, prepared and enforced by the Ministry of Industry and Trade.
Exemptions available to EIIs	No
Who pays for the policy	Government
Extent to which objectives met	Information not readily available
Estimated cost impacts	Information not available on the total amount of financial support being made available. Details are given on the project specific aspects of financial support.
Source	http://www.iea.org/textbase/pm/?mode=cc&action=detail&id=4226

Policy 4	The Electricity Energy Market and Supply Security Strategy Paper
Status	In force (May 2009) Mandatory
Sector coverage	Electricity, Natural Resources, Renewables
Aim and key provisions / targets	The Electricity Energy Market and Supply Security Strategy Paper outlines Turkey's long-term targets in the electricity energy sector. It was enforced with the resolution of the Higher Board of Planning in May 2009. The paper set the following goals: • Creation and maintenance of market structure and market activities in a way to ensure supply security • While moving towards the target of creating a sustainable electricity energy market, taking into consideration climate change and environmental impacts in activities in all areas of the industry • Minimising losses during production, transmission, distribution and utilisation of electricity energy; increasing efficiency; reducing electricity energy costs by building a competitive environmentally friendly resource based priorities of energy policy; and using such gains to offer more reasonably priced electricity service to consumers • Encouraging new technologies, ensuring diversity of resources, and maximising use of domestic and renewable resources in order to reduce foreign dependency for energy supply • Increasing the share of domestic contribution in investments to be made in the sector. • The primary target is to ensure that the share of renewable resources in electricity generation is increased up to at least 30% by 2023 (subject to revision based on potential developments in technology, market, and resource potential). • HYDROELECTRIC: ensure by 2023, that all technically and economically available hydroelectric potential is utilised in electricity generation. o Complete 5,000 MW currently under construction or development by 2015 • WIND: increase installed wind energy power to 20,000 MW by the year 2023. o 10,000 MW by 2015 • GEOTHERMAL: ensure that the geothermal potential of 600 MW, which is presently established as suitable for electricity energy production, is commissioned by 2023. o 300 MW by 2015 • SOLAR: to generalise the use of solar energy for generating electricity, ensuring maximum utilisation of the country's potential. Technological advances will be closely followed and implemented for the use of solar energy for electricity generation.

	• OTHER RENEWABLE RESOURCES: Preparation of production plans will take into account possible changes in utilisation potentials of other renewable energy resources based on technological and legislative developments. In case of increases in utilisation of such resources, share of fossil fuels, and particularly of imported resources, will be reduced accordingly.
Exemptions available to EIIs	No
Who pays for the policy	Details not available
Extent to which objectives met	This is a framework strategy document, without specific implementation measures.
Estimated cost impacts	See Policy 5 for cost of renewable energy
Source	www.enerji.gov.tr

Policy 5	Law No. 6094 Amendment to the Renewable Law No. 5346 of 2005
Status	In force (2010) Mandatory
Sector coverage	Electricity, Renewables
Aim and key provisions / targets	On December 29, 2010, Turkey's Parliament approved Law No. 6094 amending the already existing renewable energy law (Law No. 5346). The Law aims to • Expand the utilisation of renewable energy resources for generating electrical energy • Benefit from these resources in a secure, economic and qualified manner • Increase the diversification of energy resources • Reduce greenhouse gas emissions • Assess waste products • Protect the environment, and • Develop the manufacturing capabilities related to achieving these objectives The Law included the following renewable energy resources: wind, solar, geothermal, biomass, biogas, wave, current and tidal energy resources **Purchase guarantee:** Legal entities holding retail sales licenses are required to purchase certified renewable energy from renewable plants that come online between 18/5/2005 and 31/12/2015 to satisfy a portion of their energy sales from renewables. The amount required to be purchased from renewables is determined based on the ratio between the retail licensee's total sales in the previous calendar year and the total amount of electricity sold in Turkey in that year by all retailers. The new law determines the long-term prices (feed-in tariffs) for electricity purchases and guarantees a price of • 7.3 U.S. cents per kWh for wind and hydro • 10.5 U.S. cents for geothermal • 13.3 U.S cents for energy from waste products • 13.3 U.S cents for energy from solar energy. These prices are valid for plants that become operational between 13 May 2005, and 31 December 2015. After 31 December 2015, new prices will be defined by the government. It is noted that the FiT prices for wind and hydro are below the modelled average electricity price for Turkey. For the purposes of this study it is assumed that the price of renewable electricity will be at least as high as the average electricity price. One of the key characteristics of the new law is that there are incentives provided for using domestic/local equipment/technology in renewable

generation.

Additional Price Incentives for Use of Domestic Components: The new law provides additional incentives for domestic or local equipment and technology used in renewable generation.

- Energy facilities will generate an additional support of 0.4 cents to 2.4 cents per kWh for a five-year term to companies that started producing energy before the end of 2015.
- Incentives regarding licensing fees, land use, etc. established with Law No. 5346 will continue to be offered.
- The law states that any generator becoming operational before 31 December 2015 that uses mechanical or electromechanical parts manufactured in Turkey will receive the incentives described in the table below in addition to the feed-in tariff for five years.

Type	Additional Tariff Up to (cents/kWh)
Hydro	2.3
Wind	3.7
Geothermal	2.7
Biomass (including landfill)	5.6
Solar	5.7 – 9.2

Licensing Incentives: Renewable generators pay only 1% of the total licensing fee. They are exempt from annual license fees for the first eight years following the facility completion date.

Land Use Incentives: Renewable generators that are on public land benefit from 85% discount on applicable fees such as rent for the first 10 years.

Transmission Interconnection: Renewable generators are given priority for system connection.

Exemptions available to EIIs

Information is not available on exemptions available to EIIs

Who pays for the policy

Assumed that electricity consumers would pay the feed-in tariffs, whilst the Government support the incentive aspects. However, on the basis of the information available to this study, FiT prices for wind and hydro are below the estimated average electricity price for Turkey. For the purposes of this study it is assumed that the price of renewable electricity will be at least as high as the average electricity price. Therefore the cost of this policy to EII sectors is assumed to be zero, rather than negative.

Extent to which objectives met

Only at very early stages of implementation

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.00					
		2015	0.00					
		2020	0.00					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0.00	0.00	0.00	0.00	0.00	0.00
		2015	0.00	0.00	0.00	0.00	0.00	0.00
		2020	0.00	0.00	0.00	0.00	0.00	0.00
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0.00	0.00	0.00	0.00	0.00	0.00
		2015	0.00	0.00	0.00	0.00	0.00	0.00
		2020	0.00	0.00	0.00	0.00	0.00	0.00

Source http://www.resmigazete.gov.tr/main.aspx?home=http://www.resmigazete.gov.tr/eskiler/2011/01/20110108-3.htm/20110108.htm&main=http://www.resmigazete.gov.tr/eskiler/2011/01/20110108-3.htm

3.2.8 US

Table 3-7: Assessment Table - US

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Costs Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
1. Regional Climate Change Initiative (RGGI)	Existing	GHG trading	Mandatory	Y								L	L/M?	L/M?	Y
2. California Climate Solutions Act of 2006 (AB 32) / Emissions Trading Scheme	Existing / New	GHG trading	Mandatory	Y	Y	Y	Y	Y	Y	Y	Y	N/A	L/M	M	Y
3. New Source Performance Standards (NSPS)	Existing	GHG Stds.	Mandatory	Y								N/A	L/M	L/M	Y
4. BACT under Tailoring Rule	Existing	GHG Tech.	Mandatory	Y	Y	Y	Y	Y	Y	Y	Y	L	L/M	L/M	Y
5. Business Energy Investment Tax Credit (ITC)	Existing	EE & RE incen-tive	Voluntary	Y								L	L	L	Y
6. Electricity Production Tax Credit (PTC)	Existing	RE Incent-ive	Voluntary	Y								L	L	L	Y
7. US Renewable Portfolio Standards (RPS)	Existing	RE targets	Mandatory	Y								L/M	L/M	L/M	Y

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Costs Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
8. Modified Accelerated Cost-Recovery System (MACRS) + Bonus Depreciation (2008-2012)	Existing	Tax Incent-ive	Voluntary	Y								L	N/A	N/A	N
9. EPA's Mandatory Reporting of Greenhouse Gas Rule	Existing	GHG report-ing	Mandatory	Y	Y	Y	Y	Y	Y	Y	Y	L	L	L	N
10. Western Climate Initiative (WCI)	Existing	GHG trading	Framework	Y	Y	Y	Y	Y	Y	Y	Y	?	?	?	N
11. GHG Reduction Goal	Existing	GHG targets	Voluntary	Y	Y	Y	Y	Y	Y	Y	Y	L	L	L	N
12. Other US Industrial Sector Programmes e.g. Save Energy Now, Superior Energy Performance, Industries of the Future	Existing	EE incent-ives	Voluntary	Y	Y	Y	Y	Y	Y	Y	Y	L	L	L	N

Policy 1	Regional Climate Change Initiative (RGGI)
Status	In force Mandatory (for RGGI), other regional programmes are in the planning phases
Sector coverage	Depends on the programme (RGGI applies only to electric power sector)
Aim and key provisions / targets	Emissions cap-and-trade programme involving Delaware, Connecticut, Maine, New Hampshire, New York, Vermont, Massachusetts, Rhode Island, Maryland, and until the end of 2011, New Jersey. The programme targets emissions from fossil fuel power plants with a capacity of 25MW or higher. There is discussion of making changes to the RGGI system to account for the natural gas boom that has allowed the carbon reduction goals to be met well ahead of time. It has led to an increase of carbon allowances on the RGGI market so that every allowance is at the floor price and 50% of allowances at the most recent auction were not bought. The New Hampshire Senate voted to keep NH in RGGI but with some amendments. The amendments allow the state to withdraw from the programme if another participating state representing at least ten percent of the programme's total electric load withdraws and change fund allocation. Funds obtained through allowance auctions will now go directly to participating utilities for use in their own energy efficiency programmes, rather than continue the existing process whereby auction funds are distributed by the state through clean energy grants. Additionally, votes in state Congresses in Maine and Delaware to pull their respective states from RGGI failed[33]. At present the cost impact of RGGI is low (carbon prices are expected to average around $3/ton over the next several years), but this may change in the future depending on whether coverage is expanded in future years to other sectors besides the power sector and whether the targets are made more stringent. Note that in this study the costs of RGGI per MWh, tonne production and GVA have been expressed in relation to US rather than RGGI state totals, so these impacts represent average country level impacts[34]. This is to be consistent with the way other policies in this study have been expressed.
Exemptions available to EIIs	No
Who pays for the policy	Power generators and electricity consumers

[33] Source: http://www.vnf.com/news-alerts-592.html

[34] The estimates for the impacts on the specific states were multiplied by the share of the states market (e.g., electricity generation in the states) over the total U.S. market (e.g., electricity generation in the U.S.) to estimate the impact over the entire U.S.

Extent to which objectives met	The lack of demand for allowances means that no efforts are being made to further reduce carbon emissions through the programme. Officials will likely announce that the total emissions cap will be reduced faster than planned in order to appropriately match the market[35]. New Jersey's governor Chris Christie (Republican) will remove New Jersey from the RGGI programme by the end of 2011. He says that RGGI is not successfully reducing emissions and therefore is an unnecessary cost to industry[36].
Other key details	The three regional emissions trading systems were actively engaged in discussions about merging their programmes. Currently, momentum on linking the regional initiatives and general support of these regional programmes has stalled. New Jersey announced their planned withdrawal from RGGI starting in 2012 and initiatives to pull other states out of RGGI have been considered in recent state legislative sessions. Also, as of mid-2011, it does not look like the Midwest Greenhouse Gas Reduction Accord (MGGRA) will move forward. Director of the Illinois EPA, Doug Scott, states that it may be possible for the 23 states and handful of Canadian provinces that belong to these three programmes to trade emissions among themselves if Congress does not pass a federal climate bill.

[35] http://www.eenews.net/Greenwire/2010/12/03/12

[36] http://www.eenews.net/Greenwire/2011/05/26/2

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.02					
		2015	0.03					
		2020	0.04					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	1.2	0.3	0.2	0.3	0.1	0.04
		2015	2.1	0.4	0.4	0.4	0.1	0.07
		2020	3.4	0.6	0.6	0.7	0.2	0.10
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0.0	0.0	0.0	0.0	0.0	0.0
		2015	0.0	0.0	0.0	0.0	0.0	0.0
		2020	0.0	0.0	0.0	0.0	0.0	0.0

Source

For more information visit: http://www.rggi.org

The following report from February 2011 outlines some of the benefits, in $ amounts, of RGGI, http://www.rggi.org/rggi_benefits.

Economic impact analysis of RGGI can be accessed at:

http://www.edrgroup.com/library/energy-environment/economic-impact-of-regional-greenhouse-gas-initiative.html.

For a map of the three Regional Climate Initiatives, visit here: http://www.grist.org/article/2010-11-09-the-post-election-outlook-for-regional-cap-and-trade

Policy 2	California Climate Solutions Act of 2006 (AB 32)
Status	Planned (some programmes in planning phases, cap-and-trade programme to be effective starting in 2013) Mandatory
Sector coverage	General (major economic sectors, including EIIs)
Aim and key provisions / targets	California Climate Solutions Act of 2006 (AB 32) authorises the California Air Resources Board (CARB) to establish a state-wide GHG emissions cap for 2020 based on 1990 emissions, establish mandatory reporting rules for significant sources of GHGs, and adopt a plan indicating how emissions reductions would be achieved. • GHG emissions limit set at 25% reduction by 2020 compared to 1990 levels. • Mandatory GHG emission reporting regulations for the state's 800 largest emitters. • It is expected to apply to large industrial sources at or above 25,000 MTCO2e, electricity generators, and electricity imports in 2012. • The CARB rule development is being coordinated with the WCI development. (Source: http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm) • California Air Resources Board officials are discussing what the balance will be between auctioning off allowances and giving out allowances for free in the initial year[37]. • 2012 – 2015: Cap will apply to in-state electricity generators, imported electricity, refineries, and large industrial emission sources. • 2015 and beyond: Cap will be expanded to include fuel distributors, i.e. capturing emissions associated with use of transportation fuels, natural gas, and propane. • 2012: Cap will be set at level of projected emissions from covered entities • 2013 – 2014: Cap will decrease 2% each year • 2014 – 2020: Cap will decrease 3% each year *Update:* California will delay the official implementation of the cap-and-trade programme by one year, to 2013, to better prepare and implement the market measures and linkages with other entities throughout 2012. The emissions targets will not change as they were set at "business as usual" for 2012 and reductions will not be required until 2013[38]. The first official trades will take place in 15 August 2012 with a floor price of $10.00[39]. Additionally, California has released the updated draft cap-and-trade regulations addressing many controversial areas.

[37] http://www.vnf.com/news-alerts-533.html; http://www.vnf.com/news-alerts-607.html

[38] http://www.pointcarbon.com/polopoly_fs/1.1555679!CMNA20110701.pdf)

[39] http://www.pointcarbon.com/news/1.1557516

	Note that in this study the costs of this policy per MWh, tonne production and GVA have been expressed in relation to US rather than California totals, so these impacts represent average country level impacts[40]. This is consistent with the way other policies in this study have been expressed.
Exemptions available to EIIs	Not apparent from available information – to be checked
Who pays for the policy	Power and industry sectors
Extent to which objectives met	Scheme not yet started

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.000					
		2015	0.002					
		2020	0.002					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs / savings to EIIs (£mpa)	2011	0.00	0.00	0.00	0.00	0.00	0.00
		2015	0.14	0.04	0.11	0.05	0.00	0.01
		2020	0.16	0.04	0.11	0.06	0.00	0.01
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs / savings to EIIs (£mpa)	2011	0.0	0.0	0.0	0.0	0.0	0.0
		2015	15.6	0.7	8.8	1.7	19.5	2.9
		2020	17.3	0.8	9.3	1.6	20.3	2.8

Source	More information on California policies and programmes under AB32 can be found at: http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm.

[40] See footnote for US Policy 1.

Policy 3	New Source Performance Standards (NSPS)
Status	Planned (Rules / regulations in 2011/2012; implementation 2013) Mandatory
Sector coverage	Most EIIs
Aim and key provisions / targets	EPA will propose "New Source Performance Standards" (NSPS) for power plants and refineries. The covered entities consist of 40% of the U.S.'s GHG emissions. The NSPS will not put a cap on the amount of emissions, but will be based on efficiency such as requiring a maximum amount of GHG emissions for every megawatt of electricity generated or gallon of fuel refined. A notice of proposed rulemaking (NPRM) for the refinery sectors is expected to be published in the Federal Register in December 2011[41]. Refinery regulations are expected to be finalised by November 2012. For electricity generating units (EGUs), the EPA is expected to release a proposed rule by October 2011. More information on this rulemaking can be accessed at the US EPA website[42]. As a result, a final regulation is not expected to be released until 2012, and actual implementation until 2013 or later.
Exemptions available to EIIs	Not apparent from available information
Who pays for the policy	Power plants and refineries
Extent to which objectives met	Not yet implemented

[41] http://yosemite.epa.gov/opei/rulegate.nsf/byRIN/2060-AQ75
[42] http://yosemite.epa.gov/opei/rulegate.nsf/byRIN/2060-AQ91

Estimated cost impacts This policy will encourage producers to invest in simple energy efficiency measures and best practices, which are low cost measures.

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.00					
		2015	0.15					
		2020	0.15					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0.0	0.0	0.0	0.0	0.0	0.0
		2015	10.8	2.3	2.0	2.3	0.6	0.4
		2020	12.0	2.1	2.0	2.4	0.6	0.4
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0.0	0.0	0.0	0.0	0.0	0.0
		2015	0.0	0.0	0.0	0.0	0.0	0.0
		2020	0.0	0.0	0.0	0.0	0.0	0.0

Source (Source: http://www.vnf.com/news-alerts-568.html)

Policy 4	BACT under Tailoring Rule
Status	Planned (Programme becomes effective in 2011) Mandatory
Sector coverage	Most EIIs
Aim and key provisions / targets	The EPA's "Tailoring Rule" sets thresholds for greenhouse gas (GHG) emissions that define when permits under the New Source Review Prevention of Significant Deterioration (PSD) and title V Operating Permit programmes are required for new and existing industrial facilities. Facilities responsible for nearly 70 percent of the national GHG emissions from stationary sources will be subject to permitting requirements under this rule. This includes the nation's largest GHG emitters— power plants, refineries, and cement production facilities. On 2 January 2011, facilities emitting more than 75,000 tons of CO2e a year and which already have permits for other air pollutants will be required to obtain GHG permits. In July 2011, the regulations will expand to cover all new facilities with GHG emissions of at least 100,000 tons per year and modifications at existing facilities that would increase GHG emissions by at least 75,000 tons per year. Major stationary sources that are either newly constructed or undergoing modifications that will cause a significant increase in emissions must obtain a preconstruction permit that, among other things, requires the installation of "best available control technology" (BACT) for every pollutant "subject to regulation" under the CAA.
Exemptions available to EIIs	Not apparent from available information
Who pays for the policy	Industry
Extent to which objectives met	Not yet implemented

Estimated cost impacts

Since BACT only affects new or modified plants, the cost impact would be minimal. The reason is that the building of new plants and even modifications to existing plant would be uncommon over the next several years due to overcapacities across all industries in the US and bad economic conditions.

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.00					
		2015	0.15					
		2020	0.15					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0.00	0.00	0.00	0.00	0.00	0.00
		2015	10.77	2.27	1.95	2.25	0.55	0.37
		2020	11.96	2.12	2.00	2.37	0.57	0.35
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0.00	0.00	0.00	0.00	0.00	0.00
		2015	0.00	0.00	0.00	0.00	0.00	0.00
		2020	0.00	0.00	0.00	0.00	0.00	0.00

Source

http://www.vnf.com/news-alerts-568.html

Other information on the Tailoring Rule can be accessed under the 2010 heading **"**Final GHG Tailoring Rule," issued in May 2010, see, http://www.epa.gov/nsr/actions.html#2010

The Regulatory Impact Analysis (RIA) which lists estimated costs, number of impacted facilities, etc, can be accessed at: http://www.epa.gov/ttn/ecas/regdata/RIAs/riatailoring.pdf.

Policy 5	Business Energy Investment Tax Credit (ITC)
Status	In force Voluntary
Sector coverage	N/A (applies to certain renewable/energy efficiency technology types)
Aim and key provisions / targets	The federal business energy investment tax credit available under 26 USC § 48 was expanded significantly by the Energy Improvement and Extension Act of 2008 (H.R. 1424)[43], enacted in October 2008. This law extended the duration -- by eight years -- of the existing credits for solar energy, fuel cells and microturbines; increased the credit amount for fuel cells; established new credits for small wind-energy systems, geothermal heat pumps, and combined heat and power (CHP) systems; allowed utilities to use the credits; and allowed taxpayers to take the credit against the alternative minimum tax (AMT), subject to certain limitations. The credit was further expanded by The American Recovery and Reinvestment Act of 2009,[44] enacted in February 2009. In general, credits are available for eligible systems placed in service on or before 31 December 2016: **Solar.** The credit is equal to 30% of expenditures, with no maximum credit. Eligible solar energy property includes equipment that uses solar energy to generate electricity, to heat or cool (or provide hot water for use in) a structure, or to provide solar process heat. Hybrid solar lighting systems, which use solar energy to illuminate the inside of a structure using fibre-optic distributed sunlight, are eligible. Passive solar systems and solar pool-heating systems are not eligible. **Fuel Cells.** The credit is equal to 30% of expenditures, with no maximum credit. However, the credit for fuel cells is capped at $1,500 per 0.5 kilowatt (kW) of capacity. Eligible property includes fuel cells with a minimum capacity of 0.5 kW that have an electricity-only generation efficiency of 30% or higher. (Note that the credit for property placed in service before October 4, 2008, is capped at $500 per 0.5 kW.) **Small Wind Turbines.** The credit is equal to 30% of expenditures, with no maximum credit for small wind turbines placed in service after 31 December 2008. Eligible small wind property includes wind turbines up to 100 kW in capacity. (In general, the maximum credit is $4,000 for eligible property placed in service after 3 October 2008, and before 1 January 2009. The American Recovery and Reinvestment Act of 2009 removed the $4,000 maximum credit limit for small wind turbines.) **Geothermal Systems.** The credit is equal to 10% of expenditures, with no maximum credit limit stated. Eligible geothermal energy property includes geothermal heat pumps and equipment used to produce, distribute or use energy derived from a geothermal deposit.

[43] http://thomas.loc.gov/cgi-bin/query/z?c110:H.R.1424.enr

[44] http://thomas.loc.gov/home/h1/Recovery_Bill_Div_B.pdf

	For electricity produced by geothermal power, equipment qualifies only up to, but not including, the electric transmission stage. For geothermal heat pumps, this credit applies to eligible property placed in service after 3 October 2008. Note that the credit for geothermal property, with the exception of geothermal heat pumps, has no stated expiration date. **Microturbines.** The credit is equal to 10% of expenditures, with no maximum credit limit stated (explicitly). The credit for microturbines is capped at $200 per kW of capacity. Eligible property includes microturbines up to two megawatts (MW) in capacity that have an electricity-only generation efficiency of 26% or higher. **Combined Heat and Power (CHP).** The credit is equal to 10% of expenditures, with no maximum limit stated. Eligible CHP property generally includes systems up to 50 MW in capacity that exceed 60% energy efficiency, subject to certain limitations and reductions for large systems. The efficiency requirement does not apply to CHP systems that use biomass for at least 90% of the system's energy source, but the credit may be reduced for less-efficient systems. This credit applies to eligible property placed in service after 3 October 2008.
Exemptions available to EIIs	No
Who pays for the policy	Government
Extent to which objectives met	Information not readily available

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	-0.29					
		2015	-0.29					
		2020	-0.29					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	-20.58	-4.81	-3.13	-4.27	-1.07	-0.72
		2015	-21.54	-4.54	-3.90	-4.50	-1.10	-0.73
		2020	-23.92	-4.23	-4.01	-4.74	-1.15	-0.71
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0.00	0.00	0.00	0.00	0.00	0.00
		2015	0.00	0.00	0.00	0.00	0.00	0.00
		2020	0.00	0.00	0.00	0.00	0.00	0.00

Source Abovementioned legal / policy documents
http://thomas.loc.gov/cgi-bin/query/z?c110:H.R.1424.enr:
http://thomas.loc.gov/home/h1/Recovery_Bill_Div_B.pdf

Policy 6	Renewable Electricity Production Tax Credit (PTC)
Status	In force Voluntary
Sector coverage	N/A (applies to certain renewable energy projects)
Aim and key provisions / targets	The federal renewable electricity production tax credit (PTC) is a per-kilowatt-hour tax credit for electricity generated by qualified energy resources and sold by the taxpayer to an unrelated person during the taxable year. Originally enacted in 1992, the PTC has been renewed and expanded numerous times, most recently by H.R. 1424 (Div. B, Sec. 101 & 102) in October 2008 and again by H.R. 1 (Div. B, Section 1101 & 1102) in February 2009. The October 2008 legislation extended the in-service deadlines for all qualifying renewable technologies; expanded the list of qualifying resources to include marine and hydrokinetic resources, such as wave, tidal, current and ocean thermal; and made changes to the definitions of several qualifying resources and facilities. The effective dates of these changes vary. Marine and hydrokinetic energy production is eligible as of the date the legislation was enacted (3 October 2008), as is the incremental energy production associated with expansions of biomass facilities. The February 2009 legislation revised the credit by: (1) extending the in-service deadline for most eligible technologies by three years (two years for marine and hydrokinetic resources); and (2) allowing facilities that qualify for the PTC to opt instead to take the federal business energy investment credit (ITC) or an equivalent cash grant from the U.S. Department of Treasury. The ITC or grant for PTC-eligible technologies is generally equal to 30% of eligible costs.* The tax credit amount is 1.5¢/kWh in 1993 dollars (indexed for inflation) for some technologies, and half of that amount for others. The rules governing the PTC vary by resource and facility type. The table below outlines two of the most important characteristics of the tax credit -- in-service deadline and credit amount -- as they apply to different facilities. The table includes changes made by H.R. 1, in February 2009, and the inflation-adjusted credit amounts are current for the 2011 calendar year.

Resource Type	In-Service Deadline	Credit Amount
Wind	31 December 2012	2.2¢/kWh
Closed-Loop Biomass	31 December 2013	2.2¢/kWh

Open-Loop Biomass	31 December 2013	1.1¢/kWh
Geothermal Energy	31 December 2013	2.2¢/kWh
Landfill Gas	31 December 2013	1.1¢/kWh
Municipal Solid Waste	31 December 2013	1.1¢/kWh
Qualified Hydroelectric	31 December 2013	1.1¢/kWh
Marine and Hydrokinetic (150 kW or larger)**	31 December 2013	1.1¢/kWh

The duration of the credit is generally 10 years after the date the facility is placed in service, but there are two exceptions:

- Open-loop biomass, geothermal, small irrigation hydro, landfill gas and municipal solid waste combustion facilities placed into service after 22 October 2004, and before enactment of the Energy Policy Act of 2005, on 8 August 2005, are only eligible for the credit for a five-year period.
- Open-loop biomass facilities placed in service before 22 October 2004, are eligible for a five-year period beginning 1 January 2005.

In addition, the tax credit is reduced for projects that receive other federal tax credits, grants, tax-exempt financing, or subsidised energy financing.

Exemptions available to EIIs No

Who pays for the policy Government

Extent to which objectives met Information not readily available

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	-0.29					
		2015	-0.29					
		2020	-0.29					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	-20.6	-4.8	-3.1	-4.3	-1.1	-0.7
		2015	-21.5	-4.5	-3.9	-4.5	-1.1	-0.7
		2020	-23.9	-4.2	-4.0	-4.7	-1.1	-0.7
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0.0	0.0	0.0	0.0	0.0	0.0
		2015	0.0	0.0	0.0	0.0	0.0	0.0
		2020	0.0	0.0	0.0	0.0	0.0	0.0

Source Abovementioned legal / policy documents
http://thomas.loc.gov/cgi-bin/query/z?c110:H.R.1424.enr:
http://thomas.loc.gov/home/h1/Recovery_Bill_Div_B.pdf

Policy 7	US Renewable Portfolio Standards (RPS)
Status	In force Mandatory
Sector coverage	Power
Aim and key provisions / targets	Renewable Portfolio Standard's (RPS) are a policy measure adopted by many states to increase renewable energy generation. A RPS functions by requiring electric utilities and other retail electric providers to supply a specified minimum amount of customer load (typically retail sales) with electricity from certain renewable sources of generation (energy efficiency measures also are sometimes eligible). As of May 2011, RPS requirements have been established in 39 states plus the District of Columbia. Most programmes are mandatory, although some are voluntary standards. Currently, states with RPS requirements mandate that between 4 and 40 percent of electricity be generated from renewable sources by a specified date. A list of states with RPS programmes, and the applicable targets, is located in Table 1 below.

Table 1: State RPS Requirements

	Targets (% of electric sales)
AZ	15% by 2025
CA	33% by 2020
CO	IOUs 30% by 2020; cooperative and municipal utilities 10% by 2020
CT	27% by 2020
DC	20% by 2020
DE	25% by 2025-2026
HI	40% by 2030
IA	105 MW by 2025
IL	25% by 2025-2026
IN *	10% by 2025
KS	20% by 2020
LA*	350 MW by 2012-2013
MA	Class I: 15% by 2020 (+1%/year after); Class II: 3.6% renewable, 3.5% waste energy by 2009;
MD	20% by 2022
ME	40% by 2017;
MI	10% by 2015
MN	Xcel Energy (utility) 30% by 2020; other utilities 25% by 2025
MO	15% by 2021

MT	15% by 2015
NE*	Public Power Districts 10% by 2020
NC	12.5% by 2021 (IOUs); other utilities 10% by 2018
ND*	10% by 2015
NH	23.8% by 2025 (16.3% new)
NJ	22.5% by 2020-2021
NM	IOUs: 20% by 2020; rural electric cooperatives 10% by 2020
NV	25% by 2025
NY	29% by 2015
OH	25% by 2024
OK*	15% by 2015
OR	Large utilities (>3% state's total electricity sales) 25% by 2025
PA	18% by May 31, 2021 (8% renewable energy)
RI	16% by 2019
SD*	10% by 2015
TX	5,880 MW by 2015; 10,000 MW by 2025
UT*	20% by 2025
VA*	15% of 2007 base year sales by 2025
VT*	20% by 2017
WA	15% by 2020
WV	25% by 2025
WI	10% by December, 31 2015

* States with RPS goals not mandatory requirements.

Renewable Portfolio Standards often function by requiring utilities to submit Renewable Energy Credits (RECs) to fulfil their compliance obligation. Typically, 1 REC = 1 MWh of renewable generation. The impact of a state's RPS on electricity prices is reflected in Renewable Energy Credit (REC) value. REC prices vary based on the stringency of the overall targets, what types of renewables and/or energy efficiency measures qualify, and other factors. Not all states make REC prices publicly available or closely track this information. REC prices are often the highest in Northeastern states. An overview of REC prices is shown in Table 2 below.

Table 2: REC Prices

Year	MA Class 1	MA Class 2 WTE	MA Class 2	MA APS	RI	NH Class 1	NH Class 2	NH Class 3	NH Class 4
2010	$61	$10	$25	$20	$61	$61	$160	$30	$30

Exemptions available to EIIs

Information not readily available

Who pays for the policy

Electricity consumers

Extent to which objectives met	Varies by State
Estimated cost impacts	Since state RPS programmes are very diverse in structure, and there are 40 programmes, we chose not to quantify their cost impacts in this analysis. Additionally, there are already numerous studies available concerning the impact of RPS programmes on electricity prices. The U.S. Department of Energy's Berkeley National Lab looked at the costs of RPS programmes in 2007, and found that "projected rate impacts are generally modest,[45]" and also found the following – "Seventy percent of the state RPS cost studies in our sample project base-case retail electricity rate increases of no greater than one percent in the year that each modelled RPS policy reaches its peak percentage target. In six of those studies, electricity consumers are expected to experience cost savings as a result of the state RPS policies being modelled. On the other extreme, nine studies predict rate increases above 1%, and two of these studies predict rate increases of more than 5%. However, the median bill impact across all of the studies in our sample is an increase of only $0.38 per month."
Source	U.S. EPA Combined Heat and Power Partnership (CHPP) & ICF International Evolution Markets: REC Markets – February 2010, Monthly Market Update http://new.evomarkets.com/pdf_documents/February%20REC%20Market%20Update.pdf

[45] Ernest Orlando Lawrence Berkeley National Laboratory. "Weighing the Costs and Benefits of State Renewable Portfolio S tandards: A C omparative A nalysis of S tate-Level P olicy I mpact P rojections." M arch 20 07. http://eetd.lbl.gov/ea/emp/reports/61580.pdf.

3.2.9 Denmark

Table 3-8: Assessment Table - Denmark

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Cost Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
1. Feed-in premium tariffs for renewable power	Existing	RE pricing	Mandatory	Y								L/M	L/M	L/M	Y
2. Agreement on Danish Energy Policy	Existing	RE	Framework	Y								L/M	L/M	L/M	Y
3. Energy Plan	Existing	Energy	Framework	Y								N/A	N/A	N/A	N
4. Green Tax Package Scheme	Existing	Energy tax	Mandatory	Y								L/M	L/M	L/M	Y
5. Emission Offsets	Existing	GHG	Voluntary									N/A	N/A	N/A	N
6. The Danish Electricity Savings Trust's Electricity Savings Action Plan	Existing	EE	Voluntary									N/A	N/A	N/A	N
7. Energy Efficiency Plan	Existing	EE										N/A	N/A	N/A	N
8. Action Plan for Renewed Energy Conservation	Existing	Energy		Y								L	L	L	N
9. Heat Supply Act	Existing	Energy		Y								L	L	L	N

Policy 1	Feed-in premium tariffs for renewable power (Promotion of Renewable Energy Act)
Status	In Force (January 2009) Mandatory
Sector coverage	n/a
Aim and key provisions / targets	Denmark's 2009 Promotion of Renewable Energy Act establishes detailed feed-in tariffs for wind power, as well as other sources of renewable energy. It is driven by the EU Directive on the promotion of the use of energy from renewable sources (2009/28/EC). Key details are as follows: **Onshore grid-connected wind power** (not for owner's consumption), connected as of 21 February 2008 benefits from a feed-in premium of DKK 0.25 per kWh for electricity production for the first 22,000 hours at the installed output (peak-load hours) of the wind turbine, after connection to the grid. In addition, these turbines can benefit from a refund of DKK 0.023 per kWh for balancing costs for electricity. **Offshore wind farms** installed following a tender process are subject to separate incentives. The wind farm at Horns Rev 2 will be provided a feed-in premium that, when added to the market price of electricity, will amount to DKK 0.518 per kWh. For the wind farm at Rødsand 2, the total tariff (premium plus market price) will amount to DKK 0.629 per kWh. A price supplement is also granted to cover payment of any feeding fee related to supplying electricity to the grid. Premiums apply to electricity production of 10 TWh, produced in accordance with the terms of the tendering procedure, for a maximum of 20 years after the wind farm has been connected to the grid. **Wind turbines connected to the grid since 20 February 2008** receive a price supplement of DKK 0.10 per kWh for 20 years from the date of connection to the grid. A refund of DKK 0.23 is also provided for balancing costs for electricity. **Turbines connected before 1 January 2005** receive a feed-in premium which, when added to the market price, results in a price of DKK 0.36 per kWh. Provisions do not apply to turbines financed by power companies. **Existing wind turbines, grid connected since 31 December 2002,** receive a feed-in premium depending on output. The premium, when combined with the market price, will lead to a total price of DKK 0.60 per kWh. It will be provided for ten years since the time of grid connection, ending on 31 December 2012. For those with installed output of 200 kW, the premium is awarded for 25,000 peak-load hours; from 201-599 kW, it is granted for 15,000 peak-load hours; for those with an installed output of 600 kW and more, it is granted for 12,000 peak-load hours. If the amount of electricity is supplied within ten years of grid connection, electricity produced for the remainder of the period will be supported by a feed-in premium which will lead to a price (including market price) of DKK 0.43 per kWh. If the amount is

not supplied within ten years, it will continue to be supported, so the premium and market price do not exceed DKK 0.60 per kWh

For **wind turbines financed by power companies**, and grid-connected as of 1 January 2000, separate premiums are awarded. For **onshore wind power**, the premium and market price will not exceed DKK 0.33 per kWh, and the feed-in premium is granted for 10 years from the time of grid connection. For **offshore wind farms**, the total price (premium plus market) is not to exceed DKK 0.353 per kWh, and an additional supplement provided for those paying fees for grid connection. This premium will be granted for electricity production corresponding to production during 42,000 peak-load hours, and can be up to DKK 0.07 per kWh on average per 24 hours. Both kinds of turbines also benefit from a premium tariff of DKK 0.10 per kWh.

Small turbines installed for consumption by the owner, with an installed output of 25 kW or less, also benefit from premium tariffs when electricity is supplied to the grid. Regardless of grid-connection date, the total price (feed-in premium and market price) granted amounts to DKK 0.60 per kWh.

Feed-in premiums for electricity produced by **wind power producers that have scrapping certificates** are also updated in the Promotion of Renewable Energy Act (see separate entry).

For electricity produced using **biogas**, **stirling engines** or other **specialised electricity production plants** using **biomass**, the feed-in premium will result in a total price for the electricity of DKK 0.745 per kWh. For electricity produced with **biomass as well as other fuels**, a premium of DKK 0.405 per kWh is granted for the share of electricity produced from biomass sources. The premiums and market prices will be index-adjusted annually.

For **other types of biomass plants**, a feed-in premium of DKK 0.15 per kWh is awarded, whether they use biomass exclusively or combine it with other fuels.

For **biomass plants financed by power companies**, a feed-in premium is provided for ten years from the date of the commissioning. The feed-in premium is set to provide a price of DKK 0.30/kWh. In addition, the Minister for Climate and Energy and a Parliamentary committee may agree to increase the price supplement up to DKK 100 per tonne of burned biomass, up to a limit of DKK 45 million annually provided to installations. A price supplement of DKK 0.10/kWh is also granted to these installations. Once the support period is over, the installations will be granted the same premiums as other biomass and biogas plants, as described above.

For **solar**, **wave energy**, **hydropower**, or **other renewable energy plants (except for biomass and biogas**), separate tariff provisions apply depending on the date of grid connection. For plants connected before 21 April 2004, a premium is provided for the total price to reach DKK 0.60/kWh for 20 years from the date of grid connection, and till at least 1 January 2019. Where renewable energy is combined with other sources of energy, the renewable portion is provided with a

	premium tariff of DKK 0.25/kWh. For those connected after 21 April 2004, renewable energy sources and technologies of significance for the future expansion of renewable electricity will receive a premium so the price received is DKK 0.60/kWh for ten years from the date of grid connection, and DKK 0.40/kWh for the next ten years. If combined with other sources of energy, the share of renewable energy benefits from a premium of DKK 0.26/kWh for the first ten years and DKK 0.06/kWh for the next ten. For other renewable energy sources, the premium is of DKK 0.10 per kWh for 20 years from the date of grid connection. **Overall**, the modelling in this study has assumed a feed-in tariff premium[46] of DKK 0.10 / kWh for all types of renewable energy.
Exemptions available to EIIs	No information
Who pays for the policy	Electricity consumers
Extent to which objectives met	Information not available

[46] i.e. not comparable to abovementioned total prices which are based on feed-in premium and market price

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	2.96					
		2015	5.09					
		2020	6.63					
	Sectors		Steel[47]	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	n/a	2.61	0.64	0.40	0.002	0.34
		2015	n/a	5.03	1.11	0.72	0.004	0.62
		2020	n/a	7.28	1.63	1.00	0.006	0.86
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	n/a	0.00	0.00	0.00	0.00	0.00
		2015	n/a	0.00	0.00	0.00	0.00	0.00
		2020	n/a	0.00	0.00	0.00	0.00	0.00

Source http://www.iea.org/textbase/pm/?mode=cc&id=4425&action=detail
www.ens.dk/EN-US/SUPPLY/RENEWABLE-ENERGY/Sider/Forside.aspx

[47] Denmark doesn't have a steel industry

Policy 2	Agreement on Danish Energy Policy 2008-2011
Status	In Force (2008) Mandatory
Sector coverage	n/a
Aim and key provisions / targets	On 21 February 2008, The Danish government (the Conservatives and Liberals) entered into a comprehensive energy agreement with the Social Democrats, Danish People's Party, Socialist People's Party, Social Liberals and New Alliance on energy policy. The framework agreement aims to lower Denmark's dependence on fossil fuels (coal, oil and gas) through achieving energy savings and renewable energy targets. These are to be reached via linear phasing, with concrete measures set for meeting the targets. This is a domestically driven policy although will help to achieve compliance with EU Directives including the Directive on the promotion of the use of energy from renewable sources (2009/28/EC). By 2011, 20% of gross energy consumption must come from renewable energy sources. The agreement includes better terms for wind turbines and other sustainable energy sources such as biomass and bio gas. The parties agree that renewable energy should cover 20% of Danish energy consumption in 2011. Aside from significantly raising the transfer rate for electricity from land wind turbines, biomass and bio gas, the parties agree to install 400 MW from new offshore wind turbines by 2012. Plans to invest in two new 75 MW land-based facilities in 2010 and 2011 have also been announced. The deal also provides incentives and a compensation scheme for local residents to allow land-based wind farms to be located in their area, including a new stakeholder model. In addition, 25 million DKK per year for the next five years has been earmarked for wave and solar power research. The effort to save energy is being considerably ramped up: The new agreement commits Denmark to cut its energy consumption by 2% by 2012, compared with 2006 levels. This is half a percentage point more than Denmark's current target, meaning that in 2020, energy use must have fallen by 4% compared to 2006. Hydrogen vehicles are to be tax-free and the same applies to electric vehicles provisionally until 2012, and a pool of 35 million DKK is being set aside for electric vehicle research. The government and Danish People's Party would like a significant increase in research, development and demonstration efforts in energy technology to the amount of 750 million DKK in 2009 and 1 billion DKK from 2010, and this will be taken up in connection with the implementation of globalisation funding.

Exemptions available to EIIs	No
Who pays for the policy	Depends on specific policy
Extent to which objectives met	Plan milestones not yet reached
Estimated cost impacts	Information is not available on the specific costs of measures in the plan that are not costed elsewhere in this section.
Source	http://www.iea.org/textbase/pm/?mode=cc&id=4274&action=detail www.ens.dk/sw70590.asp

Policy 3	Energy Plan
Status	In force (2011) Framework policy
Sector coverage	Energy sector
Aim and key provisions / targets	Denmark Energy Plan is a domestically driven plan to eliminate fossil fuels by 2050. The new energy strategy calls for expanding renewable energy from wind, biomass and biogas to 33%, decreasing energy consumption by 30% compared to 1990 levels, and reduce use of fossil fuels by the energy industry by 33% compared to 2009 all by 2020. After reaching the short term goals for 2020, Denmark will continue to make gains and goals to eventually reach their 2050 goal of having no dependence on fossil fuels.
Exemptions available to EIIs	Not applicable – this is a broad framework policy
Who pays for the policy	Depends on specific policy
Extent to which objectives met	n/a
Estimated cost impacts	See above for cost of renewable energy
Source	http://www.eenews.net/climatewire/2011/02/25/5

Policy 4	Green Tax Package scheme
Status	In Force (since 1995, most recently updated 2009) Mandatory
Sector coverage	Applies to heavy processes, light processes and space heating
Aim and key provisions / targets	This scheme was originally domestically driven although recent updates take into account EU Directive 2003/96/EC on restructuring the Community framework for the taxation of energy products and electricity. The available information from the Danish Energy Authority indicates the following tax levels: Full taxes: • Energy tax: €6.8/GJ • CO2 tax: €13.4/t CO2 Heavy processes (EIIs) that participate in Voluntary Agreements whereby energy efficiency improvements are undertaken: • Energy tax: €0/GJ (100% rebate) • CO2 tax: €0.40/t CO2 (97% rebate) As such, this results in no energy taxes for EIIs and only a very small CO2 tax. The CO2 tax for EIIs represents only 1 to 3% of the direct EU ETS costs which are modelled elsewhere in this study. In comparison, therefore, the CO2 tax will have a very small impact on EIIs and hence is not modelled separately.
Exemptions available to EIIs	See above
Who pays for the policy	Industry pays although EII sectors get substantial rebates as indicated above.
Extent to which objectives met	Recent evaluations not readily available.
Estimated cost impacts	See Energy Taxes in Section 4
Source	Danish Energy Authority, Voluntary Agreements on Energy Efficiency – Danish Experiences http://www.ens.dk/da-DK/ForbrugOgBesparelser/IndsatsIVirksomheder/TilskudtilCO2afgift/Documents/voluntary_agreements%20version1.pdf http://www.ens.dk/en-US/Info/FactsAndFigures/scenarios/scenarios/Documents/Danish%20Energy%20Outlook%202011.pdf

http://www.ens.dk/da-DK/ForbrugOgBesparelser/IndsatsIVirksomheder/TilskudtilCO2afgift/Documents/Green-taxes-uk-rap.pdf

http://www.iea.org/textbase/pm/?mode=cc&id=156&action=detail

3.2.10 France

Table 3-9: Assessment Table - France

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Cost impacts			Inclusion status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
1. White Certificate Trading*	Existing	EE end use	Mandatory	Y								L	L	L	Y
2. Renewable Energy* Feed-in Tariff and capacity targets	Existing	RE prices	Mandatory	Y								L/M	L/M	L/M	Y
3. Law on new organisation of the electricity market	Existing	Energy	Mandatory	Y								N/A	M	M	Y
4. EXELTIUM	Existing	Energy	Voluntary	Y		Y	Y	Y	Y	Y	Y	N/A	L/M	L/M	Y
5. La Grenelle I & II* Umbrella policy	Existing (updated in 2011)	GHG	Mandatory and Voluntary measures	Y	Y	Y	Y	Y	Y	Y	Y	L	L	L	N
6. National Energy Efficiency Action Plan*	Existing (revised 2011)	EE	Framework			Y	Y	Y	Y	Y	Y	L	L	L	N
7. Energy policy framework (POPE) 2005-781	Existing	Energy	Framework	Y								N/A	N/A	N/A	N
8. State funding for nuclear R&D[48]	Existing	Energy	Voluntary	Y								N/A	L	L	N

[48] Plans unchanged after Fukushima accident; French president announced €1 billion support for nuclear power over next 10 years, according to press reports.

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Cost impacts			Inclusion status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
9. State support for CCS projects	Existing	GHG Tech	Voluntary	Y		Y		Y				L	L	L	N
10. OSEO Innovation for SMEs and large enterprises – support for RD&D	Existing	Energy	Voluntary	Y		Y	Y	Y	Y	Y	Y	L	L	L	N
11. Government Crediting and Loan Guarantee for Energy Efficiency and Renewable Energy Investment - FOGIME	Existing	Energy	Voluntary	Y		Y	Y	Y	Y	Y	Y	L	L	L	N
12. Survey and Pre-feasibility Assistance	Existing	Energy		Y		Y	Y	Y	Y	Y	Y	L	L	L	N

Policy 1	White Certificate Trading
Status	In Force (2006) / Mandatory
Sector coverage	Power
Aim and key provisions / targets	This policy is driven by EU Directive 2006/32/EC on energy end-use efficiency and energy services. Under this policy suppliers of energy (electricity, gas, heating oil, LPG, heat, refrigeration) must meet government-mandated targets for energy savings achieved through the suppliers' residential and tertiary customers. Suppliers are free to select the actions to meet their objectives, such as informing customers how to reduce energy consumption, running promotional programmes, providing incentives to customers and so on. A list of ratified activities was ratified to help the various actors to facilitate the operations. Those exceeding and undercutting their objectives can trade energy savings certificates as required for common compliance. Energy suppliers who do not meet their obligation over the period (2006-2008) must pay a penalty of €0.02 per kWh. Lump evaluation of energy savings are established for each process, expressed in kWh of final energy, cumulated and present-worthed over the life of the product. The first, experimental phase of the scheme ran for three years from 1 July 2006 to 30 June 2009. It was intended that during this time, the scheme will result in 54TWh of cumulated energy savings.
Exemptions available to EIIs	No
Who pays for the policy	Suppliers of energy
Extent to which objectives met	Information not readily available
Estimated cost impacts	During the running of Grenelle 1, up to the end of 2010, the number of white certificates generated exceeded demand (65 TWh were saved compared to the 54 TWh required). A new target was fixed for 2011-2013 at the level of 345 TWh, including 255 TWh for electricity and gas consumers and 90 TWh for vehicle combustion uses, however due to the low (or negative) costs of obtaining the savings previously; it is assumed that this policy will not add to electricity prices.
Source	http://www.iea.org/textbase/pm/?mode=cc&id=2613&action=detail www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=96&m=3&catid=12616 Energy Efficiency Action Plan for France of June 2011 (p110)

Policy 2	Renewable Energy Feed-in Tariffs (III)
Status	In Force (July 2006) Mandatory
Sector coverage	Power
Aim and key provisions / targets	This policy appears to have been domestically driven, although latest developments (including policies 2b and 2c) will also be driven by EU Directive on the promotion of the use of energy from renewable sources (2009/28/EC). Under the Electricity Law 2000, feed-in tariffs were introduced on 10 July 2005. These apply for contracts of 15 years (except for off-shore wind power and photovoltaic, for which they apply to contracts of 20 years). They are as follows: • Biogas and methanisation: between 7.5 and 9 Eur cents/kWh, with an energy efficiency bonus of between 0 and 3 Eur cents and a methanisation bonus of 2 Eur cents/kWh; • Onshore windpower: 8.2 Eur cents/kWh for 10 years. For the following five years, between 2.8 and 8.2 Eur cents depending on the site; a low of 2.8 for a plant operating for an average of 3600 hours or more and a high of 8.2 for 2400 hours or less. • Offshore windpower (contracts for 20 years): 13 Eur cents/kWh for 10 years, then a variable rate for the next 10 years ranging from 3 Eur cents/kWh for a plant operating 3900 hours or more to 13 Eur cents/kWh for 2800 hours or less. Rates fall by 2% a year for plants built after 1 January 2008, while also adjusted to take account of inflation. Annulled in August 2006, the tariff for wind power has since been reinstated. • Photovoltaic: 30 Eur cents/kWh, with a construction bonus of 25 Eur cents/kWh for mainland France and 40 Eur cents/kWh, with construction bonus of 15 Eur cents in the outer French territories; • Geothermal: 12 Eur cents/kWh, with an energy efficiency bonus of between 0 and 3 Eur cents for mainland France and 10 Eur cents/kWh, with an energy efficiency bonus of between 0 and 3 Eur cents on Corsica
Exemptions available to EIIs	We are not aware of exemptions for EIIs
Who pays for the policy	Electricity consumers
Extent to which objectives met	Information not available

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.45					
		2015	0.85					
		2020	1.20					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	4.15	2.71	0.99	1.77	0.14	0.78
		2015	8.58	5.74	1.89	3.49	0.27	1.54
		2020	13.35	9.25	2.80	5.02	0.39	2.22
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0.00	0.00	0.00	0.00	0.00	0.00
		2015	0.00	0.00	0.00	0.00	0.00	0.00
		2020	0.00	0.00	0.00	0.00	0.00	0.00

Source http://www.iea.org/textbase/pm/?mode=cc&id=3846&action=detail
http://www.developpement-durable.gouv.fr/Les-tarifs-d-achat-de-l,12195.html

Policy 2b	Renewable Energy Feed-In Tariff: Solar PV
Status	In Force (2011) Mandatory
Sector coverage	Power
Aim and key provisions / targets	In March 2011, France adjusted its feed-in tariff system for electricity from solar PV plants. The support framework is now structured along two main systems: A feed-in tariff, adjusted every trimester, for building installation no bigger than 100 kWc; and tenders for building installations larger than 100kWc and ground mounted plants. In cases when solar PV installed capacity reaches or exceeds the fixed cap of 100 MW/year for residential and 100 MW/year for non-residential caps, tariffs will drop by 2.6% each trimester -about 10% annually- and less so if the installation rate slows down. The 2006 tariffs will continue to apply to certain kinds of projects submitted in late 2009, before 11 January 2010, and certain small- and medium-sized projects in the agricultural sector. As of March 2011, building-integrated photovoltaic installations (BIPV) no larger than 9kWc are entitled a €0.46/kWh, and installation between 9 -36 kWc €0.40/kWc. Simplified BIPV systems: €0.30/kWh for plants no larger than 36kWc and €0.29/kWc for plants between 36 and 100kWc. ; the system must be safely installed parallel to the roof, and fulfil cover and staunchness requirements. As of 2010, Ground-mounted solar arrays: Benefit from a base tariff of EUR cent 31.4/kWh. For systems greater than 250 kWc, the tariff varies according to a regional coefficient ranging from 1 to 1.2, offering higher tariffs for less sunny regions. In Corsica and overseas regions, the tariff is EUR cent 40/kWh.
Exemptions available to EIIs	No
Who pays for the policy	Electricity consumers
Extent to which objectives met	Information not available
Estimated cost impacts	See policy 2 above
Source	http://www.iea.org/textbase/pm/?mode=cc&id=4486&action=detail www.developpement-durable.gouv.fr/Mesures-transitoires-pour-

les.html

Policy 2c	Renewable Energy Feed-In Tariff: Biomass
Status	In Force (2009, modified 2011) Mandatory
Sector coverage	Power
Aim and key provisions / targets	As of 27 January 2011, new feed-in tariffs for electricity produced from biomass are in place. These apply to vegetable and animal agricultural waste, algae and some industrial biomass waste (pulp and paper, wood industries). It does not cover biogas, household or municipal waste. A fixed tariff of EUR cents 4.34/kWh is offered for a period of 20 years, equivalent to a 3.6% decrease from 2009 rates of EUR cents 4.5/kWh. In addition, a variable rate of EUR cents 8-13/kWh is added according to the level of power generation, energy efficiency, and the source of energy. In 2010 France tendered 250 MW of biomass installed capacity shared among a total 32 CHP plants and another 200 MW for plants no smaller than 12 MW was closed in February 2011. France targets a total installed capacity of 2,300 MW by 2020.
Exemptions available to EIIs	No
Who pays for the policy	Electricity consumers
Extent to which objectives met	Information not available
Estimated cost impacts	See policy 2 above
Source	http://www.iea.org/textbase/pm/?mode=cc&id=4485&action=detail www.developpement-durable.gouv.fr/Le-tarif-d-achat.html

Policy 3	Law on New organisation of electricity markets
Status	In force (2010) Mandatory
Sector coverage	All economic sectors
Aim and key provisions / targets	Electricity tariffs in France are regulated; the main electricity provider is 85% state-owned EDF. Further to EC investigation into electricity tariffs which opened in 2007, a new domestically-driven law was adopted at the end of 2010 which aimed to allow access to existing nuclear generation capacity. The main objective of the new regulation is to give alternative suppliers access to roughly one third of France's nuclear production and to set a timetable for ending regulated tariffs by 2015. This may affect electricity prices in the future, driving them up.
Exemptions available to EIIs	No
Who pays for the policy	Electricity consumers
Extent to which objectives met	Not applicable

Estimated cost impacts The estimated impact on electricity prices is an increase of €2.5 - €6.1/MWh for the 2015 milestone year and an increase of €10 - €30/MWh for the 2020 milestone year. The average values within these ranges have been used for the calculations in this study, ie €4.3 and €20/MWh respectively.

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0					
		2015	4					
		2020	17					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	37	25	8	15	1	7
		2020	190	132	40	72	6	32
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	0	0	0	0	0	0
		2020	0	0	0	0	0	0

Source Source: pgs. 26 and 41 of
http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000023174854&categorieLien=id
April 2010 Impact Assessment of the draft law
http://www.assemblee-nationale.fr/13/projets/pl2451-ei.asp
http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000023174854&categorieLien=id

Policy 4	EXELTIUM Project
Status	In force (2006) Mandatory once the firm is included in the scheme
Sector coverage	Energy Intensive Sectors
Aim and key provisions / targets	The EXELTIUM project is a domestically-driven project which was initiated in 2006 between EDF and six large electricity consumers in France. The contract envisaged initially the supply of 13 TWh per year for a total of 24 years at a discount tariff equal to the cost of producing the electricity (estimated between €37/MWh and €46/MWh in various press sources, no official impact assessment was identified) in exchange for investments towards new nuclear developments made by the six industrial companies including Air Liquide, Alcan, Arcelor-Mittal, Arkema, Rhodia and Solvay. The partnership agreement was made in 2008. In 2009, further to the financial crisis, a number of banks (Société Générale, BNP Paribas, Calyon and Natixis) stepped in to supply additional capital to the industries. The overall financing of the project was still lower, reportedly at €2bn compared to the initially envisaged €4bn and another financing tranche – Exeltium 2 was agreed upon in 2011, with the support of major banks ("Senior financing of a total amount of EUR 1,590m, with a maturity of 9.5 years, was arranged and distributed by Société Générale, BNP Paribas, Crédit Agricole CIB and Natixis. The Caisse des Dépôts et Consignations subscribed separately to a junior facility for about EUR 233m[49]."") There are no reports of state financing of the project. According to Reverdy 2007[50], the Exeltium Consortium company by-laws stipulate that the conditions for joining the consortium entail a consumption of electricity over 2.5 kWh to generate €1 of value added and off-peak consumption representing at least 55% of the maximum power. The consortium was formed with the support of the French Government (the Industry Ministry) and some preliminary review of the deal, which assumed that only a limited proportion of electricity would be sold under the deal and would therefore not affect competition. However, once the actual interest in the project became evident after initial subscription, DG Competition initiated an investigation of the deal in 2007 (for detailed documents on the investigation see DG Competition[51]). The latest statement by EDF on the investigation[52] suggests the following commitments to reduce impacts on market competition: • For each calendar year, the proportion of the electricity sold under long term contracts will be limited to maximum 40% of the

[49] http://www.sgcib.com/about-us/last-deals/exeltium-%E2%80%93-project-financing-/exeltium-%E2%80%93-project-financing

[50] Reverdy 2007, http://hal.inria.fr/docs/00/18/71/05/PDF/EGOS_Reverdy_Subtheme40.pdf

[51] http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=1_39386

[52] http://ec.europa.eu/competition/antitrust/cases/dec_docs/39386/39386_1618_3.pdf

electricity sold to Large Industrial Consumers (with a consumption >7GWh/year).

- For all the calendar years considered (for 10 years starting on 10 January 2010) the volume of electricity sold under long term contracts will not exceed 35%.
- The absolute volume sold under the long term contracts will not exceed the proportion of electricity represented by the volume of 20-30 TWh of the overall volume consumed by Large Industrial Consumers.
- EDF agrees to withdraw the "no-resale" clause from the long term contracts.
- Free exit clauses are seen as options to terminate the contract (with options to terminate the contract after one, three or four years).

Exemptions available to EIIs n/a

Who pays for the policy See above

Extent to which objectives met Early stages of project

Estimated cost impacts See above and the following table.

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0					
		2015	-1					
		2020	-6					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	-11	-8	-2	-5	-0.4	-2
		2020	-67	-46	-14	-25	-2	-11
Direct policy	Total estimated	2011	0	0	0	0	0	0

cost impacts to EIIs	incremental annualised costs to EIIs (£mpa)	2015	0	0	0	0	0	0
		2020	0	0	0	0	0	0

Source http://www.hugingroup.com/documents_ir/PJ/CO/2010/164385_88_7W59_PR-EDF-Exeltium-250310.pdf

http://www.abcmoney.co.uk/news/28200778066.htm

http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/08/533&type=HTML

http://uk.reuters.com/article/2010/04/13/idUKLDE63C20820100413

http://www.linklaters.com/News/LatestDeals/2010/Pages/20100419.aspx

http://hal.inria.fr/docs/00/18/71/05/PDF/EGOS_Reverdy_Subtheme40.pdf

Policy 5	The Grenelle Act I: Renewable targets
Status	In Force (2009) Mandatory
Sector coverage	Electricity Sector
Aim and key provisions / targets	The overall Grenelle I and II policy is driven by EU Decision No 406/2009/EC on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020 and the EU Directive on the promotion of the use of energy from renewable sources (2009/28/EC). It includes a renewable energy target of 23% by 2020, which is in compliance with the EU requirements, broken down as follows: Biomass, (ktep) 2005 : 9 153 2009 : 9 776 2020 : 16 455 Wind, (MW) 2005 : 752 2009 : 4 621 2020 : 25 000 Solar (MW) 2005 : 25 2009 : 332 2020 : 5 400 Hydro (MW) 2005 : 25 349 2009 : 25 688 2020 : 28 300 Geothermal and heat pumps (ktep) 2005 : 206 2009 : 915 2020 : 2 350
Exemptions available to EIIs	No
Who pays for the policy	Electricity consumers
Extent to which objectives met	Information not readily available

Estimated cost impacts	See Policy 2
Source	Tout savoir sur la politique de la France. Ministère de l'Écologie, du Développement durable, des Transports et du Logement. 2011 http://www.iea.org/textbase/pm/?mode=cc&id=3761&action=detail http://www.legrenelle-environnement.fr/grenelle-environnement/

3.2.11 Germany

Table 3-10: Assessment Table - Germany

Name	Status	Type	Enforce-ment	Target sectors (Y where applicable)								Cost Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial	2011	2015	2020	
1. 2009 Amendment of the Renewable Energy Sources Act (EEG) that includes Feed-in Tariffs	Existing	RE - prices	Mandatory	Y								L	L	L	Y
2. CHP Support	Existing	EE – prices	Mandatory	Y								L	L	L	Y
3. Nuclear energy phase out - Gesetz zur Änderung des "Atomgesetzes" (BGBl. I S. 1704)	New	Energy	Mandatory	Y								N/A	L/M	L/M	Y
4. Energy Tax Incentives for Industries implementing an ISO 5001 EMS	Existing	Energy tax	Voluntary			Y	Y	Y	Y	Y	Y		L	L	Y
5. Indirect cost increases compensation	New	Energy	Voluntary			Y	Y	Y	Y	Y	Y		?	?	Y

Name	Status	Type	Enforce-ment	Target sectors (Y where applicable)								Cost Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial	2011	2015	2020	
6. GHG Reduction Goal, umbrella policy and Integrated Climate Change and Energy Programme	Existing	GHG	Framework									N/A	N/A	N/A	N
7. Renewable Energies Programme, including Renewable Heat Act of 2008	Existing	RE	Mandatory	Y								L	L	L	N
8. Energy Efficiency Action Plan	Existing	EE	Voluntary	Y								L	L	L	N
9. Target to Double Energy Productivity by 2020	Existing	GHG	General target	Y		Y	Y	Y	Y	Y	Y	N/A	N/A	N/A	N

Policy 1	2009 Amendment of the Renewable Energy Sources Act -EEG
Status	In Force (January 2009, amended in 2010) / Mandatory
Sector coverage	n/a
Aim and key provisions / targets	On 1 January 2009 the amendment of the Renewable Energy Sources Act (EEG) came into force. It provides a higher feed-in tariff for wind energy, and other measures to stimulate the development of both onshore and offshore wind power. This policy is driven by EU Directive on the promotion of the use of energy from renewable sources (2009/28/EC). The feed-in tariff for **onshore wind farms** increased from EUR 8.03 to EUR 9.20 cents/kilowatt-hour (kWh) for the first 5 years of operation, and EUR cents 5.02/kWh after that. This tariff will be decreased every year for new installations by one percent, as opposed to the previous two percent. The law also increases the **repowering bonus**, to support the replacement of old turbines by new ones. The initial remuneration will be increased by EUR 0.5 cent/kWh. Turbines that are replaced must be located in the same administrative district and be at least ten years old. The new turbine needs to have at least twice, but no more than five times the original turbine's capacity. For offshore wind, the initial tariff is set at EUR cent 15 /kWh until 2015. After that it is set to decrease to EUR cent 13/kWh for new turbines, decreasing by five percent per year. The amendment is meant to reflect the increasing costs faced by wind turbine manufacturers, largely due to increases in the costs of raw materials such as steel and copper. **Hydropower** tariffs have increased, and differentiate between new and modernised facilities. For capacity up to 500kW, the tariff is EUR cents 12.67/kWh for new and EUR cents 11.67/kWh for modernised facilities. Between 500kW and 2MW the tariff for both facilities is EUR cents 8.65/kwh, and between 2 and 5MW it is EUR cents 7.65/kWh for new and EUR cents 8.65/kWh for modernised facilities. For facilities over 5MW, the tariff starts at EUR cents 7.29/kWh for the first 500kW of output, decreasing for increasing outputs in three steps to reach EUR cents 3.05/kWh for output over 50MW. These same tariffs apply for capacity added to existing facilities that have more than 5MW capacity. **Biogas** facility tariff changes generally favour small plants. Tariffs for landfill gas facilities have increased for small plants up to 500kWel, to EUR cents 9/kWh from the previous 7.11. Tariffs for mine gas facilities up to 1MWel have also increased to EUR cents 7.16/kWh, and have decreased to EUR cents 5.16 and 4.16/kWh for capacity above 1MW and above 5MW respectively. A new technology bonus is available for reprocessing facilities for landfill and sewage gas and biomass, of EUR cents 2/kWh up to a maximum of 350m3/hour and EUR cents 1/kWh up to a maximum of 700 m3/hour. **Small biomass** facilities also benefit, with tariffs increased to EUR cents 11.67/kWh for capacity up to 150kWel (from EUR cents 10.67/kWel). Under the new EEG, the tariff of EUR cents 7.79/kWh for capacity over

5MW only applies if the electricity is produced using combined heat and power generation. In addition, the CHP bonus for electricity produced using biomass combined heat and power increased to EUR cents 3/kWh. The tariff and bonuses will decrease by 1% a year. In addition, biogas and biomass production that uses energy crops, waste biomass and manure are eligible for bonuses.

Tariffs for **geothermal** facilities increase, and are simplified into under and over 10MW capacity categories. For the former the rate is EUR cents 16/kWh, and for the latter EUR cents 10.5/kWh. New heat cogeneration bonuses were introduced, of EUR cents 3/kWh for a capacity of up to 10MWel, increasing to EUR cents 4/kWh if petrothermal technology is used. The tariff and bonuses decrease by 1% a year.

For **Solar PV**, tariffs under the new law decreased for all capacity sizes.

For **roof-mounted facilities**, these are EUR cents 43.01/kWh up to 30kW, 40.91 from 30 to 100kW, 39.58 from 100kW to 1MW, and 33 over 1MW. For free-standing facilities the tariff decreased to EUR cents 31.94/kWh. The new law removed bonuses for building integrated facilities; however a new tariff of EUR cents 25.01/kWh was introduced for systems up to 30kW when electricity produced is used within the building or facility.

On 1 January 2010 the PV-tariffs decreased by 9% for roof systems and for on-site consumption, and 11% for the remaining categories. To compensate the decreasing investment costs for PV-systems two further cuts took place during the year 2010: by 1 July tariffs decreased by 8 to 13%, to which another 3% cut was added by 1 October. Furthermore additional categories were introduced for on-site consumption on 1 July 2010.

On 1 January 2011 a degression of 13% for PV-systems became effective.

Exemptions available to EIIs

The added costs of electricity are distributed among consumers, with the exception of the following EIIs, according to EEG 2009:

- The ratio of the electricity costs to gross value added exceeds 15% and electricity demand exceeds 10 GWh/year at a certain delivery point; in which case the added costs to the client cannot exceed €0.05 cents per kilowatt-hour
- The ratio of the electricity costs to gross value added is below 20% and the electricity demand is below 100 gigawatt-hours the limitation of the added cost will only apply to 90% of the electricity purchased in the previous year.

The amended EEG, which will come into force from 2012[53] suggests that the maximum added cost to EIIs from renewable energy is €0.05 cents /kWh for enterprises consuming more than 200 GWh and for which the cost of electricity exceeds 20% of gross value added (GVA).It is assumed

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Gesetz für den Vorrang Erneuerbarer Energien (Erneuerbare-Energien-Gesetz – EEG). Konsolidierte (unverbindliche) Fassung des Gesetzestextes in der ab 1. Januar 2012 geltenden Fassung (Grundlage: Entwurf der Bundesregierung vom 6. Juni 2011 – BT-Drucks. 17/6071 und Beschluss des Deutschen Bundestages vom 30. Juni 2011 – BT-Drucks. 17/6363)

that this would be applicable to the EII sectors covered in this report. .

Who pays for the policy Electricity consumers will pay the increased costs of renewables. The cost of the exemption for EIIs will be borne by other consumers.

Extent to which objectives met Not yet implemented

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.08					
		2015	0.11					
		2020	0.14					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	1.76	0.49	0.27	1.70	0.07	0.29
		2015	2.94	0.84	0.41	2.71	0.12	0.47
		2020	4.06	1.17	0.58	3.64	0.16	0.63
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0.00	0.00	0.00	0.00	0.00	0.00
		2015	0.00	0.00	0.00	0.00	0.00	0.00
		2020	0.00	0.00	0.00	0.00	0.00	0.00

Source http://www.iea.org/textbase/pm/?mode=cc&id=4054&action=detail
www.bmu.de/english/renewable_energy/aktuell/3860.php
http://www.bmu.de/files/pdfs/allgemein/application/pdf/brochure_electricity_costs.pdf

Policy 2	CHP Support
Status	In force (since 2001) Mandatory
Sector coverage	CHP
Aim and key provisions / targets	A fixed price is paid for the electricity generated by the Combined Heat and Power plant, whether it is fed into the grid or consumed on site. On 25 June 2001, the German government and German industrial sector and energy industry initialled an agreement concerning the reduction of CO2 emissions and the promotion of CHP generation, the objective being to reduce emissions by 2010 by a total of roughly 45 million tonnes of CO2/year by at least a minimum of 20 million t CO2/year. Under this policy the objective is to increase the % of high efficiency CHP in the national energy mix from 12% to 25%. It is not clear whether this policy was originally domestically or EU driven, although there are current EU drivers including EU Directive 2004/8/EC on the promotion of cogeneration based on a useful heat demand in the internal energy market (amending Directive 92/42/EEC).
Exemptions available to EIIs	For Manufacturing enterprises with electricity costs above 4% of turnover and with consumption above 100 MWh / year at any connection point, the added cost from the CHP feed-in tariff cannot be higher than €0.25/MWh.
Who pays for the policy	Energy consumers
Extent to which objectives met	Information not readily available

Estimated cost impacts Given the relatively small cost impacts of this policy, similar policies have not been investigated for the other EU Member States.

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.22					
		2015	0.22					
		2020	0.22					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	5.13	1.43	0.77	4.95	0.21	0.85
		2015	5.61	1.60	0.78	5.17	0.22	0.89
		2020	6.16	1.78	0.88	5.52	0.24	0.95
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0.00	0.00	0.00	0.00	0.00	0.00
		2015	0.00	0.00	0.00	0.00	0.00	0.00
		2020	0.00	0.00	0.00	0.00	0.00	0.00

Source
http://www.iea.org/textbase/pm/?mode=re&id=4519&action=detail
http://www.iea.org/textbase/pm/?mode=cc&id=809&action=detail
http://www.bmu.de/files/pdfs/allgemein/application/pdf/brochure_electricity_costs.pdf

Policy 3	Amendment of the Atomic Power Act: nuclear phase out
Status	In force (2011) / Mandatory
Sector coverage	Power
Aim and key provisions / targets	In May 2011, the German Government announced domestically-driven plans (Gesetz zur Änderung des "Atomgesetzes", BGBl. I S. 1704) to withdraw from nuclear power completely by 2022. This will change the electricity generation mix in the country.
Exemptions available to EIIs	No
Who pays for the policy	Electricity consumers
Extent to which objectives met	Not yet implemented
Estimated cost impacts	Cost estimates are presented in the table below. A number of studies have predicted a range of impacts on electricity prices: Friedrich-Ebert-Stiftung, 2011: Added cost estimate for 2022 withdrawal: 0.7 Eurocent/kWh, added to a base price of 5.2 Eurocent/kWh under the baseline assumption that a withdrawal from nuclear would take place in 2038. Vereinigung der Bayerischen Wirtshaft, 2011: Added cost estimate for 2022 withdrawal is €6/MWh in 2015 and €7/MWh in 2020 compared to a base price of €45/MWh. All assumptions based on "Das Energiewirtschaftliche Gesamtkonzept" and current laws. EWI, GWS, PROGNOS, 2010: Added cost estimate for 2020 is between 0.8 Eurocent/kWh and 0.9 Eurocent/kWh for nuclear withdrawal scenarios, with the main scenario at 0.8 Eurocent/kWh. Based on an average of these figures, the assumptions used in the analysis are €6.0/MWh in 2015 and €7.75/MWh in 2020. In all three reports the cost estimates equate to the additional costs of new generation capacity.

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0					
		2015	5					
		2020	7					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	135	38	19	124	5	21
		2020	191	55	27	171	7	29
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0	0	0	0	0	0
		2015	0	0	0	0	0	0
		2020	0	0	0	0	0	0

Source Vereinigung der Bayerischen Wirtshaft, 2011. Ausstieg_aus_der_Kernenergie_bis_2022_Konsequenzen_fuer_Deutschland_und_Bayern[54]

EWI, GWS, PROGNOS, 2010. Energieszenarien für ein Energiekonzept der Bundesregierung[55]

Friedrich-Ebert-Stiftung, 2011. Der Einstieg in den Ausstieg Energiepolitische Szenarien für einen Atomausstieg in Deutschland[56]

[54] http://www.vbw-bayern.de/agv/vbw-Themen-Wirtschaftspolitik-Energie-Publikationen-Ausstieg_aus_der_Kernenergie_bis_2022_Konsequenzen_fuer_Deutschland_und_Bayern--14361,ArticleID__20668.htm

[55] http://www.bmu.de/files/pdfs/allgemein/application/pdf/energieszenarien_2010.pdf

[56] http://library.fes.de/pdf-files/wiso/08339.pdf

Policy 4	Eco Tax changes as part of the Energy Concept of the Federal Government 2011
Status	In force (2011) Mandatory
Sector coverage	Manufacturing Industry
Aim and key provisions / targets	This overall policy is driven by EU Directive 2003/96/EC restructuring the Community framework for the taxation of energy products and electricity. According to the Electricity Tax Law (Stromsteuergesetz, StromStG) of 1999 amended in 2011 (§9a), the eco-tax (€15.37/MWh currently and €12.3/MWh up to 2011) is fully reimbursed for the following production processes: electrolysis, glass, ceramics, cement, lime, metals, fertilizers and chemical reduction methods. The company pays the tax in full and then applies for 100% reimbursement for the electricity used in eligible processes. The same tax can be reimbursed up to 90% (§10 of the same law), depending on the pension insurance contributions of the company, if the company is classified as being part of a manufacturing industry[57] and if the tax payment exceeds €1000/year. These reimbursements will be linked to energy management processes from 2013 onwards. As such, all target EII sectors with the possible exception of industrial gases[58] would appear to qualify for a 100% reimbursement of the energy tax. If the industrial gas sector does not qualify for 100% reimbursement it can be reimbursed by 90%. Based on the Eurostat energy tax levels with no reimbursements of €15.2/MWh (2010 data) and considering the electricity consumption levels of the EIIs in this study and the levels of reimbursement available, the average level of energy tax for the target EIIs in this study if it was spread evenly across the sectors in this study would be approximately €0.08/MWh.
Exemptions available to EIIs	This is an exemption
Who pays for the policy	Industry pays although EII sectors get substantial rebates as indicated above.
Extent to which objectives met	To be implemented
Estimated cost impacts	See above and Section 4.1

[57] The definition of a manufacturing industry is mining, processing trades, energy and water supply, waste and waste water removal and construction. Processing trades include the production of goods and services which afterwards can be used as input, investment, for usage and consumption.

[58] It is noted that industrial gases can be produced using electrolysis but the most common method is to fractionally distill liquefied air into its various components, with the primary cost of production being the energy cost of liquefying the air.

Source

http://www.gesetze-im-internet.de/stromstg/BJNR037810999.html

http://bmwi.de/BMWi/Redaktion/PDF/E/eckpunkte-energieeffizienz,property=pdf,bereich=bmwi,sprache=de,rwb=true.pdf

http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/SharedContent/Oeffentlich/B3/Publikation/Jahrbuch/ProdGewerbe,property=file.pdf

http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/DE/Content/Statistiken/IndustrieVerarbGewerbe/content75/VerarbeitendesGewerbeInfo,templateId=renderPrint.psml

Frontier Economics and EWI, 2010. Energiekosten in Deutschland: Entwicklung, Ursachen, Internationaler Vergleich.

Policy 5	Indirect cost increases compensation under EU ETS
Status	Not yet in force
Sector coverage	Energy Intensive Industries
Aim and key provisions / targets	A number of stakeholders mention plans to provide compensation to energy intensive industries for the indirect cost increases caused by full auctioning to the electricity sector under the EU ETS. No official details are provided yet, however it believed that EU state aid rules will affect the final outcome.
Exemptions available to EIIs	This is an exemption
Who pays for the policy	Details not currently available
Extent to which objectives met	Details not currently available
Estimated cost impacts	Details not currently available
Source	http://www.energiesparen-suedwestfalen.de/index.php/politik-schafft-rahmenbedingungen/60-stromkostenkompensation; http://www.bmu.de/files/pdfs/allgemein/application/pdf/zuteilungsverordnung__2020.pdf

3.2.12 Italy

Table 3-11: Assessment Table - Italy

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Cost Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
1. White Certificate Trading for End-Use Energy Efficiency	Existing	EE	Mandatory	Y								L	L/M	L/M	Y
2. Law concerning anti-crisis measures: energy provisions	Existing	Energy	Voluntary	Y		Y	Y	Y	Y	Y	Y	L	L	L	Y
3. RES promotion – Decree Implement-ing Directive 2001/77/EC*	Existing	RE incentiv es	Voluntary	Y								L	L/M	L/M	Y
4. Finance Act 2008 – incentives for EE/RE	Existing	RE prices	Mandatory	Y								L/M	L/M	L/M	Y
5. New Feed-in premium for photovoltaic systems*	Existing	RE prices	Mandatory	Y								L/M	L/M	L/M	Y
6. Feed-in Tariff for Solar Thermo-dynamic Energy*	Existing	RE prices	Mandatory	Y								L/M	L/M	L/M	Y
7. Green Certificates	Existing	RE incen-	Mandatory	Y								L	L	L	Y

Name	Status	Type	Enforcement	Target sectors (Y where applicable)								Cost Impacts			Inclusion Status
				Electricity	Gas	Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Industrial gas	2011	2015	2020	
System		tives													
8. Industry 2015: Industrial Innovation Projects	Existing	Energy	Voluntary			Y	Y	Y	Y	Y	Y	L	N/A	N/A	N
9. National Energy Efficiency Action Plan*	Existing	EE	Mandatory	Y								L	L	L	N
10. Utility targets for increasing energy efficiency*	Existing	EE targets	Mandatory	Y	Y							L	L	L	N
11. National Energy Strategy 2008, revised 2010 and 2011	Existing	Energy	Framework	Y	Y							L	L	L	N

Policy 1	White Certificate Trading for End-Use Energy Efficiency
Status	In Force (effective January 2005) Mandatory
Sector coverage	n/a
Aim and key provisions / targets	This policy is currently driven by EU Directive 2006/32/EC on energy end-use efficiency and energy services, although it is not clear if the original policy was domestically or EU-driven. Decrees voted on 20 July 2004 require Italian electricity and gas suppliers to help their customers save energy engendered the 2005 White Certificates trading scheme. The two decrees of 20 July 2004 repealed the two decrees of 24 April 2001 about the identification of quantitative national targets for energy savings and development of renewable sources. In compliance with specific energy conservation targets, all Italian electricity and gas distributors with at least 100,000 end customers at the close of 2001 can - as of May 2006 - trade white certificates of certified energy savings. Energy service providers, subsidiaries of electricity and gas distributors and distributors themselves will all sell energy efficiency certificates (white certificates) each representing primary energy savings of one tonne of oil equivalent (toe). Distribution companies must meet specified energy savings targets, either by implementing energy conservation projects that benefit their customers, which will earn them white certificates, or through the purchase of white certificates produced by energy conservation projects undertaken by others. The White Certificates represent marketable documents issued by the Energy Market Administrator testifying the energy saved by the energy distribution companies - as well as by their controlled partnerships - and by the Energy Service Companies (ESCO). A simplified methodology, by technical cards, is used to determine the quantification of primary energy savings. Savings achieved under the scheme must be additional to measures that would be normally implemented, including those implemented to meet new legal requirements. Reference conditions are thus continuously updated to account for regulatory and market changes. The White Certificates can be exchanged by means of bilateral contracts, or in the frame of a specific market ruled by GME. Three types of white certificates can be produced and traded. Type I certificates are for savings achieved in the electricity sector, Type II certificates for those achieved in the gas sector, and Type III for those in neither sector (from other fuels). In December 2007, new legislative and regulatory changes were introduced. Targets for 2008 and 2009 were made more stringent and new targets introduced for 2010-2012; the implementation period was extended from 2009 to 2012; the scheme was extended to distributors

	with 50 000 customers or more, and a wider range of companies allowed to participate in the scheme (companies with appointed energy managers). In addition, a previous rule obliging electricity distributors to achieve 50% of their savings in the electricity sector, and vice versa for gas distributors, was abolished. Distribution operators can pass the costs incurred by the scheme on to customers, within limits imposed by the Regulatory Authority. For 2009 the tariff limit imposed is EUR 88.92 per toe. In 2009 a new decree (DL 02/2009) was issued confirming the scheme's extension till 2012. In addition, it allows the programme to automatically renew for three additional years in 2012 unless steps are taken by parliament. The Ministry of Environment said in January 2009 that the programme had prevented approximately 2 million tonnes of carbon dioxide emissions. In June 2006, the Italian Regulatory Authority for Electricity and Gas published the criteria and modality for the verification of energy distributors' compliance with the White Certificate Trading Programme. Recent changes to the scheme include: • extension of the implementation period from 2009 to 2012 • increase in the value of yearly quantitative targets for energy savings • lowering the threshold of served customers by the single target-bound distribution system operator (from 100 thousand to 50 thousand). As of October 2006, 700 ESCOs have been allowed to operate within the White Certificate Trading Programme, but only 70 presented conservation project proposals.
Exemptions available to EIIs	No
Who pays for the policy	Power companies
Extent to which objectives met	Information not readily available

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	0.44					
		2015	0.44					
		2020	0.44					
	Sectors		Steel	Aluminium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	11.3	1.5	2.0	0.4	0.1	1.5
		2015	12.4	1.7	2.0	0.5	0.1	1.6
		2020	13.6	1.9	2.2	0.5	0.1	1.7
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0.00	0.00	0.00	0.00	0.00	0.00
		2015	0.00	0.00	0.00	0.00	0.00	0.00
		2020	0.00	0.00	0.00	0.00	0.00	0.00

Source http://www.iea.org/textbase/pm/?mode=cc&id=2085&action=detail
http://www.iea.org/textbase/pm/?mode=cc&id=2594&action=detail
www.autorita.energia.it/operatori/operatori_ee.htm
www.autorita.energia.it/docs/03/103-03.htm

Policy 2	Law concerning anti-crisis measures: energy provisions
Status	In Force (as of August 2009) Mandatory
Sector coverage	General
Aim and key provisions / targets	The domestically-driven Law no. 102 of 3 August 2009, concerning anti-crisis measures, includes three articles designed to accelerate the deployment of more advanced, efficient and energy-saving technologies. The relevant articles are: • Art. 5 concerning the tax reduction for investment in capital goods (appliances and equipment); • Art. 6 concerning depreciation rates for capital goods investments; • Art. 6b concerning measures for business activity in public transport sector. The tax reduction, applying only to businesses (i.e. not for self-employed workers), is applied to personal or corporate income tax and covers 50% of the appliance or equipment investment cost. The reduction can be applied exclusively to investments included into the table ATECO, section 28. This table specifies which types of appliance and equipment are included, essentially industrial equipment such as electric motors, turbines, compressors, heating and cooling systems, equipment for agriculture and metallurgical industry, etc. While the table does not specify energy performance thresholds for the equipment, the measure aims to encourage the replacement of existing equipment with newer, more efficient technology. For 2009, the investments had to be made between 1 July and 31 December, and for 2010 the investments need to be made between 1 January and 30 June. Article 6 on the revision of depreciation rates for capital goods provides that depreciation rates vary for equipment using more advanced technology and in relation to their energy performance, in order to take account of the evolving impact on production processes of more efficient equipment. The coefficients for the tax depreciation are to be established by a subsequent decree.
Exemptions available to EIIs	No
Who pays for the policy	Government
Extent to which objectives	Information not readily available

met	
Estimated cost impacts	Cost impact information not readily available
Source	http://www.iea.org/textbase/pm/?mode=cc&id=4478&action=detail www.parlamento.it/parlam/leggi/09102l.htm

Policy 3	RES promotion
Status	In Force (as of February 2004) Mandatory
Sector coverage	n/a
Aim and key provisions / targets	The Decree entered into force on 15 February 2004 and sets out in twenty articles a national framework for the promotion of renewable energy sources and particularly for their use in micro-generation plants. The decree adopts a definition of electricity produced from renewables consistent with article 2 of the EC Directive 2001/77/EC. The Decree sets a timetable for the periodic reporting, review and monitoring, by the Ministry of Economic Development, of progress towards the implementation of the objectives. It is currently driven by EU Directive on the promotion of the use of energy from renewable sources (2009/28/EC). In addition, the Decree introduces various measures, such as a simplified permit procedure to build power plants, and asking the Regulator to favour the grid connection process. To assess the exploitable energy potential from biomass, an ad-hoc experts committee has been created to help design appropriate legislation. The Decree provides also the adoption of legislation and criteria (minimum requirements, possibility to accumulate incentives, preferential tariffs, capacity targets, use of green certificates) for granting incentives to power produced from solar energy. The Decree includes specific provisions which favour biomass and hybrid plants (i.e., those producing part of their power from renewables) over fossil fuel plants in dispatching. A five-year programme agreement between the MSE and ENEA on RD&D measures to support renewables and energy efficiency has been established. Regional targets for renewable-based electricity are encouraged and regional governments can establish their own plans for renewables support. Specific articles address the issue of guarantee of origin for electricity produced from renewables, which can be requested for plants producing more than 100 MWh per year from GSE. Conditions under which the electricity produced can be sold in the power market or purchased by GSE are indicated. Specific rules are set for the streamlining of authorisation procedures for plants and infrastructure devoted to power production from renewables. A new Renewable Energy Decree was adopted in May 2011. This decree stipulates the national target of 17% renewables by 2020 as part of the primary energy demand. No specific renewable electricity targets are provided.
Exemptions	No

available to EIIs	
Who pays for the policy	Support provided by Government where applicable
Extent to which objectives met	Information not readily available
Estimated cost impacts	See policy 4 below for costs of renewable feed-in tariffs
Source	http://www.iea.org/textbase/pm/?mode=cc&id=1578&action=detail http://www.governo.it/Governo/Provvedimenti/testo_int.asp?d=62612

Policy 4	Finance Act 2008 -- Incentives for EE/RE
Status	In Force (2008) Mandatory
Sector coverage	n/a
Aim and key provisions / targets	The 2008 Budget Law is applicable to EU Directive 2006/32/EC on energy end-use efficiency and energy services and the more recent EU Directive 2009/28/EC on the promotion of the use of energy from renewable sources. It includes new measures relating to the production of electricity from renewable energy sources. This law established the following values for the feed-in tariff: • EUR cents 20/kWh for geothermal plants • EUR cents 34/kWh for tidal and wave • EUR cents 22/kWh for hydroelectric • EUR cents 28/kWh for biomass biogases and bioliquids (vegetal oil) when complying with EU regulation 73/2009 • EUR cents18/kWh for landfill gas, sewage treatment plant gas, biogases and bioliquids • EUR cents 30/kWh for wind plants (up to 200 kW). The passage of Law no. 99 23/7/09 modifies some of these values, which apply to renewable production occurring after the law's entry into force.
Exemptions available to EIIs	Information not readily available
Who pays for the policy	Electricity consumers
Extent to which objectives met	Information not readily available

Estimated cost impacts:

Indirect policy cost impacts to EIIs (via electricity prices)	Estimated cost pass through to EIIs (%)	100						
	Estimated impact on energy prices for EIIs (£/MWh)	2011	4.06					
		2015	7.86					
		2020	11.05					
	Sectors		Steel	Alum-inium	Cement	Chlor-alkali	Fertiliser	Ind gases
	Total estimated incremental annualised costs to EIIs (£mpa)	2011	104.9	13.9	18.3	4.1	0.7	14.1
		2015	222	30	36	8	1	29
		2020	343	47	57	12	2	43
Direct policy cost impacts to EIIs	Total estimated incremental annualised costs to EIIs (£mpa)	2011	0.0	0.0	0.0	0.0	0.0	0.0
		2015	0.0	0.0	0.0	0.0	0.0	0.0
		2020	0.0	0.0	0.0	0.0	0.0	0.0

Source http://www.iea.org/textbase/pm/?mode=re&id=4469&action=detail

Policy 5	New Feed-In premium for photovoltaic systems
Status	Effective 31 December 2010, ends 31 December 2011 Mandatory
Sector coverage	n/a
Aim and key provisions / targets	The Ministerial Decree of 19 February 2007 introduced in Italy a new version of the feed-in premium scheme applied to photovoltaic plants connected to the grid with a nominal capacity higher than 1 kWp realised by individuals, registered companies, condominiums and public bodies. The current EU-driver for this policy is EU Directive on the promotion of the use of energy from renewable sources (2009/28/EC). The decree provided a set of tariffs, valid for a period of 20 years, with a bonus in case of high degree of photovoltaic integration in the buildings. Three types of systems are considered: not integrated, partially integrated and fully integrated. For 2010 the premium for building integration of the systems varies, from a minimum of EUR 0.346/kWh (for un-integrated plants with capacity less than 20 kW) to a maximum of EUR 0.471/kWh (for fully integrated plants with capacity between 1 and 3 MW). A tariff bonus of 5% is provided for: • energy self-producers, as defined by the Decree 79/1999; • public schools and public health centres; • installations integrated to building substituting asbestos roofs; • municipalities with less than 5 000 inhabitants. Plants with a capacity lower than 20 kWp can further benefit from on the spot trading service. Producers can get, in addition to the premium, the price of the electricity they sell either on the market or through bilateral contracts.
Exemptions available to EIIs	No
Who pays for the policy	Electricity consumers
Extent to which objectives met	Information not readily available
Estimated cost impacts	See policy 4 above for costs of feed-in tariffs

Source http://www.iea.org/textbase/pm/?mode=cc&id=3813&action=detail
www.gse.it/attivita/ContoEnergiaF/Pagine/default.aspx

Policy 6	Feed-In Tariff for Solar Thermodynamic Energy
Status	In Force (as of 2008) Mandatory
Sector coverage	n/a
Aim and key provisions / targets	The Decree of 11 April 2008 lays down the criteria to stimulate the production of electricity from solar thermodynamic plants, including hybrid ones, connected to the electricity grid, and built in Italy. Plants must be equipped with thermal accumulation systems. The current EU-driver for this policy is EU Directive on the promotion of the use of energy from renewable sources (2009/28/EC). On top of the selling price, net electricity produced by thermodynamic solar plants commissioned after 18 July 2008 can obtain a feed-in premium for 25 years. Up to 2012 the bonus varies from EUR 0.22 to EUR 0.28 / kWh depending on the level of integration of the plants. In case of hybrid plants, the feed-in tariff decreases depending on the ratio between the amount of energy not produced by a solar energy source and the amount produced by a solar energy source. The maximum cumulative power of all solar thermodynamic plants eligible for the incentives corresponds to 1.5 million square metres of cumulative surface. The national objective of total power to be installed by 2016 corresponds to 2 million square metres of cumulative surface. For the 2013-2014 period, such bonus values will be reduced by 2% a year; from 2014 onward special Ministerial Decree will define further cuts.
Exemptions available to EIIs	No
Who pays for the policy	Electricity consumers
Extent to which objectives met	Information not readily available
Estimated cost impacts	See policy 4 above for cost estimates of renewables feed-in tariffs
Source	http://www.iea.org/textbase/pm/?mode=cc&id=4106&action=detail www.gse.it/attivita/solaretermodinamico/Pagine/default.aspx

Policy 7	Introduction of the Green Certificates System
Status	In Force (effective as of 2002) Mandatory
Sector coverage	Power sector
Aim and key provisions / targets	The 1999 Electricity Liberalisation Act and Decrees from Italy's Ministries of Trade and Industry and of Environment (MICA Decree 11/11/99) introduced a cap and trade mechanism to promote renewable energy sources. It required Italian energy producers and importers (producing or importing more than 100 GWh/year from conventional sources) to ensure that a certain quota of electricity fed into the grid comes from renewable energy sources. The budget law of 2008 (Law No 244 24-12-2007) sets the following minimum obligation quotas: • 2007: 3.8% • 2008: 4.6% • 2009: 5.3% • 2010: 6.1% • 2011: 6.8% Producers and importers can comply with the obligation by means of green certificates. They can buy those certificates through bilateral contracts or participating to the green certificates platform (managed by GME, the energy markets operator). Suppliers can fulfil the obligation by buying green certificates from entitled new renewable energy plants, by building new renewable energy plants, or by importing electricity from new renewable energy plants from countries with similar instruments on the basis of reciprocity. Renewable source plants that came into operation before 31 December 2007 can obtain green certificates for 12 years. Subsequent regulatory interventions have increased the incentive period to 15 years. *Update:* On 29 March 2011, the Legislative Decree no. 28 entered into force. This Decree, also known as “Renewables Decree”, constitutes the implementation Directive 2009/28/EC on the promotion of the use of energy from renewable sources. This basically reforms Italy’s Green Certificate System. In particular, it requires that plants operational starting 2013 will apply a new feed-in tariff system. For plants built up to December 2012, current scheme would still be used but by 2015, a feed-in tariff would be applied. From 2013, the Green Certificate requirement will be at 7.5% and will decrease to o by 2015 when feed in tariffs will apply to all new renewable projects. Up to 2011, Italy’s costs of green certificates have been among the

	highest in the EU according to Ecofys, Fraunhofer ISI, TU Vienna EEG, Ernst &Young (2011) Financing Renewable Energy in the European Energy Market. Report for the European Commission.
Exemptions available to EIIs	No
Who pays for the policy	Electricity producers and users
Extent to which objectives met	Information not readily available
Estimated cost impacts	See policy 4 above for cost estimates for Feed-in Tariffs
Source	http://ec.europa.eu/energy/renewables/studies/doc/renewables/2011_financing_renewable.pdf GLS Brokers LTD, "The Italian Green Certificates regime and its future perspectives", May 2011. http://www.gse.it/attivita/statistiche/Documents/Statistiche%20Rinnovabili%202010.pdf

Policy 8	Industry 2015: Industrial Innovation Projects
Status	In Force (effective 2007) / Voluntary
Sector coverage	n/a
Aim and key provisions / targets	In its 2007 fiscal budget the Italian government planned for the Industry 2015 programme, which is a domestically-driven policy comprised two new funding mechanisms and a call for projects to promote innovation in Italian industry. Selected projects, involving a variety of private sector enterprises of various sizes as well as research institutions, would receive co financing from the government. Two of the project streams target sustainable mobility and industrial energy efficiency and use of renewable energy, and were launched in 2008. In January 2009, the Industrial Energy Efficiency stream selected 30 projects mobilising an investment of EUR 500 million in research and development targeting both efficiency and the use of renewable energy technologies. Approximately 65% of the investment funding (and 56% of company proposals) target bioenergy, energy production from waste and solar photovoltaics. The remaining 35% of investments target high-efficiency building materials, improved efficiency in end-use systems and sub-systems, as well as wind energy.
Exemptions available to EIIs	No
Who pays for the policy	Government
Extent to which objectives met	Information not readily available
Estimated cost impacts	Information not readily available on how the funding has been broken down into EE, RE etc. It is noted that this relates to historic funding as no additional funding is available.
Source	http://www.iea.org/textbase/pm/?mode=cc&id=4290&action=detail www.industria2015.ipi.it/index.php?id=3

4. Derivation of quantitative metrics

4.1 Methodology

4.1.1 Criteria and selected metrics

The criteria to be used in identifying suitable metrics for this study were agreed with the Steering Group during the inception phase. These included:

- Simplicity
- Data availability
- Consistency
  - across countries
  - with industry approaches
- Transparency[59]
- Ability to consider future policies

Based on these criteria, the selected metrics were:

				Units
Indirect policy costs:	Policy cost affecting the power sector (£pa) / Electricity generation (MWh pa)	x	Cost pass through factor (%)	£/MWh
Indirect plus direct policy costs:	Additional electricity costs (£pa) / EII sector production (tpa)	+	Policy cost affecting EII sector directly (£pa) / EII sector production (tpa)	£/t product

[59] It is important that methods underlying the metric and data can be understood

$$\frac{\text{Additional electricity costs (£pa)} + \text{Policy cost affecting EII sector directly (£pa)}}{\text{EII GVA (£pa)}} \quad \%$$

4.1.2 Determining policy costs

This section describes the methodologies and data used to derive the cost estimates that are included in the metrics. This study has sought to obtain the best available information on the costs of the key policies. However in many cases cost data is not available and hence estimates have been made. Given the wide range of policies and countries under consideration, it has not been possible within the scope of this study to undertake detailed analysis of cost impacts. Instead, indicative cost estimates have been developed, using data that is readily available and using methods that enable a consistent approach to be applied across the different countries. As such, whilst there is a relatively high level of uncertainty associated with absolute cost estimates of individual policies given the range of simplifying assumptions and limitations of data, the analysis should provide a good indication of the relative cost impacts across the target countries and sectors in order to support the comparison of the key energy and climate change policies.

Methodologies

The approach taken to determining policy costs for the selected countries is summarised below. Note that costs are presented in 2010 real prices and the currency exchange rates that have been used are shown in Appendix 3 Section 13.

The first choice was to obtain data from impact assessment studies or similar studies that have examined the specific policies in detail. Such data has been available for the UK policies (based on recent analysis by DECC[60]), the US policies and some of the EU policies.

Where such data is not available, the second choice was to develop estimates using the methods in the table below.

[60] From analysis undertaken by DECC for the report 'Estimating impacts of energy and climate change policies on energy prices and bills', November 2011.
http://www.decc.gov.uk/en/content/cms/meeting_energy/aes/impacts/impacts.aspx

Table 4-1: Methods for developing cost estimates of policies

GHG – trading

For the EU ETS the methods are as follows:

Direct costs:

The approach for estimating direct costs involves use of the data on % added direct EU ETS costs per unit of gross value added (GVA) derived by the European Commission in the document "Table with results of the quantitative analysis at NACE-4 digit level (1st July 2009)"[61] as follows:

(1) The % added cost / GVA was applied to the GVA data[62] to determine the absolute added cost figure.

(2) The value in (1) was multiplied by the proportion of need not met by free allocation, derived from data provided by Bloomberg New Energy Finance[63].

(3) The values in (2) are then corrected to be in line with the EUA price assumptions (see below), compared to those in the original EC analysis.

Key notes related to this approach include:

- In 2011 the proportion of need not met by free allocation is negative due to over allocations in Phase II compared to actual emissions (hence allocations are available for sale, e.g. to power sector, or banking), whereas in 2015 and 2020 the proportions are positive and increasing due to more stringent allocations based on bottom-up benchmarks equivalent to the average of the top 10% GHG emissions efficient installations for each product group.
- Industry is likely to smooth out the actual costs over time by banking Phase II allowances for Phase III compliance rather than selling them. Such an action will reduce the Phase II benefits and the Phase III costs of the EU ETS. However, for the purposes of this study such assumptions are not made and companies will gain the value of surplus allowances or pay the purchase costs based on their annual compliance, with no banking.
- Actual direct costs of the EU ETS will be lower than the estimates in this study if these industries undertake low cost abatement.
- Firms which are more carbon-efficient than average will face lower specific costs than shown, while less efficient firms will face higher specific costs
- Free allocation for the steel sector in Phase III has excluded allowances associated with waste gas transfers. Any allowances the steel industry receives in this area will further increase their allocation relative to need and reduce their costs.

Indirect costs:

For non-UK MSs: £pa EII = ((EUA * power sector CO2 emissions[64]) / MWh generated) *

[61] Assuming 100% auctioning and €30/t EUA prices. EU wide average data for 2008. http://ec.europa.eu/clima/policies/ets/leakage/docs/20090701_list_sectors_en.pdf

[62] Using 2008 data to be consistent with the year of data for % added cost / GVA (see previous note). Note that GVA data was available for each of the sectors except chlor-alkali where the data covered basic inorganic chemicals. This will lead to an overestimation of the cost impacts of EU ETS on the chlor-alkali sector.

[63] Data supplied from DECC on 24 November 2011. Some details of Bloomberg's modelling are given in Bloomberg New Energy Finance (2012), "Carbon Markets – EU ETS" (Leaflet dated 17 April 2012).

MWh consumed by EII.

For Phase III (i.e. 2015 and 2020 milestone years in this study) there will be 100% auctioning to the power sector and therefore this approach is considered reasonable within the scope of this study. For Phase II (i.e. 2011 milestone year) this approach is more of a simplification although is still considered reasonable given the inconclusive studies[65] and complex range of factors involved.

For UK: Data has been provided by DECC (see above-referenced footnote). The estimated price and bill impacts of the EU ETS and Carbon Price Floor (CPF) are based on analysis of the impact of the carbon price on wholesale electricity prices. The results presented assume full cost pass through of the EUA (carbon) price faced by the marginal generator to end use consumers regardless of whether allowances are allocated free of charge to generators or are purchased from auctions or the secondary carbon market.

Note that this data only covers indirect costs, so direct costs for the UK were calculated in line with the abovementioned method that has been applied to other MSs.

Potential compensation to EIIs due to indirect EU ETS costs has not been modelled for any MS as specific policies have not yet been agreed.

Note that the indirect EU ETS costs for 2011 have been subtracted from the electricity prices (excl all taxes) from Eurostat (2010 data) to derive a base electricity price for non-UK MSs. For the UK, base electricity price data is from DECC – see Table 4.3.

EUA prices:

For the main analysis the EUA prices assumed in the EU ETS modelling (in 2010 prices[66], central fossil fuel prices, without impact of Carbon Price Floor[67]) are:

2011: £13.1/t

2015: £18.3/t

2020: £27.7/t

However, as a sensitivity, the Steering Group has requested that the impact of market forecasts of EUA prices[68] are considered (for UK, indirect impacts are unaffected by this due to the impact of the Carbon Price Floor). These are as follows:

[64] See Appendix 3 for details of assumed power sector CO2 emissions

[65] A range of studies undertaken during phases I and II of the EU ETS provide estimates of the impact of the EU ETS on electricity prices in a range of EU countries. These studies indicate that the level of pass-through under free allocation to the power sector depends on electricity market structure and the price setting generation type, i.e. the marginal plant in the despatch curve. However, these studies vary in their assumptions and results and are inconclusive with regards to the detailed impacts of the EU ETS on electricity prices for large industrial consumers. Studies include: Neuhoff, K., Grubb, M., & Keats, K. (2005). *Impact of the Allowance Allocation on Prices and Efficiency.* Faculty of Economics, University of Cambridge. Cambridge Working Papers in Economics; Newbery, D. (2005). *Emissions Trading and the Impact on Electricity Prices.* Cambridge University; Nind, A. (2005). *Implications of the EU-ETS for the power sector and electricity prices.* ILEX Energy Consulting; Reinaud, J. (2007). *CO2 Allowance and electricity price interaction.* International Energy Agency. OECD; Sijm, J., Bakker, S., Chen, Y., Harmsen, H., & Lise, W. (2005). *CO2 price dynamics: The implications of EU emissions trading for the price of electricity.* ECN. Energy Research Centre of the Netherlands; Sijm, J., Hers, S., Lise, W., & Wetzelaer, B. (2008). *The impact of the EU ETS on electricity prices.* Energy Research Centre of the Netherlands. ECN.

[66] Converted to 2010 prices using deflator index from HMT website using growth projections from Budget 2011.

[67] taken from 'Carbon values used in DECC's energy modelling', DECC, October 2011. http://www.decc.gov.uk/en/content/cms/emissions/valuation/valuation.aspx

2011: £11.6/t

2015: £13.0/t

2020: £14.5/t

Key notes include:

- Prices are for the December contract for each of the relevant years. These are the average price these contracts have traded on the Intercontinental Exchange (ICE) from January 1st to November 23rd 2011.
- There is no significant volume of trading for contracts beyond 2014. Figures beyond then should therefore be treated with caution

For the US, we have estimates from policy impact assessment studies

Energy efficiency – trading, standards, efficiency upgrade, targets, technology requirements, etc

Indirect costs:

£pa power sector = tpa CO2 ↓ * £/t CO2 for energy efficiency improvements for coal, gas and other power generation types

£/MWh = £pa power sector / MWh generated

£pa EII = £/MWh * MWh consumed by EII

Direct costs:

£pa EII = Energy consumption ↓ * £/ unit energy consumption ↓ from fuel and electricity conservation supply curves

Renewable energy targets

Increase in costs to EIIs of feed-in tariffs (in 2015 and 2020 vs 2011)

Increase in electricity price (in 2015 and 2020):

£/MWh = ((MWh ↑ RE_{wind} * £/MWh FiT_{wind}) + (MWh ↑ RE_{solar} * £/MWh FiT_{solar}) + (MWh other sources * £/$MWh_{Current}$)) / MWh total) - £/$MWh_{Current}$

Increase in costs to EIIs:

£pa EII = £/MWh * MWh consumed by EII

Increase in costs to EIIs of price premia for renewables (in 2015 and 2020 vs 2011):

Increase in electricity price (in 2015 and 2020):

£/MWh = ((MWh ↑ RE_{total} * £/MWh extra cost of RE)) / MWh total)

Increase in costs to EIIs:

£pa EII = £/MWh * MWh consumed by EII

Cost of RE in 2011:

£/MWh = ((£/MWh extra cost of RE_{wind} * MWh $RE_{wind\ 2011}$) + (£/MWh extra cost of RE_{solar} * MWh $RE_{solar\ 2011}$)) / MWh total

[68] Original prices in Euros and assuming a conversion rate of €1 = £0.858. Converted to 2010 prices using deflator index from HMT website using growth projections from Budget 2011

£pa EII = £/MWh * MWh consumed by EII

Energy prices

If related to fuels

£/MWh = % ↑ fuel costs * % fuel in overall generation mix * £/MWh current average

£pa EII = £/MWh * MWh consumed by EII

If related to electricity prices

£pa EII = £/MWh change in electricity price * MWh consumed by EII

Data

The data sources used for developing the cost estimates are shown in the table below.

Table 4-2: Data for developing cost estimates of policies

Type of policy	Specific policies	Reference	Notes
GHG	EU ETS	See previous table	See previous table
	RGGI – US	New York State website	
	California ETS – US	'California Industry Impacts of a Statewide Carbon Pricing Policy', Morgenstern, Richard and Eric Moore, December 2010	
	NSPS and BACT under Tailoring Rule – US	APPA comments referring to study 'Growth from Subtraction, Impact of EPA Rules on Power Markets', Credit Suisse, September 23, 2010; and ICF estimates	
Energy Efficiency	Energy efficiency – trading, standards, efficiency upgrade, targets. Direct costs Including: - China – 10,000 Enterprises Programme; - India – PAT	Energy conservation supply curves from 'China Energy and Emissions Paths to 2030', Ernest Orlando Lawrence Berkeley National Laboratory, January 2011	*China:* Fuel conservation supply curves used for steel and cement, the dominant contributors to energy consumption out of the EII sectors of interest. Assumed to be representative of the overall EII sectors of interest. Used to determine average cost

Type of policy	Specific policies	Reference	Notes
	Scheme; - Japan – Sectoral Energy Efficiency Targets; - Russia – Federal Target Oriented Programme of the Russian Federation.		of reducing a unit of energy consumption, which is then multiplied by energy consumption reduction target. Cost estimates assume measures with average cost-effectiveness are taken up. *India:* Assuming same net cost of reducing a unit of energy consumption as China due to similar assumed BAU technology profile and energy costs *Japan:* Assuming same net cost of reducing a unit of energy consumption as China. Whilst energy conservation measures will be more expensive (due to greater BAU technological progress), this will be counter-acted by greater energy costs (e.g. electricity cost is approximately double) and hence greater value of energy savings. More detailed investigations would be needed to develop more accurate estimates. Note the cost estimates relate to the general energy efficiency targets and not the sectoral benchmark targets, due to lack of data on the expected additional energy

Type of policy	Specific policies	Reference	Notes
			consumption reductions of the benchmarks. *Russia:* Assuming net cost of reducing a unit of energy consumption is that of China, multiplied by the relative energy cost (taking electricity cost as a proxy, i.e. cost in Russia is approx 65% of cost in China), as energy savings make up the dominant portion of the net cost. This assumes a similar BAU technology profile.
	Energy efficiency – trading, standards, efficiency upgrade, targets. Indirect Costs As above plus: - China – Efficiency Upgrade; - Turkey – Ministry of Energy and Natural Resources Strategic Plan	Cost effectiveness of energy efficiency measures at power stations from 'Integrating Consultancy – Efficiency Standards for Power Generation', Report by Sinclair Knight Merz for Australian Greenhouse Office, 2000	This reference indicates it is significantly more cost-effective to apply energy efficiency measures at coal power stations, than gas or oil. As such, energy efficiency measures for the power sector are focussed on coal power stations. Note that the cost impacts related to direct costs (see above) are significantly higher than those of indirect costs.
	IGCC and supercritical technology - India	Differential costs of IGCC and conventional coal taken from Electric Power Research Institute (EPRI) presentation: Dalton, Stu, Cost Comparison of IGCC and Advanced Coal, July 2004	
	CHP Support – Germany	See policy description in Section 3.2.11 (Policy 2)	

Type of policy	Specific policies	Reference	Notes
	White Certificate Trading – Italy	Il meccanismo dei Titoli di Efficienza Energetica (certificati bianchi) dal 1° giugno al 31 dicembre 2010[69]. Struttura, prezzi e qualità nel settore elettrico[70]	
RE	Feed-in Tariff	FiT prices and renewable electricity price premia are quoted in the policy descriptions in Section 3 Details of electricity generation levels by energy source given in Appendix 3	We have not made assumptions about the evolution of FiT prices beyond currently available information. As such, we have assumed the currently available information applies over the time horizon of this study.
	ITC and PTC – US	'Federal Policies for Renewable Electricity, Impacts and Interactions', Palmer, Karen, et al, Resources for the Future, January 2011.	The study looked at the impacts of various tax credits included in the American Recovery and Reinvestment Act of 2009. Their analysis combined the tax credits impacts and did not differentiate between the different types of tax credits. We used the combined impacts results for ITC and PTC. The study considered the impacts by region and we used the average for the U.S. as a whole.
Energy Taxes	China - Differential electricity pricing (China Policy 4) India – National Clean Energy Fund (India Policy 5)	See policy descriptions in Section 3	As left

[69] http://www.autorita.energia.it/allegati/pubblicazioni/2sem2009TEE.pdf

[70] http://www.autorita.energia.it/allegati/relaz_ann/11/ra11_1_2.pdf

Type of policy	Specific policies	Reference	Notes
	Japan – Energy Tax Reform on Fossil Fuels (Japan Policy 6) Denmark – Green Tax Package Scheme (Denmark Policy 4) Germany – Eco taxes (Germany Policy 4)		
	France Italy	See Appendix 2, Sec 1.8 (France) and 1.11 (Italy)	As left
	Turkey	See following table	See following table
Energy Policy	Energy policy: Amendment of Atomic Power Act - nuclear phase out – Germany	Vereinigung der Bayerischen Wirtshaft, 2011. Ausstieg_aus_der_Kernenergie_bis_2022_Konsequenzen_fuer_Deutschland_und_Bayern[71] EWI, GWS, PROGNOS, 2010. Energieszenarien für ein Energiekonzept der Bundesregierung[72]. Friedrich-Ebert-Stiftung, 2011. Der Einstieg in den Ausstieg Energiepolitische Szenarien für einen Atomausstieg in Deutschland[73].	
	Energy policy: Law on organisation of electricity markets & EXELTIUM – France	Source: pps 26 and 41 of foot noted reference[74]	

[71] http://www.vbw-bayern.de/agv/vbw-Themen-Wirtschaftspolitik-Energie-Publikationen-Ausstieg_aus_der_Kernenergie_bis_2022_Konsequenzen_fuer_Deutschland_und_Bayern--14361,ArticleID__20668.htm

[72] http://www.bmu.de/files/pdfs/allgemein/application/pdf/energieszenarien_2010.pdf

[73] http://library.fes.de/pdf-files/wiso/08339.pdf

[74] http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000023174854&categorieLien=id

A summary of the base electricity data used in the study as well as taxes on electricity is given in the table below.

Table 4-3: Electricity price data and energy taxes (2010 prices)

Country	Base price[75] (£/MWh)	Energy taxes (£/MWh)	Reference	Notes
China	52.5	10.2 plus other taxes (see notes)	2010 annual communication on the implementation of electricity price and settlement of electricity charges', State Electricity Regulatory Commission[76].	The quoted energy tax is the Differential Electricity Pricing policy (China Policy 4, see Sec 3.2.3). The base price is the price quoted from the reference minus the impact of this policy and RE costs. Within the base price there are some other taxes including Government Funds (approx 6.5% of electricity price) and the FGD mark-up (approx £1.5/MWh)
India	53.8	0.3 plus other taxes (see notes)	2009 price for large industry from Central Electricity Authority	Details of changes in regulated prices between 2009 and 2010 not readily available. Quoted base price considered reasonable by ICF specialists in India. The quoted energy tax is the National Clean Energy Fund policy (India Policy 5, see Sec 3.2.4). The base price quoted includes other taxes which vary across states between 0% and 17%. There is no uniform structure across states for taxes, duties, cess charged on electricity sales. Some states

[75] The base price was intended to exclude all taxes, climate change policy costs, renewable energy costs and energy policy costs. However, in some cases it has not been possible within the scope of this study to fully disentangle the different elements that make up the total electricity price. Elements that are included in the base price include some or all energy taxes for countries outside the EU and Turkey.

[76] Original Chinese document: www.serc.gov.cn/ywdd/201109/W020110928342946677139.doc

				collect taxes in other forms.
Japan	101.9	3.1 plus other taxes (see notes)	IEA	The quoted energy tax is the increase in energy taxes as part of the 'Special Provision on Taxation for Global Warming Countermeaure' under the overall Energy Tax Reform on Fossil Fuels (Japan Policy 6, see Sec 3.2.5). The existing level of energy tax under this policy is included in the base electricity price.
Russia	33.8	Included in base price	Federal Statistics Service	The base price includes energy taxes
Turkey	60.0	2.3	Base price based on Eurostat 2010 data, Band IF 70k MWh < consumption < 150k MWh[77]	
US	29.6	Included in base price	Annual Survey of Manufacturers and Annual Energy Outlook	The base price includes energy taxes
Denmark	58.1	0.0	Source of base price as for Turkey For details of energy tax see Denmark Policy 4, Sec 3.2.9	Base price equals Eurostat price excl all taxes (£67.5/MWh) minus indirect EU ETS costs and RE costs
France	44.4	1.3	Source of base price as for Turkey For details of energy tax see Appendix 2, Sec 1.8	Base price equals Eurostat price excl all taxes (£45.6/MWh) minus indirect EU ETS costs and RE costs
Germany	47.7	0.08	Source of base price as for Turkey For details of energy	Base price equals Eurostat price excl all taxes (£58.9/MWh) minus

[77] The Eurostat data that has been used is that which is most representative of large energy intensive industry, and for which a full data set is available. For this reason, data for Band IG (which represents the largest size category) has not been used. However it is noted that where Eurostat data covers both bands, there is only a small difference in electricity prices between the two bands.

			tax see Germany Policy 4, Sec 3.2.11	indirect EU ETS costs, RE costs and transmission and distribution charges[78]
Italy	70.7	0.0	Source of base price as for Turkey For details of energy tax see Appendix 2, Sec 1.11	Base price equals Eurostat price excl all taxes (£80.1/MWh) minus indirect EU ETS costs and RE costs
UK	54.1	1.6	DECC report 'Estimating impacts of energy and climate change policies on energy prices and bills', November 2011.	

Details on production and GVA data for each sector can be found in Appendix 3.

4.2 Development of metrics

4.2.1 Indirect policy impacts

This section presents the metrics that have been developed to compare electricity prices across the countries of interest, and the incremental impacts on electricity prices of the different energy and climate change policies.

These are shown in Figures 4-1 and 4-2 and Table 4.4 on the basis of the DECC values for EUA prices. A sensitivity on EUA prices is shown later in this section.

The different elements in the figures include:

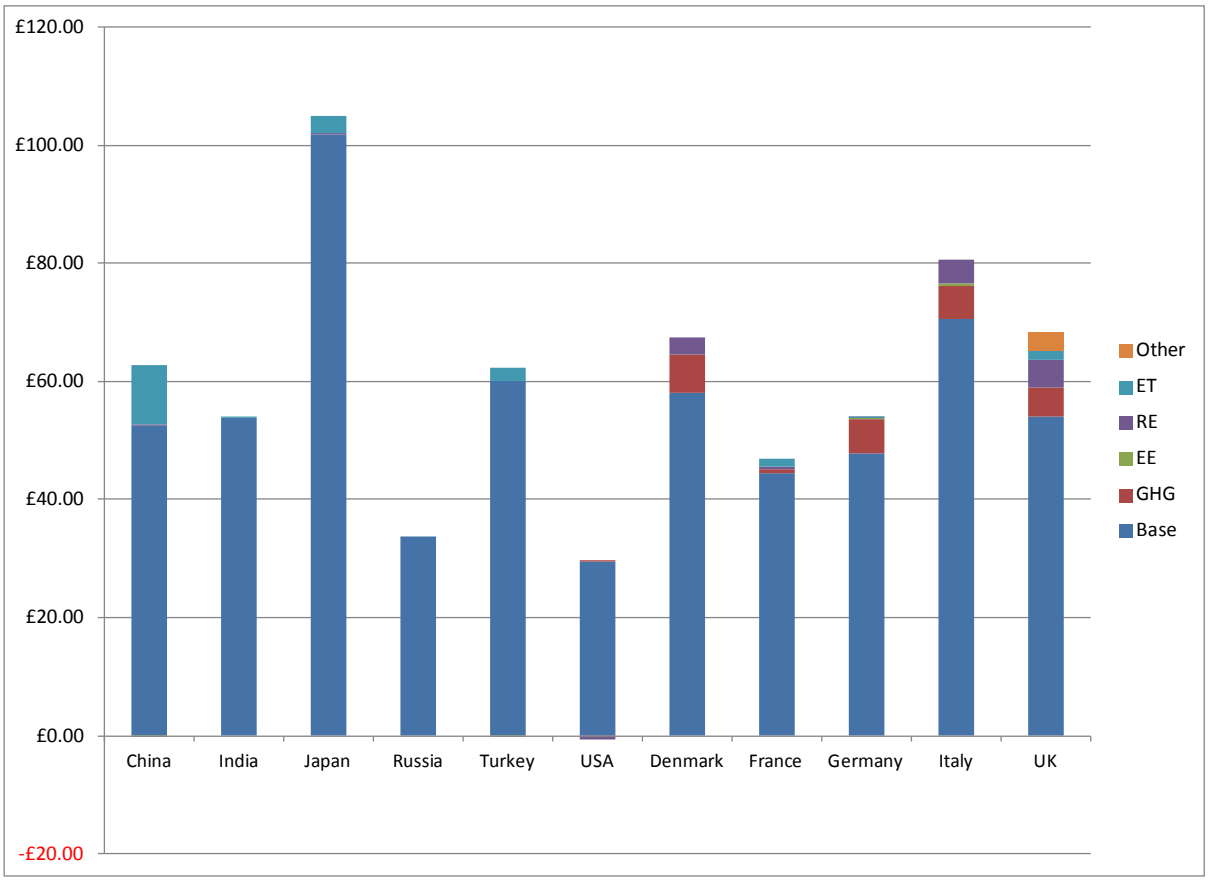
- 'Base' – the estimated base electricity price applicable to the relevant sectors
- 'GHG' – the incremental cost of GHG policy measures e.g. EU ETS
- 'EE' – the incremental costs of Energy Efficiency policy measures e.g. the Chinese 10,000 Enterprises Programme; the Japanese Sectoral Energy Efficiency Benchmarks etc
- 'RE' – the incremental costs of Renewable Energy policy, in particular the renewable feed-in tariffs and other policies needed to achieve renewable energy production and capacity targets

[78] The German electricity prices for EIIs used in this report take into account the discount for EIIs on transmission and distribution charges as described in Appendix 2 Section 1.9. From the information readily available at the time of this study, we are not aware of similar discounts in the other MSs of interest, although further investigations outside the scope of this study would be required to confirm this.

- 'ET' – the incremental costs of Energy Taxes
- 'Other' – the incremental costs of other policies including Energy policy

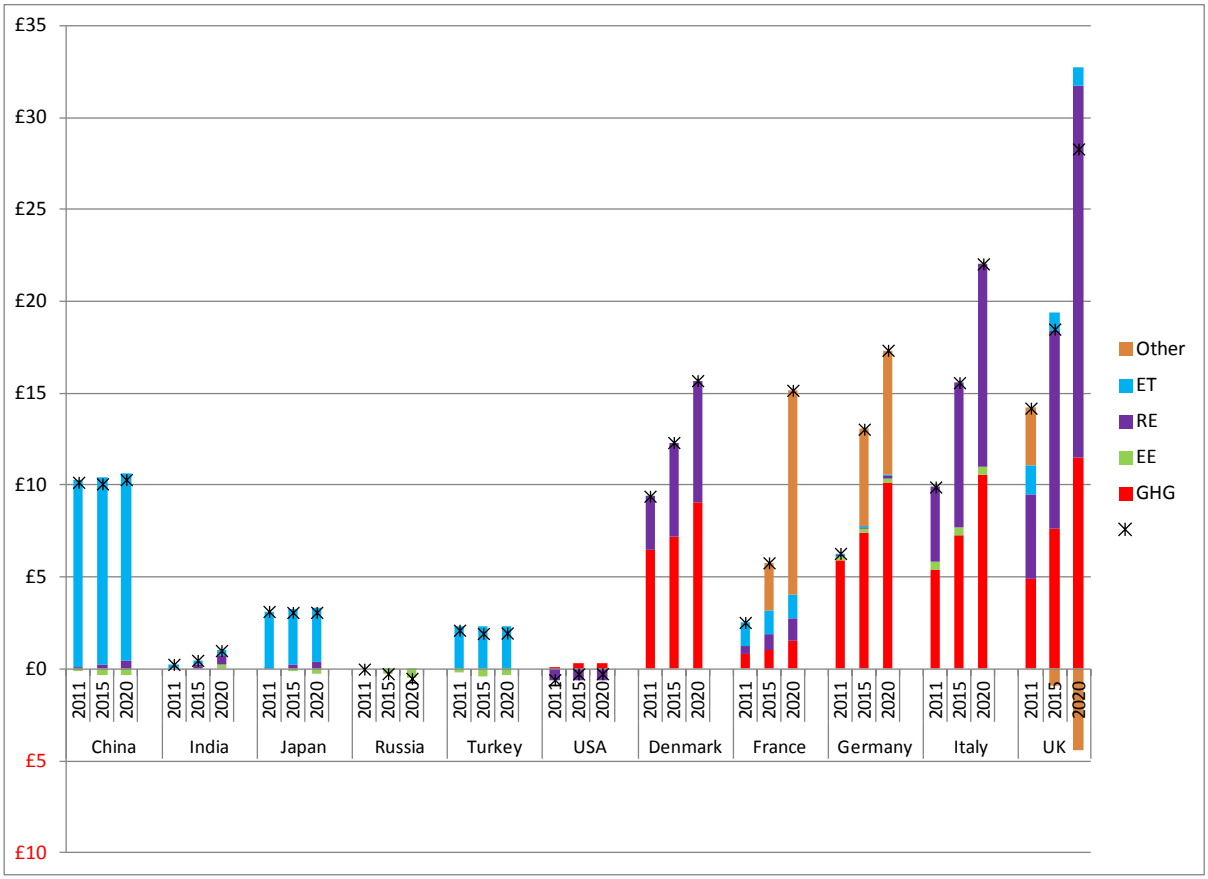
In their publication, 'Estimated impacts of energy and climate change policies on energy prices and bills', DECC present a range for the costs associated with renewable policies, given that, for example those industrial consumers that generate electricity on site will not be subject to some of these costs. The impacts presented for the UK throughout this report are estimates of the policy costs faced by those EIIs who purchase all their electricity from an energy supplier and face the full cost of all policies consistent with an equal cost per unit of supply across all electricity customers..It should be noted that those industrial users generating electricity onsite would face lower policy costs than illustrated.

Figure 4-1: Base electricity price and indicative incremental impacts in 2011 on electricity price of energy and climate change policies (£/MWh, 2010 prices)[79]



[79] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011,

Figure 4-2: Indicative incremental impacts in 2011, 2015 and 2020 on electricity price (£/MWh, 2010 prices) of energy and climate change policies[80]



[80] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011, .

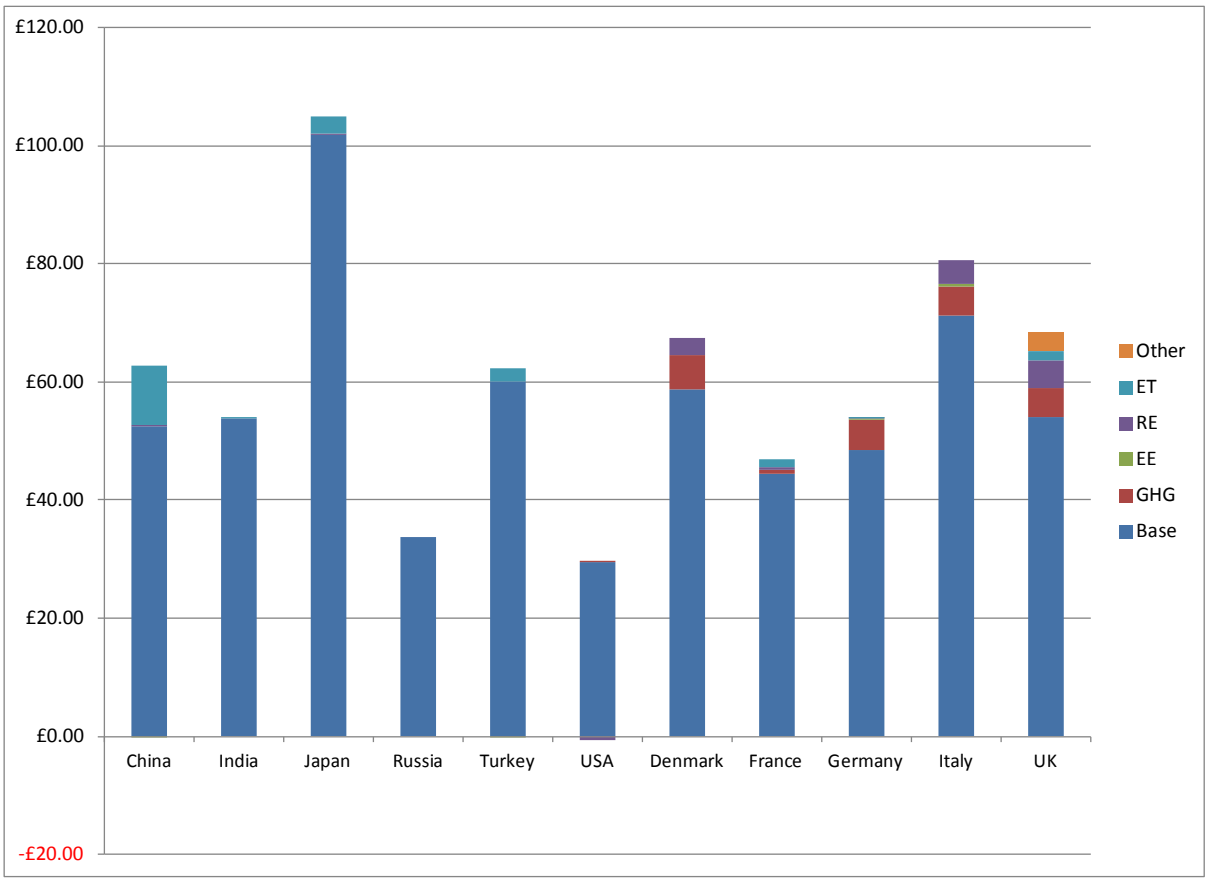
Table 4-4: Indicative incremental impacts on electricity price (£/MWh) of energy and climate change policies (real, 2010 prices)

Country	GHG trading & standards			Energy efficiency targets			Renewable energy feed-in tariffs & incentives			Energy taxes			Other			Total		
	2011	2015	2020	2011	2015	2020	2011	2015	2020	2011	2015	2020	2011	2015	2020	2011	2015	2020
China	0.0	0.0	0.0	-0.1	-0.4	-0.3	0.1	0.3	0.5	10.2	10.2	10.2	0.0	0.0	0.0	10.2	10.1	10.3
India	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.5	0.3	0.3	0.3	0.0	0.0	0.0	0.3	0.5	1.0
Japan	0.0	0.0	0.0	0.0	-0.1	-0.3	0.1	0.2	0.4	3.1	3.0	3.0	0.0	0.0	0.0	3.1	3.1	3.1
Russia	0.0	0.0	0.0	0.0	-0.2	-0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.5
Turkey	0.0	0.0	0.0	-0.2	-0.4	-0.4	0.0	0.0	0.0	2.3	2.3	2.3	0.0	0.0	0.0	2.1	1.9	2.0
USA	0.0	0.3	0.3	0.0	0.0	0.0	-0.6	-0.6	-0.6	0.0	0.0	0.0	0.0	0.0	0.0	-0.6	-0.3	-0.2
Denmark	6.4	7.2	9.1	0.0	0.0	0.0	3.0	5.1	6.6	0.0	0.0	0.0	0.0	0.0	0.0	9.4	12.3	15.7
France	0.8	1.1	1.5	0.0	0.0	0.0	0.5	0.9	1.2	1.3	1.3	1.3	0.0	2.6	11.1	2.5	5.8	15.2
Germany	5.9	7.4	10.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	5.2	6.8	6.3	13.1	17.3
Italy	5.4	7.3	10.6	0.4	0.4	0.4	4.1	7.9	11.1	0.0	0.0	0.0	0.0	0.0	0.0	9.9	15.6	22.0
UK	4.9	7.6	11.5	0.0	0.0	0.0	4.6	10.8	20.2	1.6	1.0	1.0	3.1	-0.9	-4.4	14.2	18.5	28.3

As explained in Table 4-1, this study has considered a **sensitivity for EUA prices** assuming market forecasts rather than the values quoted in DECC's document 'Carbon values used in DECC's energy modelling' (October 2011) which have been used for the main analysis.

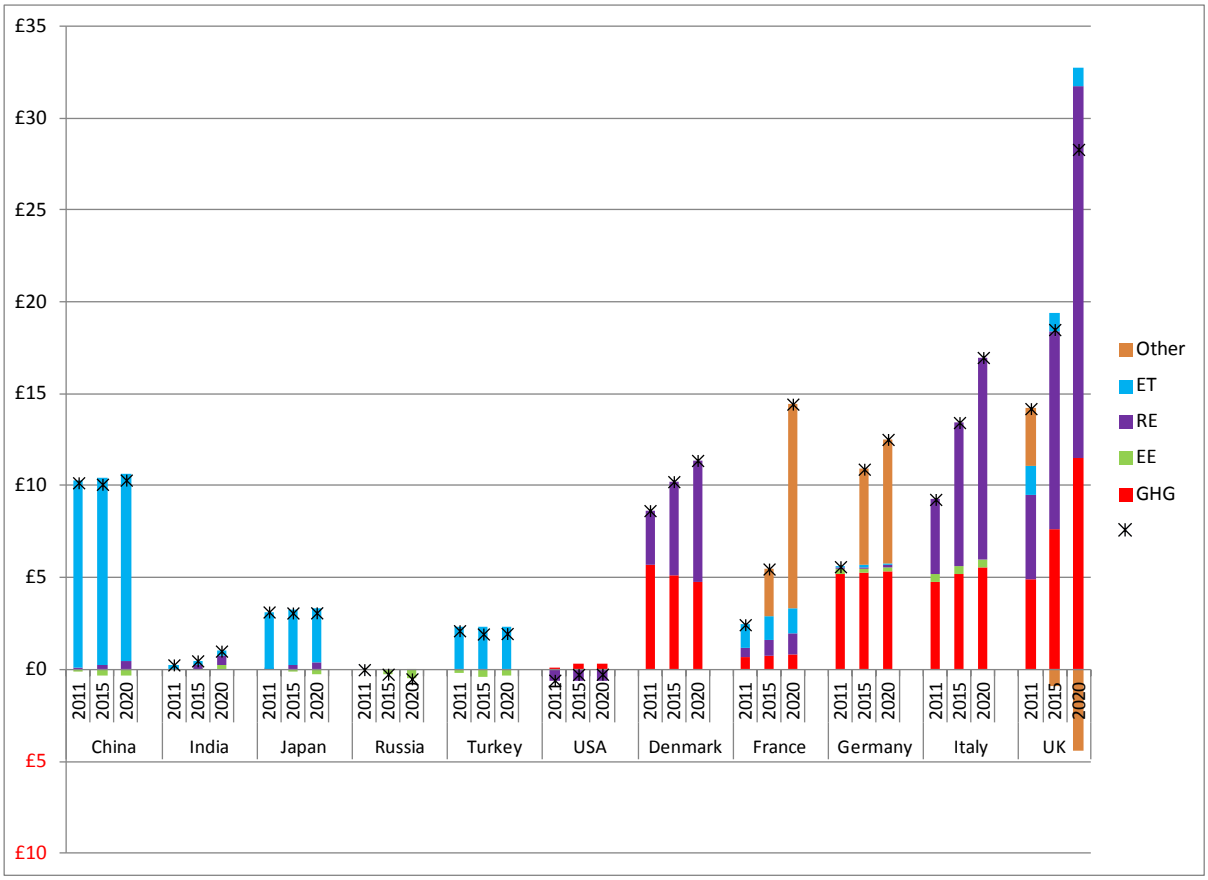
Using these market forecasts (see Table 4-1) the incremental impacts on electricity prices of climate change policies are shown in the following figures. For this sensitivity the UK costs are unaffected due to the effect of the Carbon Price Floor.

Figure 4-3: Base electricity price and indicative incremental impacts in 2011 on electricity price of energy and climate change policies (£/MWh, 2010 prices) – Sensitivity using market forecasts of EUA prices[81]



[81] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

Figure 4-4: Indicative incremental impacts in 2011, 2015 and 2020 on electricity price (£/MWh, 2010 prices) of energy and climate change policies – Sensitivity using market forecasts of EUA prices[82]



The following observations can be made from the development of metrics for indirect policy costs to EIIs expressed per unit of electricity, based on the DECC values for EUA prices:

- The UK has a base electricity price for EIIs within the range of the other EU Member States considered in this study (higher than France and Germany, lower than Italy and Denmark).
- Compared to the non-EU countries in this comparison, the UK's base electricity price for EIIs is significantly higher than prices in Russia and USA, is similar to prices in China and India, slightly lower than prices in Turkey and significantly lower than prices in Japan.
- Differences in base electricity prices between countries reflect several factors, including: different supply mixes, different transmission and distribution costs, different non-energy taxes, and different market structures.
- The UK has relatively high incremental policy costs mainly due renewable energy costs[83] (in Germany for example, renewable energy costs for EIIs are

[82] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011, .

[83] Note that the support costs associated with Electricity Market Reform are included in 'Renewables' category, whereas the impact of the policy on the wholesale price (merit order) is in the 'Other' category.

very low due to the policy to limit added renewable energy costs to these installations) and also the UK carbon price floor (which is additional to the EU ETS which impacts all EU member states) – although it should be noted that in 2015 and 2020 the policies to support low carbon generation have a downward impact on UK wholesale electricity prices. A similar downward impact is likely to occur in other countries where low carbon generation is growing as a proportion of the electricity mix, but this effect has only been modelled for the UK due to data limitations. This analysis does not take account of those measures announced by the Chancellor in the 2011 Autumn Statement to reduce the transitional impacts of policy on the costs for the most electricity-intensive industries. The UK analysis corresponds to the top end of the range of renewables costs faced by EIIs in DECC's price and bill impacts publication[84], and therefore implicitly assumes that EIIs generate no electricity on site as such generation does not incur these costs.

- Energy taxes for EIIs in the EU Member States considered in this study are generally low due to significant re-imbursements that are possible. From the information that has been possible to obtain in this study, re-imbursements to EIIs appear most significant for Germany, Denmark and Italy, and are also relatively high for France. However, this is an area where further investigations would be necessary to provide a more categoric conclusion across the different Member States.
- The incremental costs for France and Germany also include the significant estimated impacts of electricity market reorganisation and nuclear energy phase out respectively. However, these should be treated with a note of caution given the significant uncertainties surrounding such estimates.
- All EU MSs are shown to have substantially higher incremental electricity costs caused by climate change and energy policies than most of the non-EU countries. Indirect EU ETS costs contribute significantly to this difference, with the exception of France which has relatively low EU ETS costs due to a smaller proportion of fossil fuel power generation capacity. Renewable energy costs are also shown to be higher in the EU MSs (especially the UK, Italy and Denmark) compared to outside the EU.
- The main contributor to incremental costs for the non-EU countries is higher electricity and fuel costs resulting from new and more stringent energy tax policies aimed at encouraging energy efficiency and low carbon technology. China is shown to have had the most significant recent increase in energy taxes of the non-EU countries considered, bringing incremental impacts of policy costs on electricity prices into a similar range as for the EU Member States. **It is noted that some energy taxes for these countries are embedded in the base electricity prices as it has not be possible to fully disentangle them.**
- The US, India and Russia have the lowest incremental cost impacts on electricity prices as a result of climate change and energy policies, according to the analysis in this study. For the US, this is due to the less stringent

[84] DECC, *Estimated impacts of energy and climate change policies on energy prices and bills*, 2 011, http://www.decc.gov.uk/assets/decc/11/about-us/economics-social-research/3593-estimated-impacts-of-our-policies-on-energy-prices.pdf

mandatory energy efficiency and GHG improvement requirements at national level, as well as the focus on tax credits and other incentives to encourage uptake of energy efficiency and renewable energy. However, cost impacts will vary significantly between different US states. For India and Russia there are significant energy efficiency policies but these do not have significant cost impacts on the power sector due to fuel cost savings.

4.2.2 Indirect and direct policy impacts

The results of the indirect and direct policy impacts are presented by sector for each of the selected countries together.

Results for production-based metrics – DECC values for EUA prices

Figures 4-5 to 4-10 show the incremental policy cost per tonne of product (based on DECC values for EUA prices), with the policy costs broken down into:

- Direct impacts
- Indirect impacts
  - GHG policies
  - Energy Efficiency policies
  - Renewable Energy policies
  - Energy Tax policies
  - Other (Energy) policies

Note that the scale of the y-axis varies between graphs in order to more accurately show the impact of different policies.

The following overall observations can be made from the development of metrics for indirect plus direct policy costs to EIIs expressed per tonne of product, as shown in Figures 4-5 to 4-10, on the basis of the DECC values for EUA prices:

- The EII sectors in the EU generally have significantly higher costs of energy and climate change policies per tonne of product in the 2015 and 2020 milestone years of this study, compared to the countries in this study that are outside the EU. These are largely driven by direct and indirect EU ETS costs as well as renewable policy costs (mainly UK, Italy and Denmark) and energy policy costs (mainly Germany and France).
- For the 2011 milestone year, direct EU ETS costs for sectors covered under Phase II are shown as negative due to a surplus of allowances. As such they have the ability to sell these allowances to buyers, eg the power sector, or bank for Phase III, thus smoothing out actual costs over time by reducing Phase II benefits and Phase III costs. For the purposes of this study we assume companies obtain the value of surplus allowances in the relevant year rather than making assumptions regarding banking.
- The situation changes in Phase III when more stringent allocations are imposed based on bottom-up benchmarks equivalent to the average of the

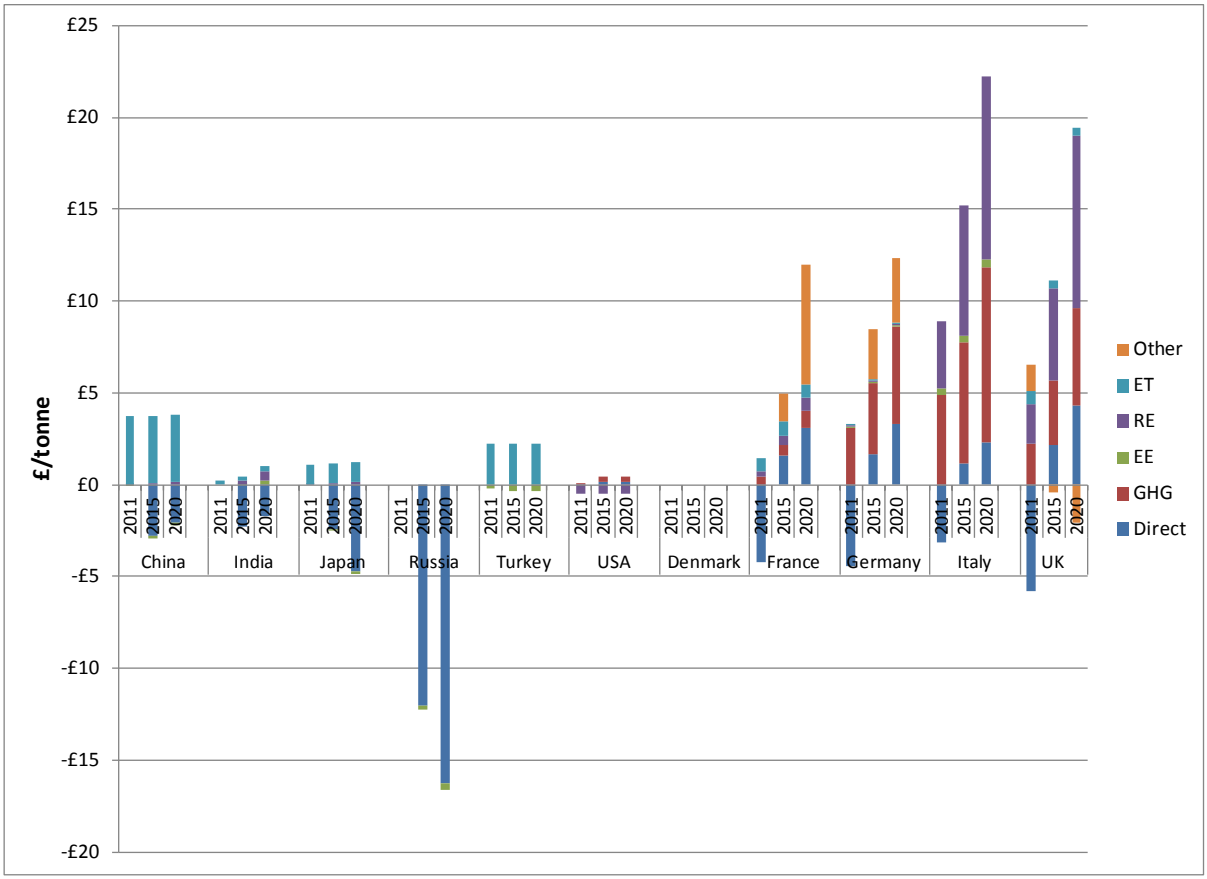
top 10% GHG efficient installations. This results in allowances being less than industry's need in the 2015 and 2020 milestone years.

- Direct costs of EU ETS are generally lower than indirect costs except for the cement and fertiliser sectors, due to their significant reliance on fuel in comparison to electricity.
- Energy and climate change policies in Russia, China, India and Japan are shown to result in some substantial savings due to industrial energy efficiency measures, especially for the steel, cement and fertiliser sectors. This is backed up by regional fuel conservation supply curves for key sectors in this study showing that the annualised costs of achieving fuel savings are typically only a small fraction of the annual value of those fuel savings.
- Russia is shown as having particularly good scope for cost-effective energy savings due to the relative stringency of the new energy efficiency targets, the relatively energy intensive processes, and the limited uptake so far of energy efficiency measures due to low energy costs and limited policies.
- Detailed comparisons of added policy costs per tonne product across countries would require a detailed assessment of the accuracy and consistency of production, energy consumption and other data across the countries[85], including the extent to which sectors generate their own electricity rather than purchase it from an electricity supplier. As such it is not possible to draw firm conclusions of this type from the current data.

Where relevant, some additional observations are also made for specific sector results.

[85] For example, in the method for determining direct EU ETS costs per tonne (see Table 4.1) there are potential inconsistencies across EU Member States due to potential differences in the readily available data including sectoral scope of GVA data (used to calculate direct costs) and production data (used to express direct costs per tonne); in GVA per tonne across MSs (method applies an EU average relationship for % added cost per GVA and MS specific GVA data to determine direct costs for each MS); in production trends across MSs (direct costs based on 2008 GVA data to be consistent with the year of data for the % added cost per GVA relationships, whereas as metrics expressed per 2011 tonnes).

Figure 4-5: Steel sector – indicative incremental costs of energy and climate change policies expressed as £ / tonne production (2010 prices)[86,87]

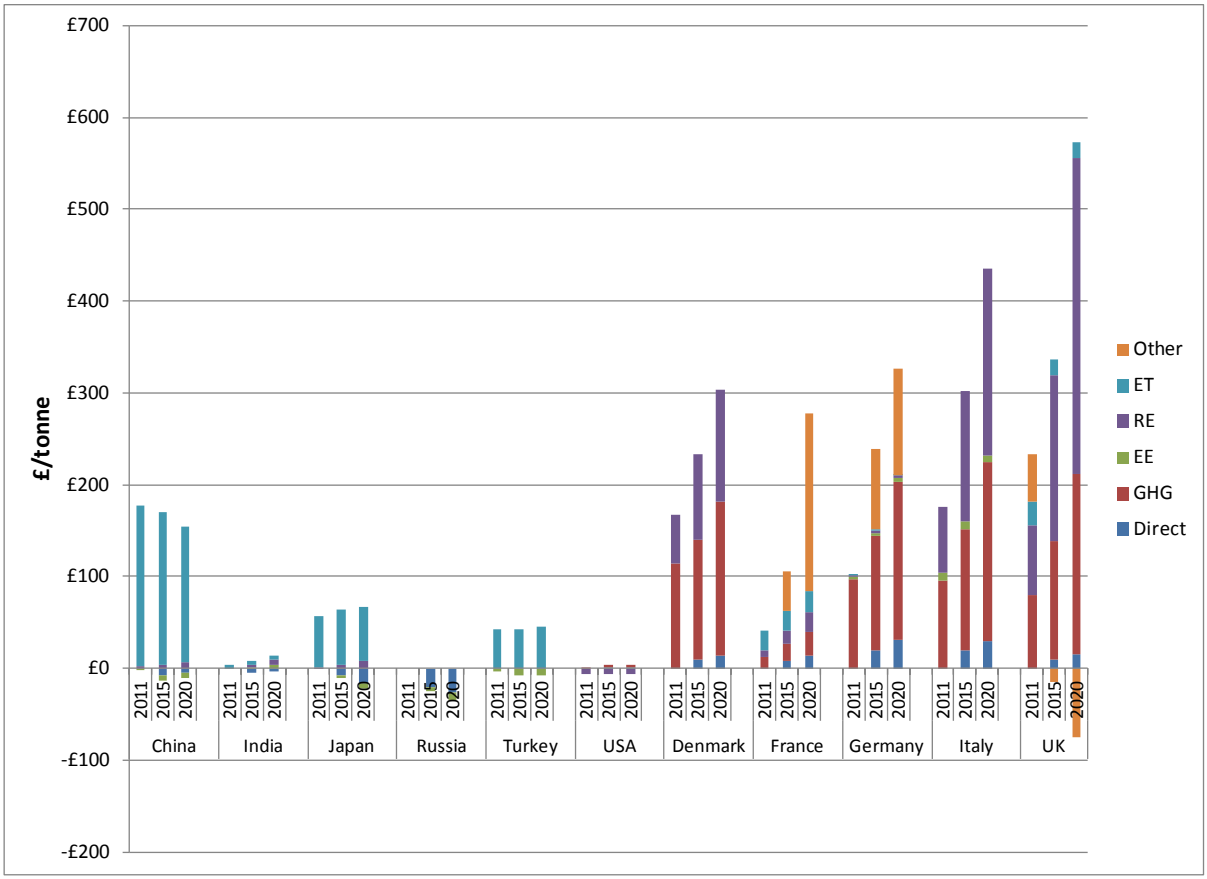


- Assumptions on the split in production in each country between Electric Arc and Basic Oxygen Steelmaking are given in Appendix 3 Section 12.
- Indirect EU ETS costs (shown as 'GHG' policy) are largest where Electric Arc Steelmaking dominates, eg in Italy
- Indirect EU ETS costs are particularly low for France as a relatively small proportion of its power sector is covered by the EU ETS.
- Direct EU ETS costs follow the same order as the relative contribution of Basic Oxygen Furnace steelmaking to total steelmaking (UK 75%, Germany 70%, France 64% and Italy 33%)
- Renewable energy policy costs are relatively high for UK and Italy, given the significance of electricity consumption for this sector.
- Energy policy costs in France and Germany are relatively significant.
- Note that Denmark doesn't have a steel sector.
- Russia is shown as having significant scope for cost-effective energy efficiency techniques. This is reflected in statistics highlighting that currently Russia has one of the least energy efficient steel sectors in the world.

[86] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

[87] Detailed comparisons of added policy costs per tonne product across countries would require a detailed assessment of the accuracy and consistency of production, energy consumption and other data across the countries. As such it is not possible to draw firm conclusions of this type from the current data.

Figure 4-6: Aluminium sector - indicative incremental costs of energy and climate change policies expressed as £ / tonne production (2010 prices)[88,89]

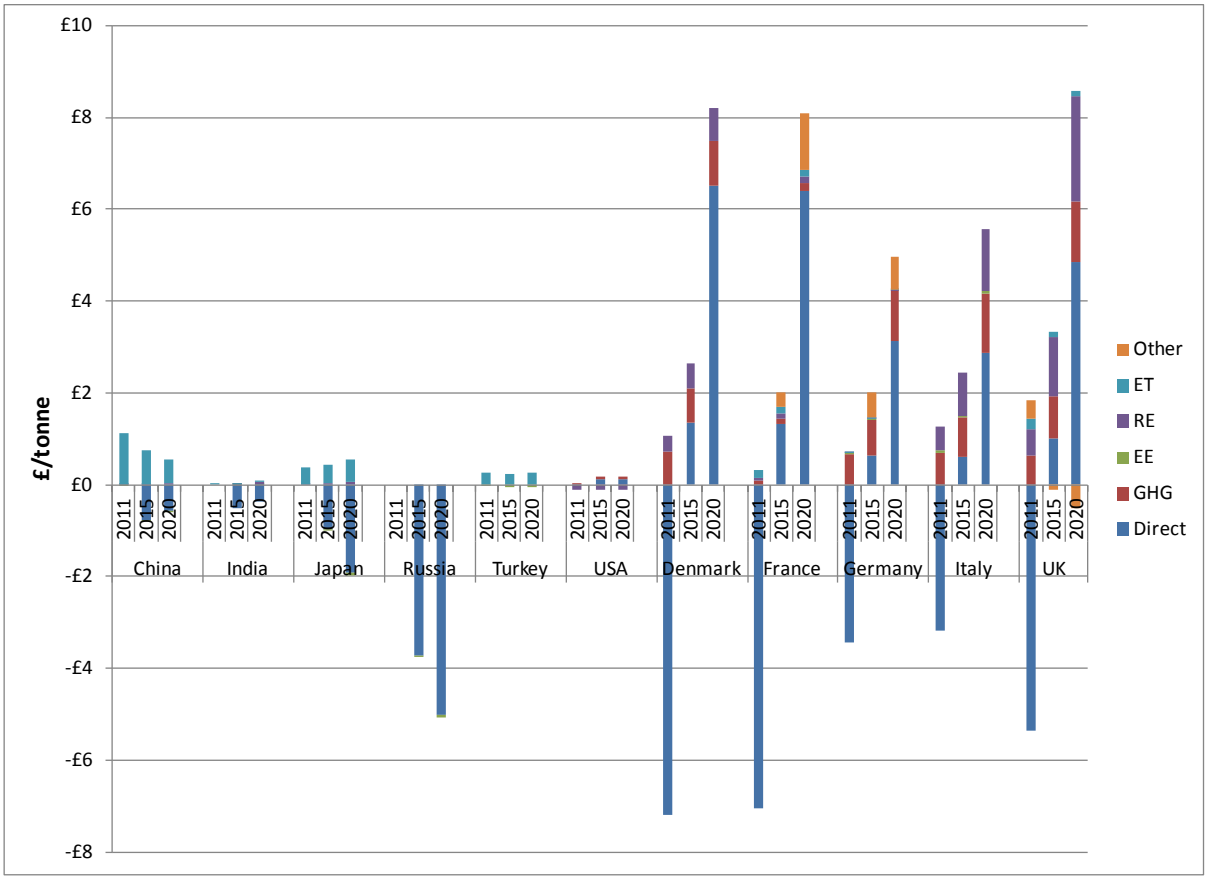


- As electricity is the dominant energy source for this sector, indirect EU ETS costs dominate the overall EU ETS costs.
- As for steel, France benefits from a power sector less exposed to EU ETS compared to the other EU Member States
- Renewable policy costs are relatively high for UK, Italy and Denmark
- Energy policy costs in France and Germany are relatively significant for this sector.
- Outside the EU, the impact of relatively high electricity taxes becomes particularly noticeable in China
- The nature of the processes in this sector mean there is relatively low scope for cost-effective energy efficient measures
- Note that this analysis was undertaken before Rio Tinto Alcan's recent announcement that they are closing their smelter in Lynemouth, UK.

[88] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

[89] Detailed comparisons of added policy costs per tonne product across countries would require a detailed assessment of the accuracy and consistency of production, energy consumption and other data across the countries. As such it is not possible to draw firm conclusions of this type from the current data.

Figure 4-7: Cement sector - indicative incremental costs of energy and climate change policies expressed as £ / tonne production (2010 prices)[90,91]

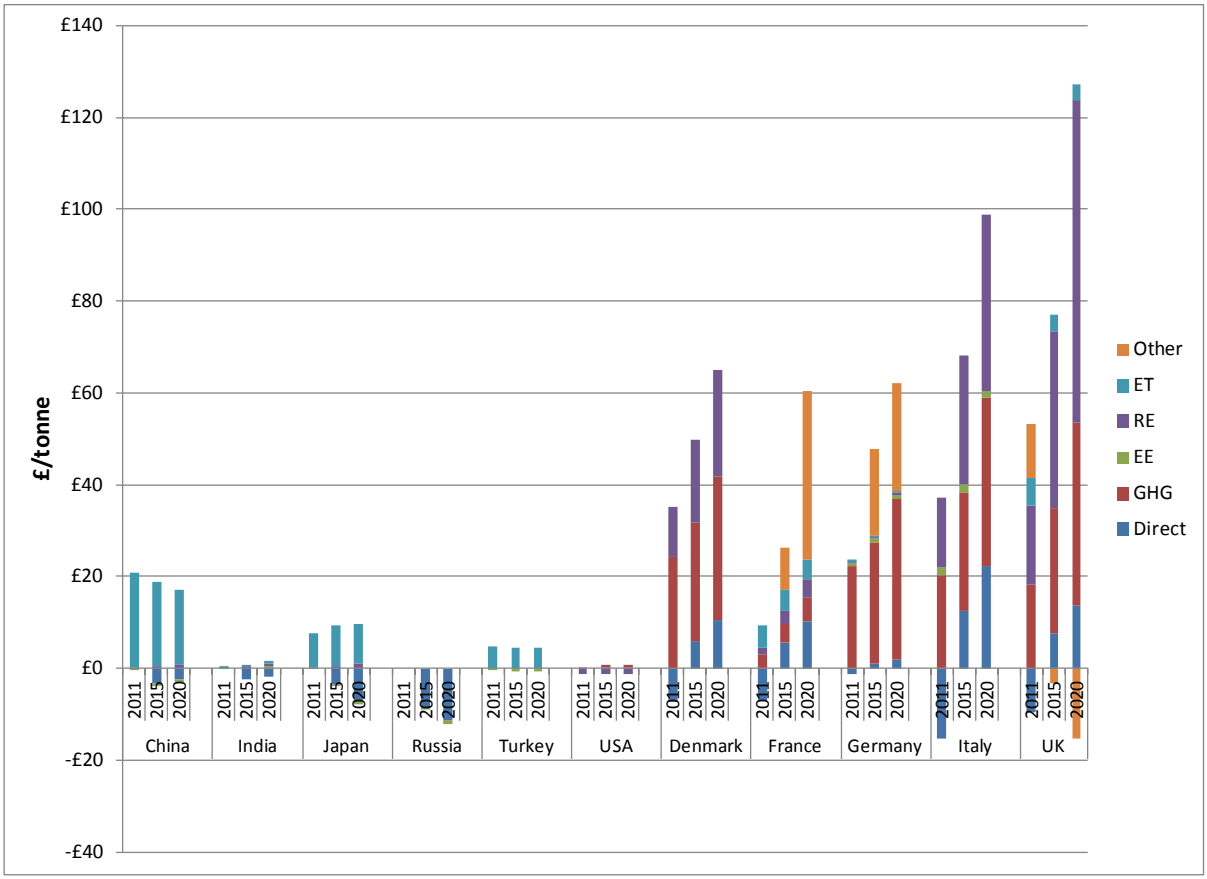


- Production data is based on cement and not clinker. Data is from U.S. Geological Survey, Mineral Commodity Summaries 2011 - Cement, January 2011.
- Direct EU ETS costs are dominant for this sector, given the high proportion of fuel in the energy consumption mix.
- Due to the different proportions of clinker in cement across different countries it is difficult to draw clear comparisons. Clinker (not cement) production is the key driver of EU ETS costs.
- There is substantial scope for cost-effective energy efficiency measures in this sector particularly in China, India and Russia. These will be driven by the emerging energy efficiency policies in these countries.

[90] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

[91] Detailed comparisons of added policy costs per tonne product across countries would require a detailed assessment of the accuracy and consistency of production, energy consumption and other data across the countries. As such it is not possible to draw firm conclusions of this type from the current data.

Figure 4-8: Chlor-alkali sector - indicative incremental costs of energy and climate change policies expressed as £ / tonne production (2010 prices)[92,93]

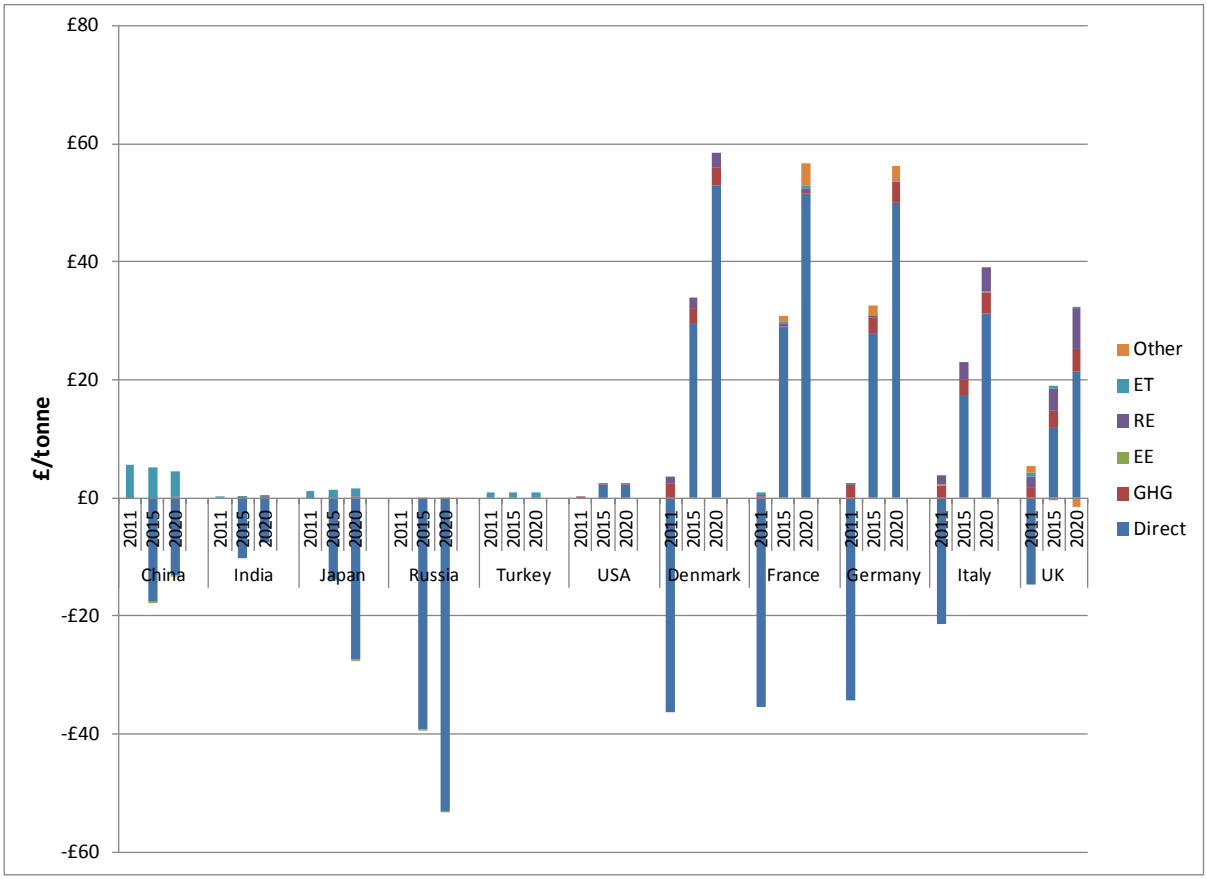


- This sector shows a similar pattern of cost impacts compared to aluminium, as energy consumption in both sectors is dominated by electricity and there is relatively limited scope for cost-effective energy savings.

[92] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

[93] Detailed comparisons of added policy costs per tonne product across countries would require a detailed assessment of the accuracy and consistency of production, energy consumption and other data across the countries. As such it is not possible to draw firm conclusions of this type from the current data.

Figure 4-9: Fertiliser sector - indicative incremental costs of energy and climate change policies expressed as £ / tonne production (2010 prices)[94,95]

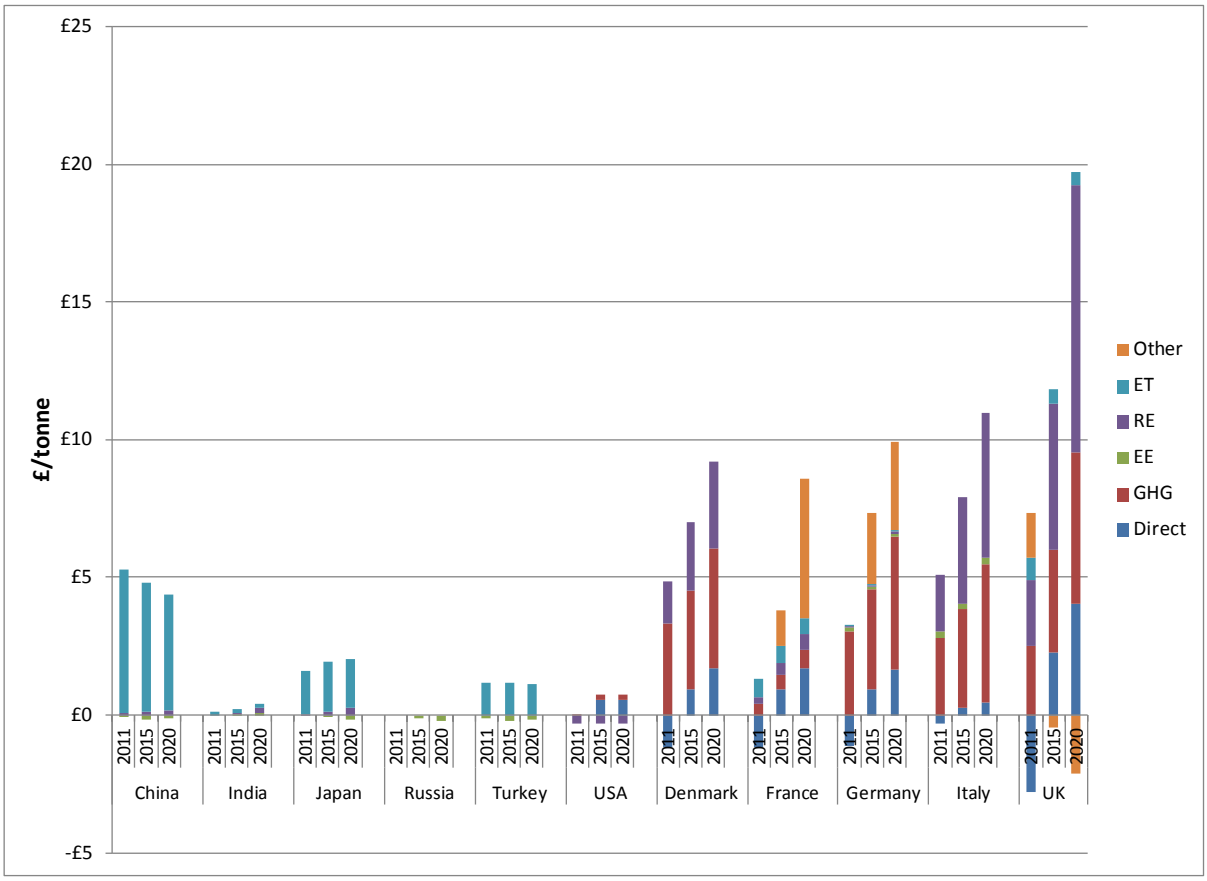


- This sector shows a similar pattern of cost impacts compared to cement, as energy consumption is dominated by fuel consumption and there is relatively good scope for cost-effective energy savings.

[94] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

[95] Detailed comparisons of added policy costs per tonne product across countries would require a detailed assessment of the accuracy and consistency of production, energy consumption and other data across the countries. As such it is not possible to draw firm conclusions of this type from the current data.

Figure 4-10: Industrial gases sector - indicative incremental costs of energy and climate change policies expressed as £ / tonne production (2010 prices)[96,97]



- This sector shows a similar pattern of cost impacts compared to aluminium and chlor-alkali, as energy consumption is dominated by electricity and there is relatively limited scope for cost-effective energy savings.
- The most common method for production of industial gas is fractional distillation of liquefied air into its various components, with the primary cost of production being the energy cost of liquefying the air.

[96] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

[97] Detailed comparisons of added policy costs per tonne product across countries would require a detailed assessment of the accuracy and consistency of production, energy consumption and other data across the countries. As such it is not possible to draw firm conclusions of this type from the current data.

Results for GVA-based metrics – DECC values for EUA prices

Figures 4-11 to 4-15 show the incremental policy cost per GVA of each sector, with the same break down of costs as the production-based results and also on the basis of the DECC values for EUA prices.

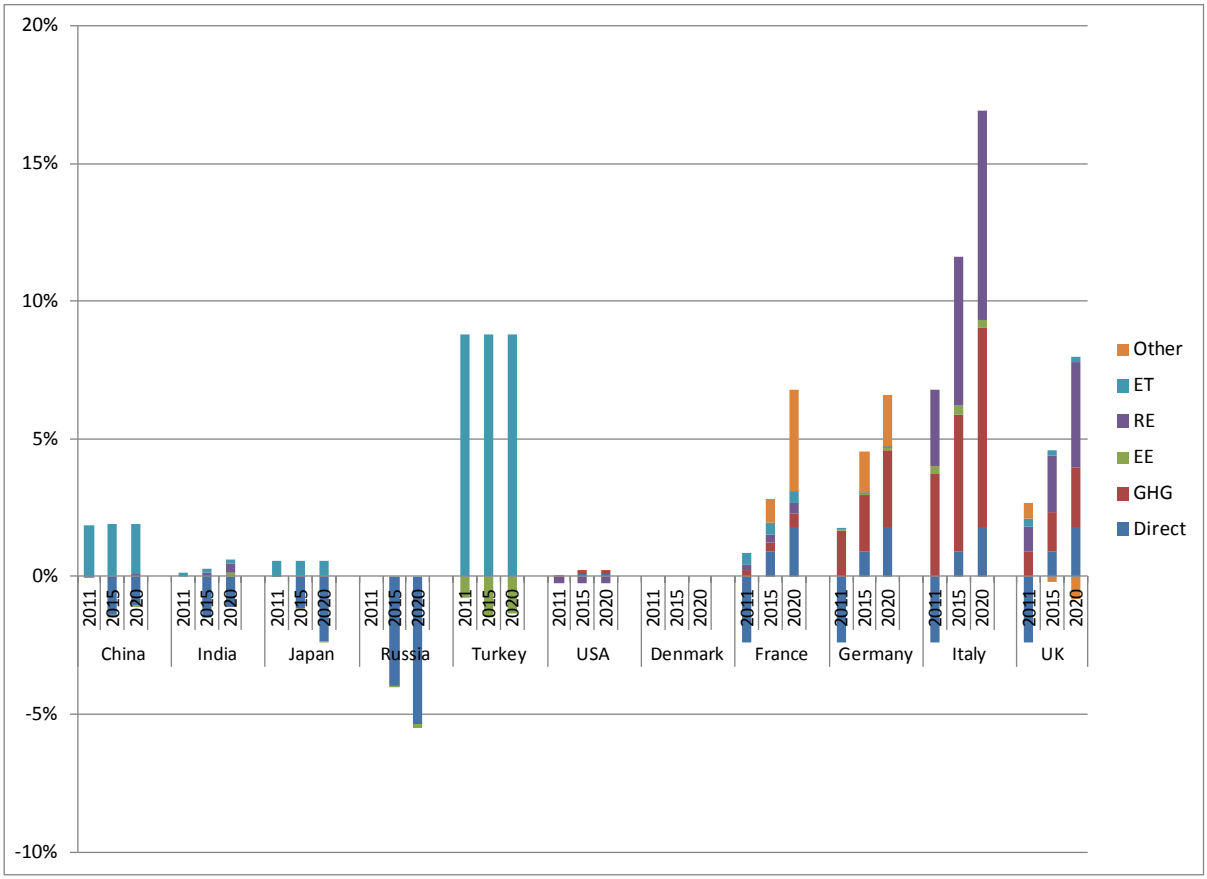
It is noted, however, that **the results expressed per GVA are less accurate than the production based ones as a number of sector / country combinations do not have GVA data at the level of detail corresponding to the scope of sectors in this study**.[98] Furthermore, results are not shown for the chlor-alkali sector due to lack of readily available data.

As such, it is not possible to draw clear observations from the GVA-based results. However, the abovementioned observations from the production-based metrics are also likely to be relevant to the GVA-based metrics.

As above, note that the scale of the y-axis varies between graphs in order to more accurately show the impact of different policies.

[98] GVA data was at a more aggregate level than the target sectors for Chlor-alkali (all countries except Japan and US); industrial gases (China, India, Russia, Turkey); fertilisers and cement (China, Russia, Turkey); aluminium (China, Japan, India, Russia); and steel (Russia).

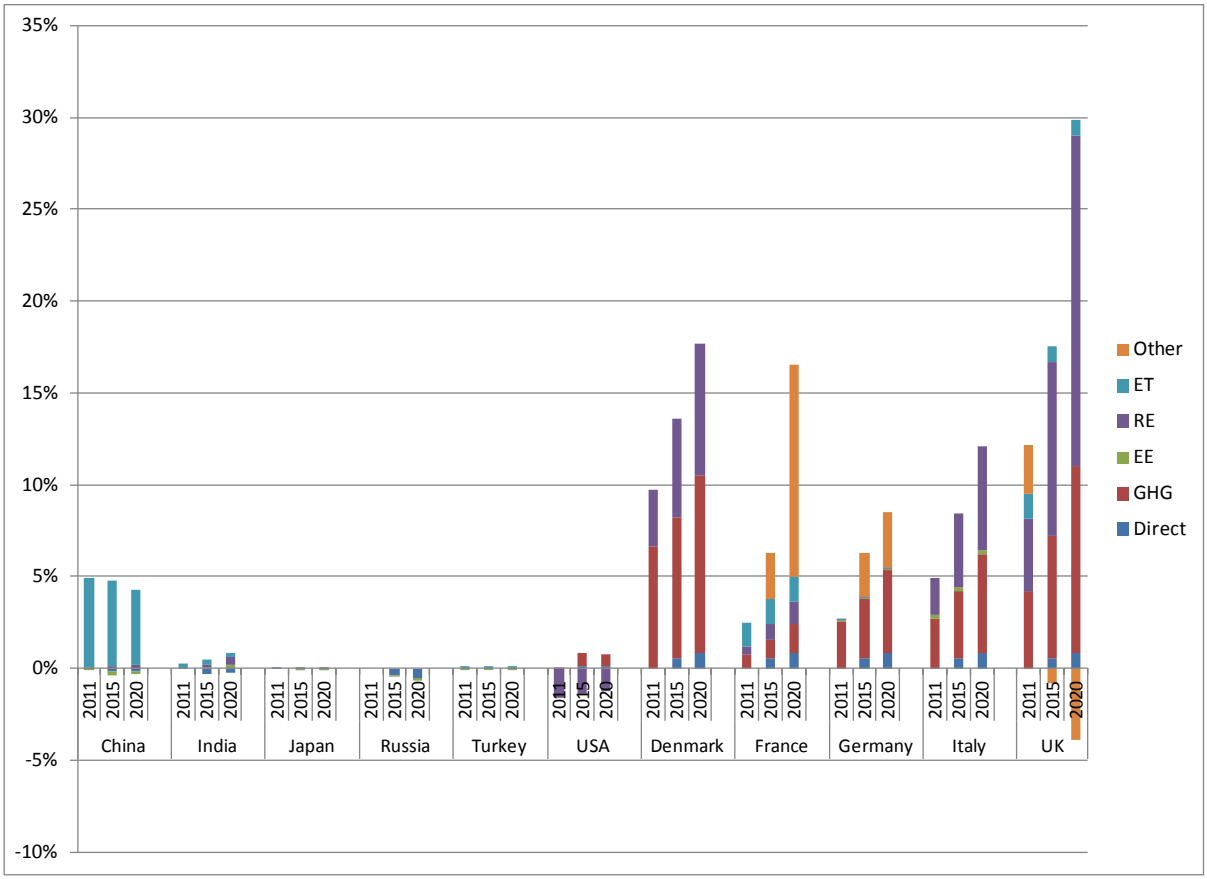
Figure 4-11: Steel sector – indicative incremental costs of energy and climate change polices expressed as % of GVA[99] (2010) prices[100]



[99] Data for more aggregated sector: Metal production for Russia

[100] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

Figure 4-12: Aluminium sector - indicative incremental costs of energy and climate change policies expressed as % of GVA[101] (2010 prices)[102]

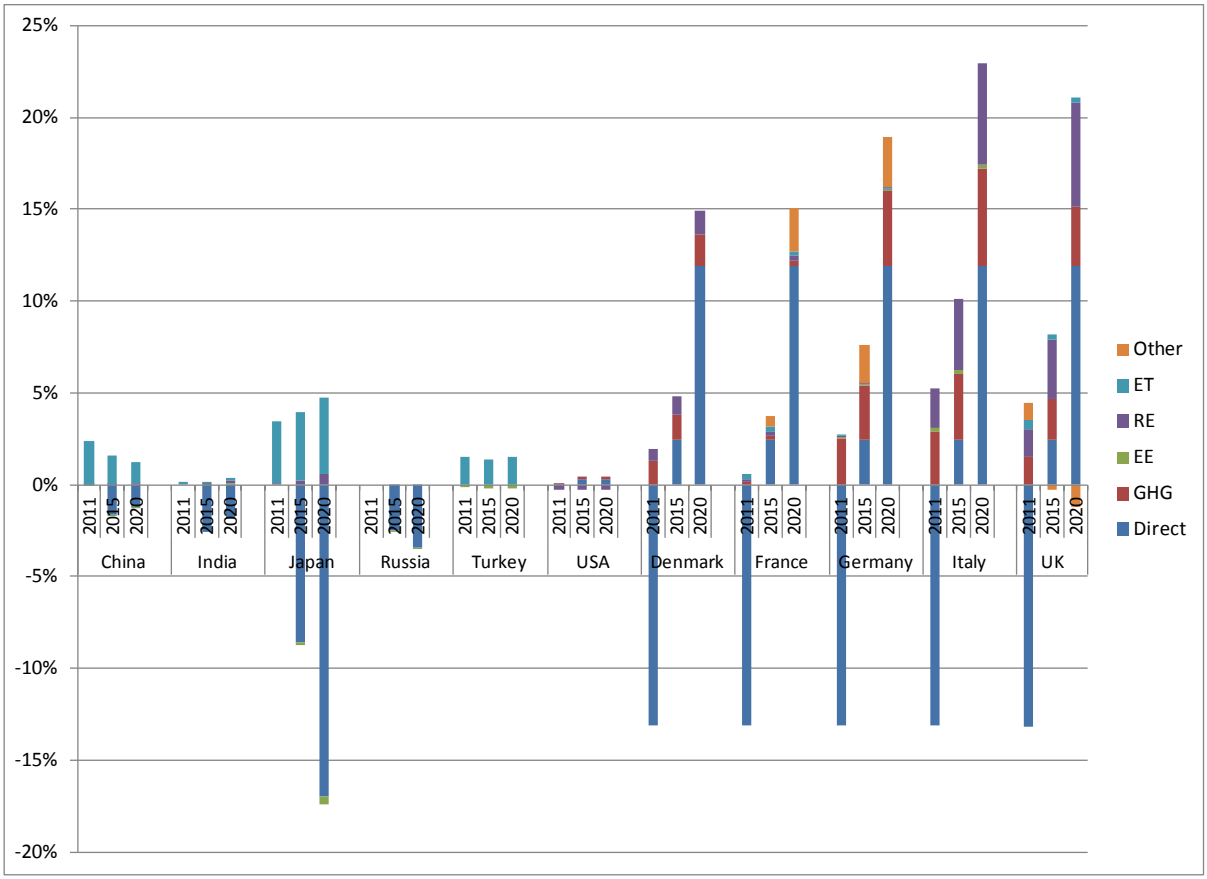


- Note that this analysis was undertaken before Rio Tinto Alcan's recent announcement that they are closing their smelter in Lynemouth, UK.

[101] Data for more aggregated sectors: Non-ferrous metals for China, Japan & India; Metal production for Russia

[102] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

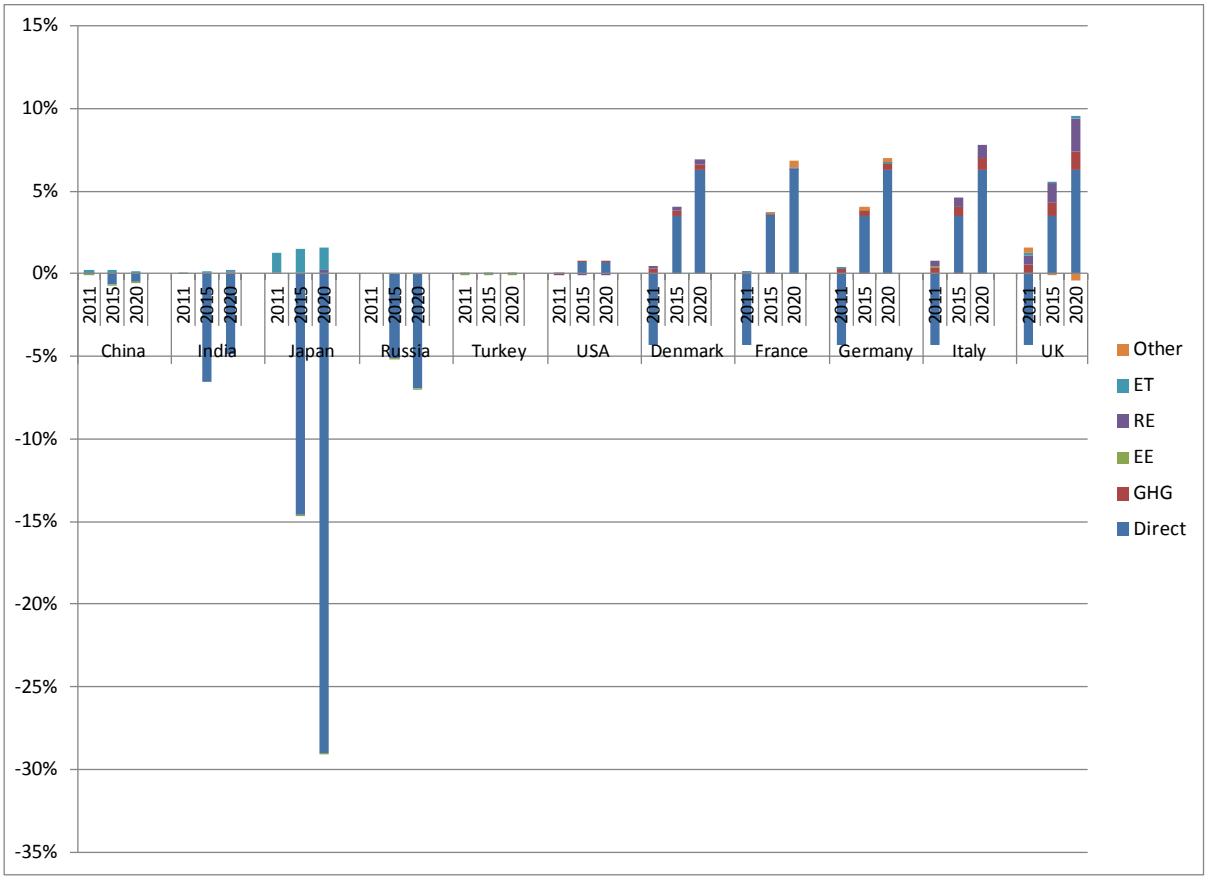
Figure 4-13: Cement sector - indicative incremental costs of energy and climate change policies expressed as % of GVA[103] (2010 prices)[104]



[103] Data for more aggregated sectors: Non-metallic minerals for China, Russia and Turkey

[104] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

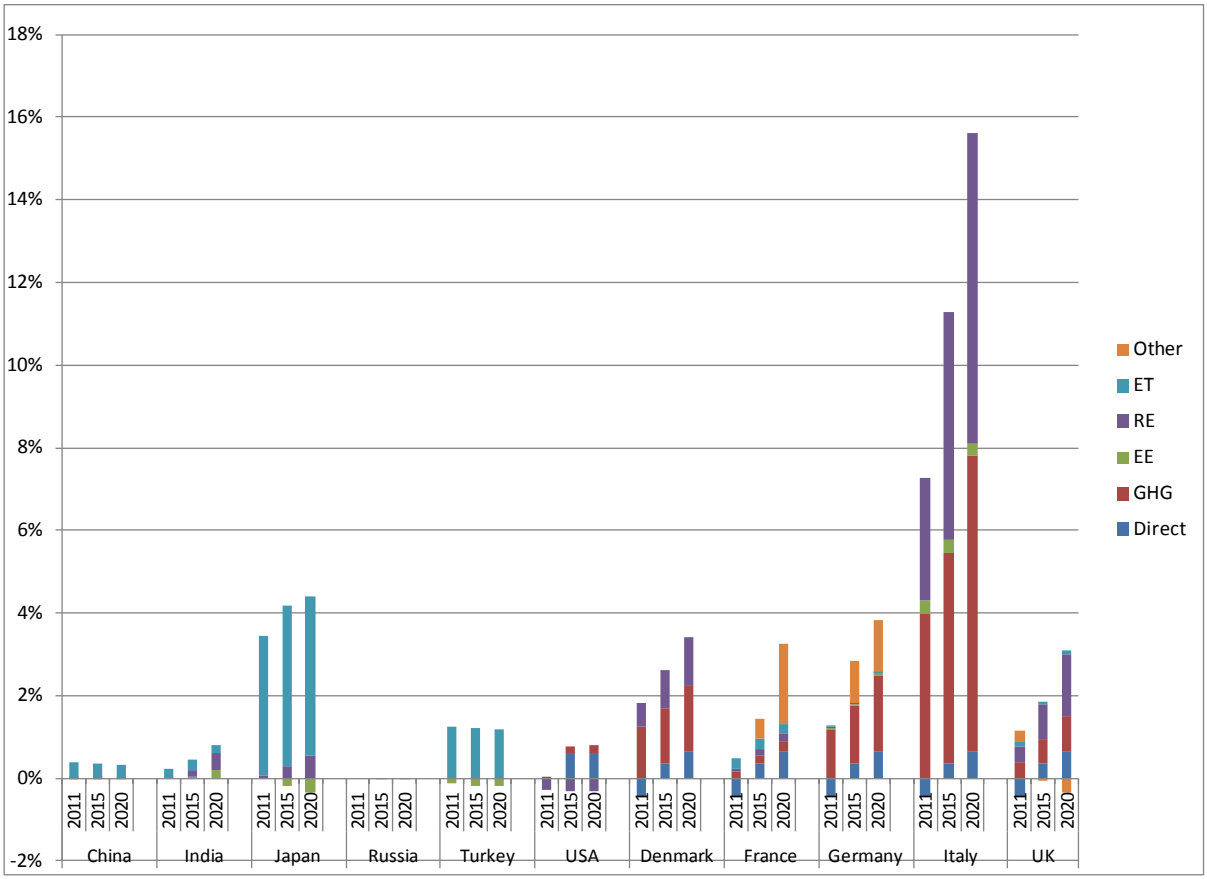
Figure 4-14: Fertiliser sector - indicative incremental costs of energy and climate change policies expressed as % of GVA[105] (2010 prices)[106]



[105] Data for more aggregated sectors: Chemicals for China and Russia; Basic chemicals for Turkey

[106] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

Figure 4-15: Industrial gases sector - indicative incremental costs of energy and climate change policies expressed as % of GVA[107] (2010 prices)[108]



Results for production- and GVA-based metrics – Sensitivity using market forecasts of EUA prices

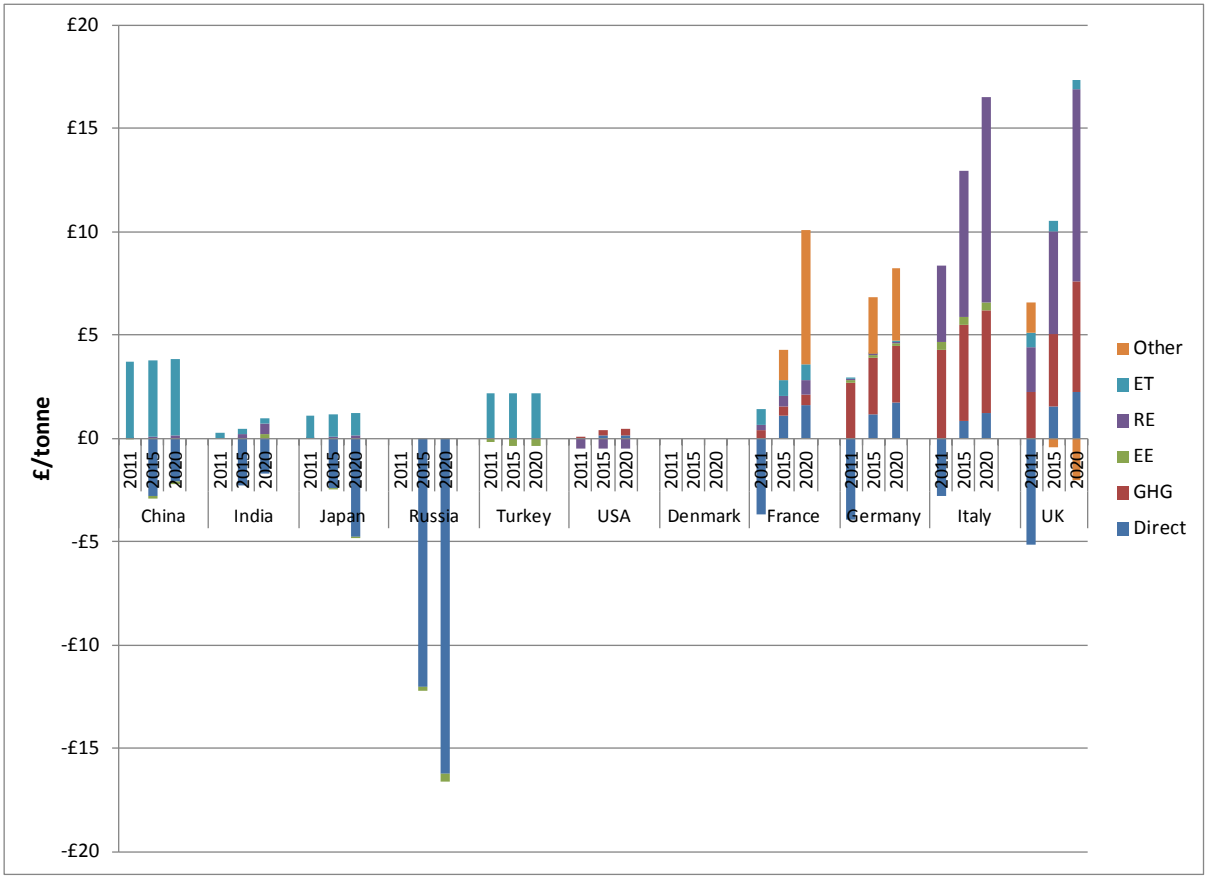
This final section presents the results of the production-based and GVA-based metrics on the basis of the sensitivity of EUA prices based on market forecasts instead of DECC's values. A comparison of the prices is given in Table 4.1.

The trends are the same as the preceding figures based on DECC's EUA values, except that direct EU ETS costs are lower for all Member States and indirect EU ETS costs are lower for non-UK Member States (the UK's indirect costs would be unchanged due to the effect of the Carbon Price Floor, which does not apply to direct emissions). The difference in EU ETS costs increases from 2011 to 2020 in line with the diverging EUA price assumptions.

[107] Data for more aggregated sectors: Chemicals for China and Russia; Basic chemicals for India and Turkey

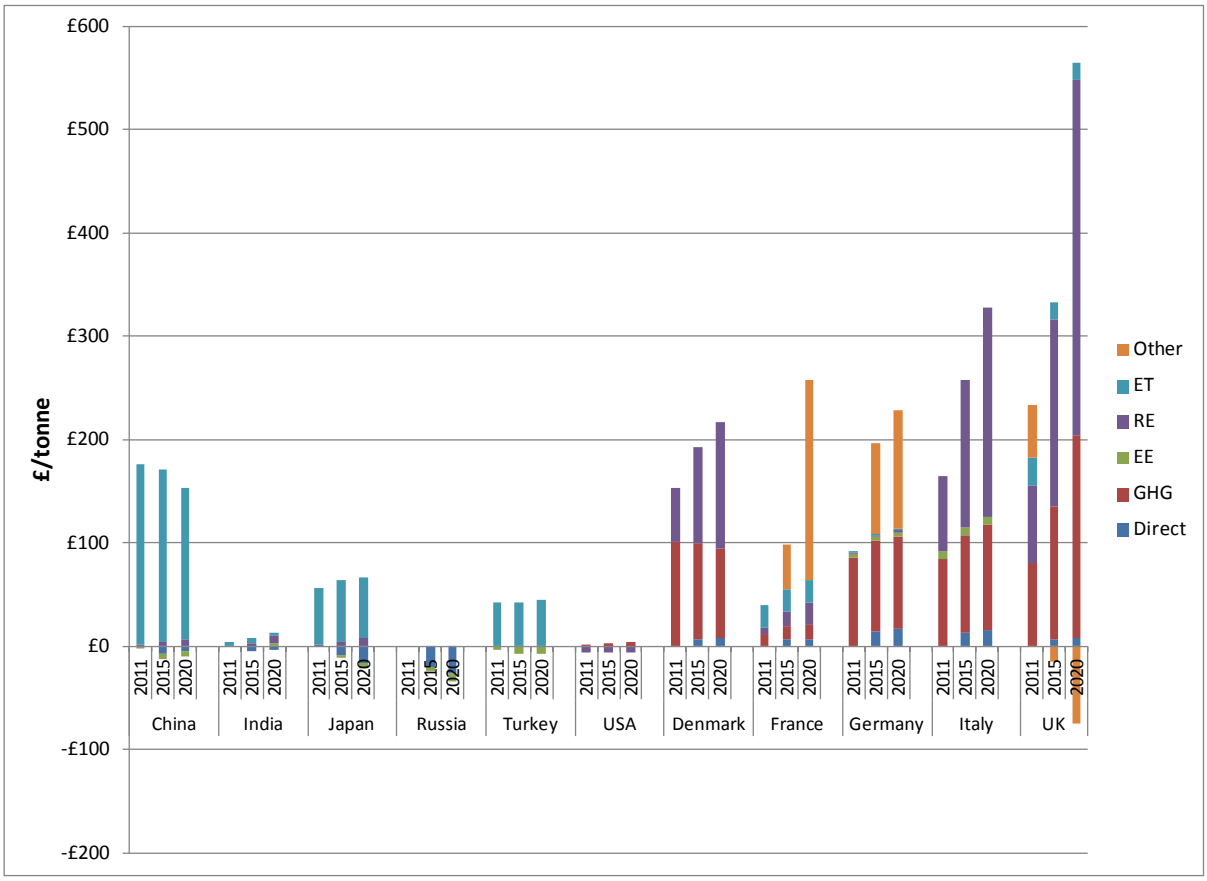
[108] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

Figure 4-16: Steel sector – indicative incremental costs of energy and climate change policies expressed as £ / tonne production (2010) prices - Sensitivity using market forecasts of EUA prices[109]



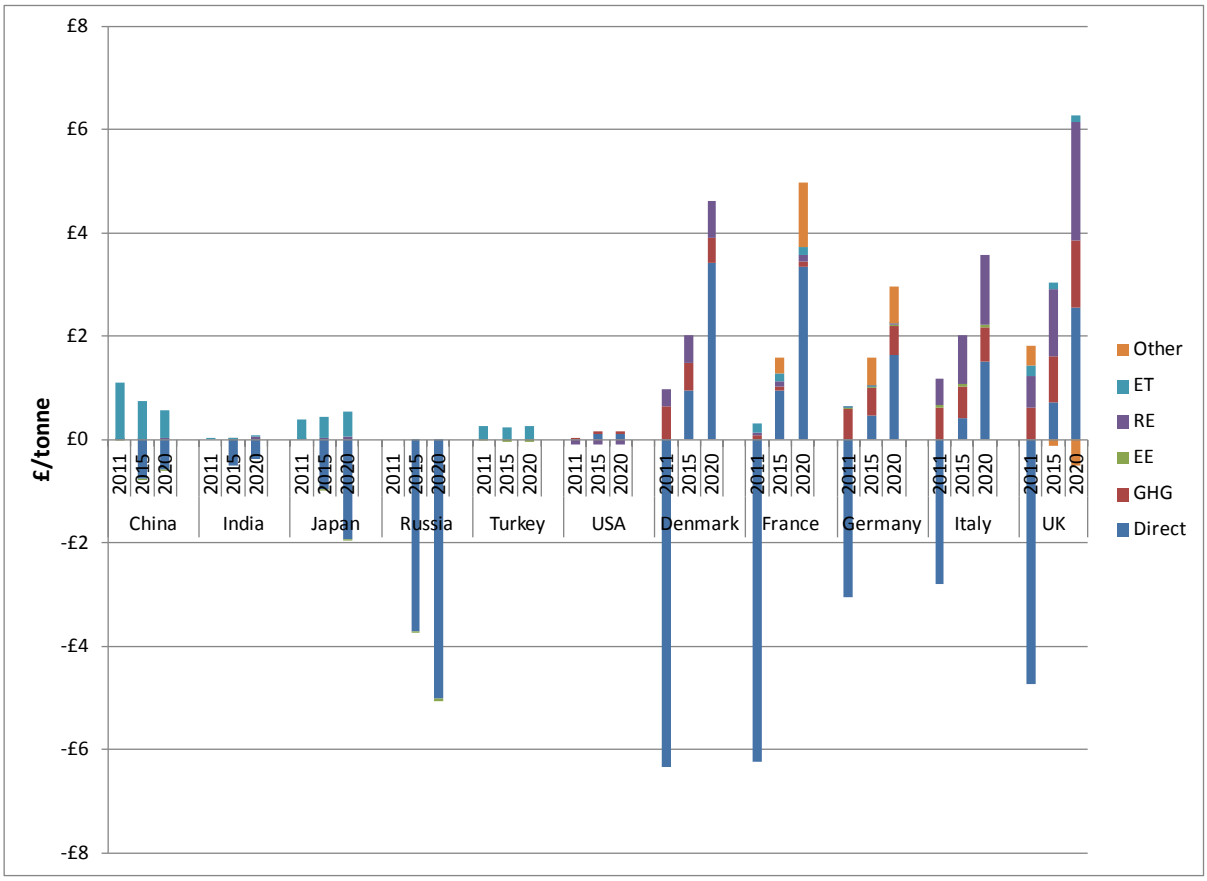
[109] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

Figure 4-17: Aluminium sector - indicative incremental costs of energy and climate change policies expressed as £ / tonne production (2010) prices - Sensitivity using market forecasts of EUA prices[110]



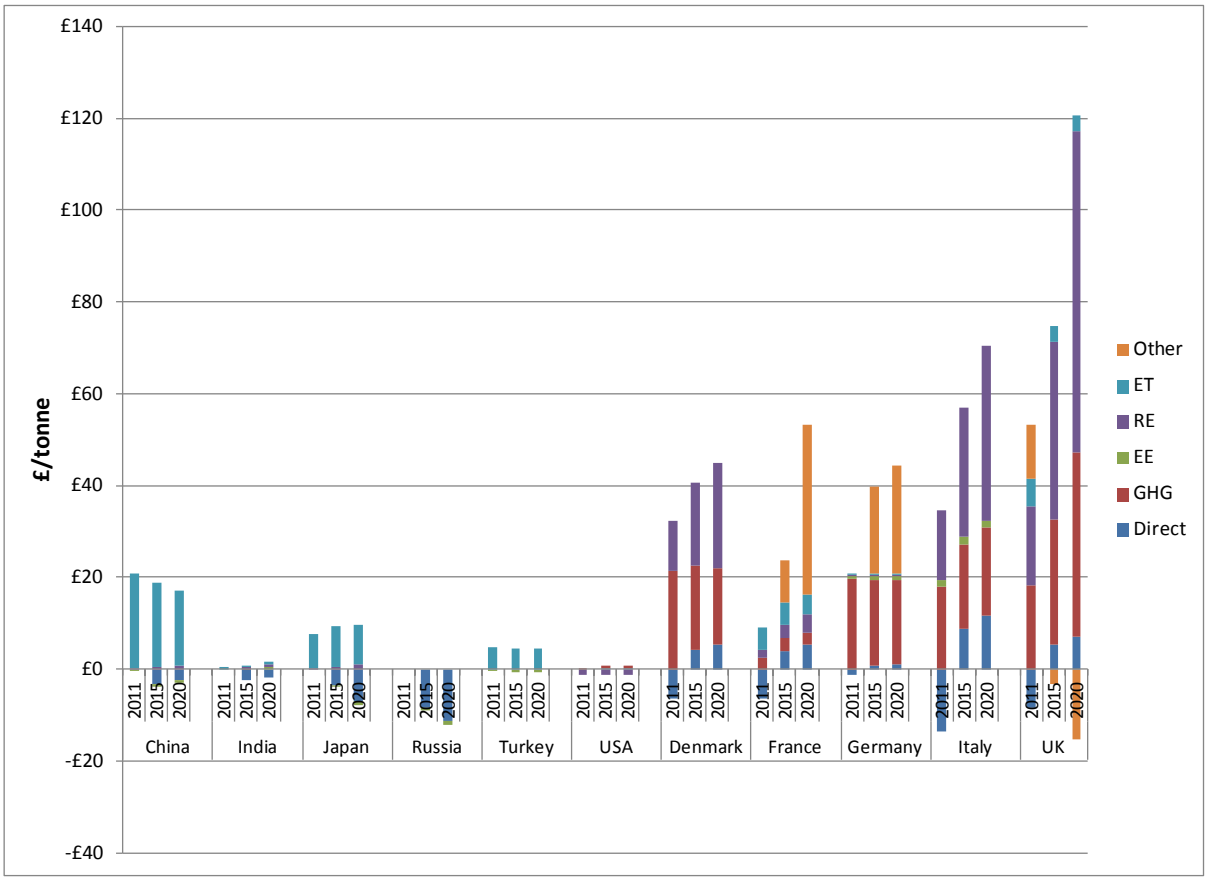
[110] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

Figure 4-18: Cement sector - indicative incremental costs of energy and climate change policies expressed as £ / tonne production (2010) prices - Sensitivity using market forecasts of EUA prices[111]



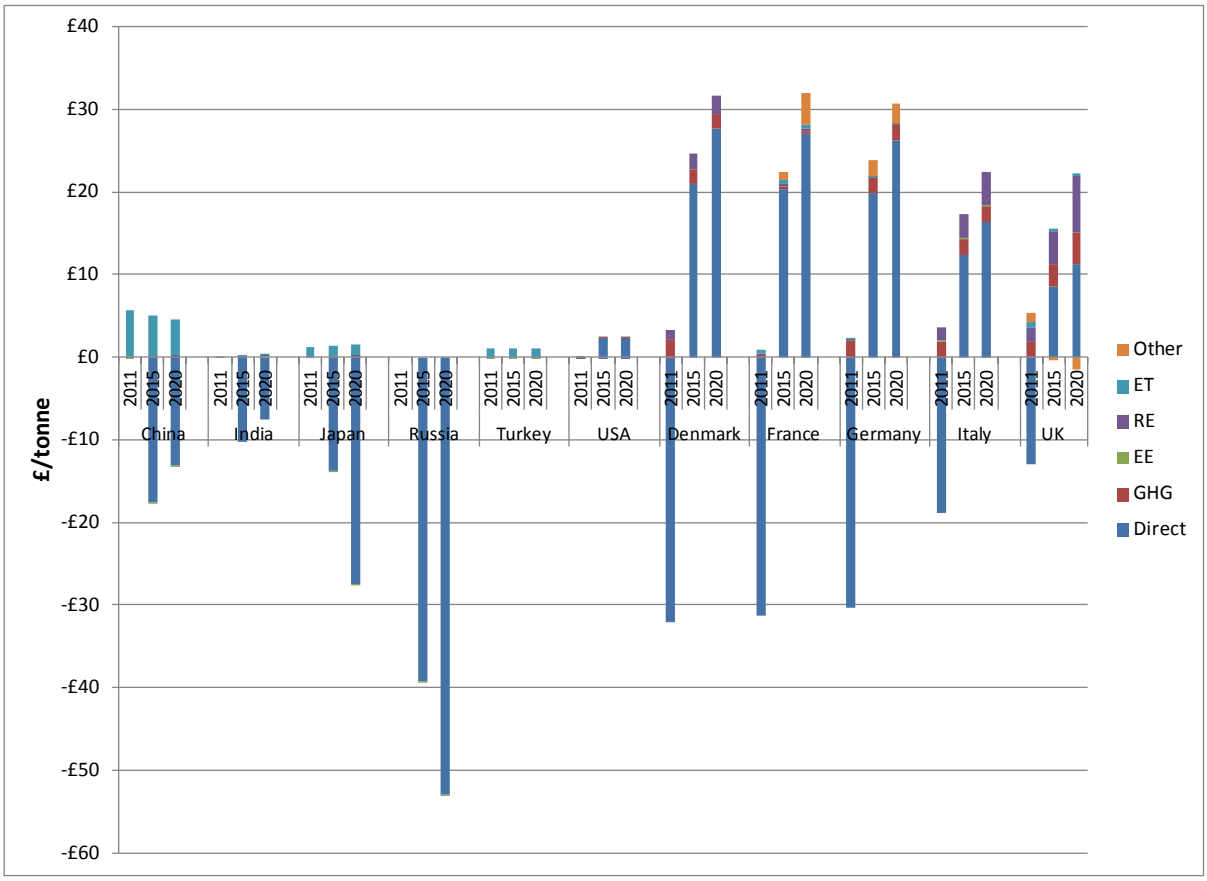
[111] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

Figure 4-19: Chlor-alkali sector - indicative incremental costs of energy and climate change policies expressed as £ / tonne production (2010) prices - Sensitivity using market forecasts of EUA prices[112]



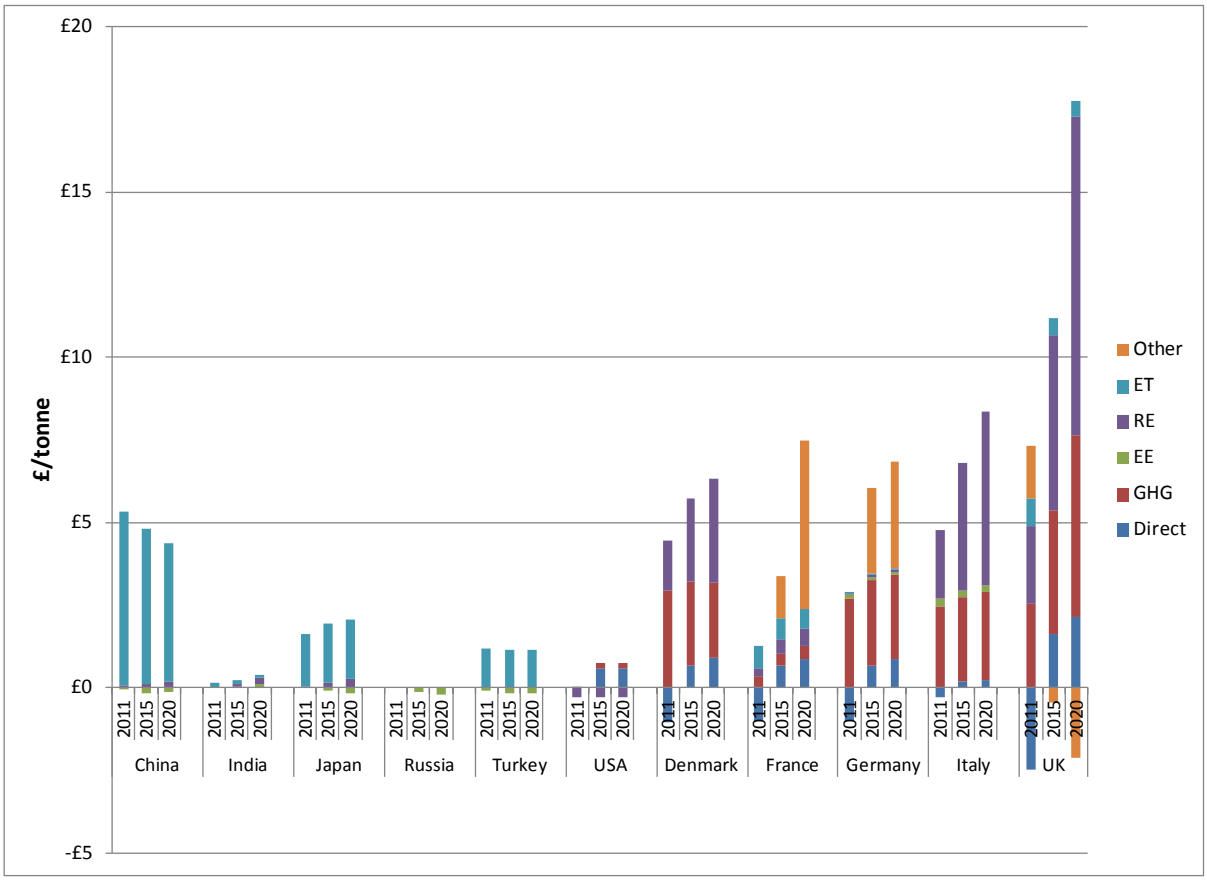
[112] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

Figure 4-20: Fertiliser sector - indicative incremental costs of energy and climate change policies expressed as £ / tonne production (2010) prices - Sensitivity using market forecasts of EUA prices[113]



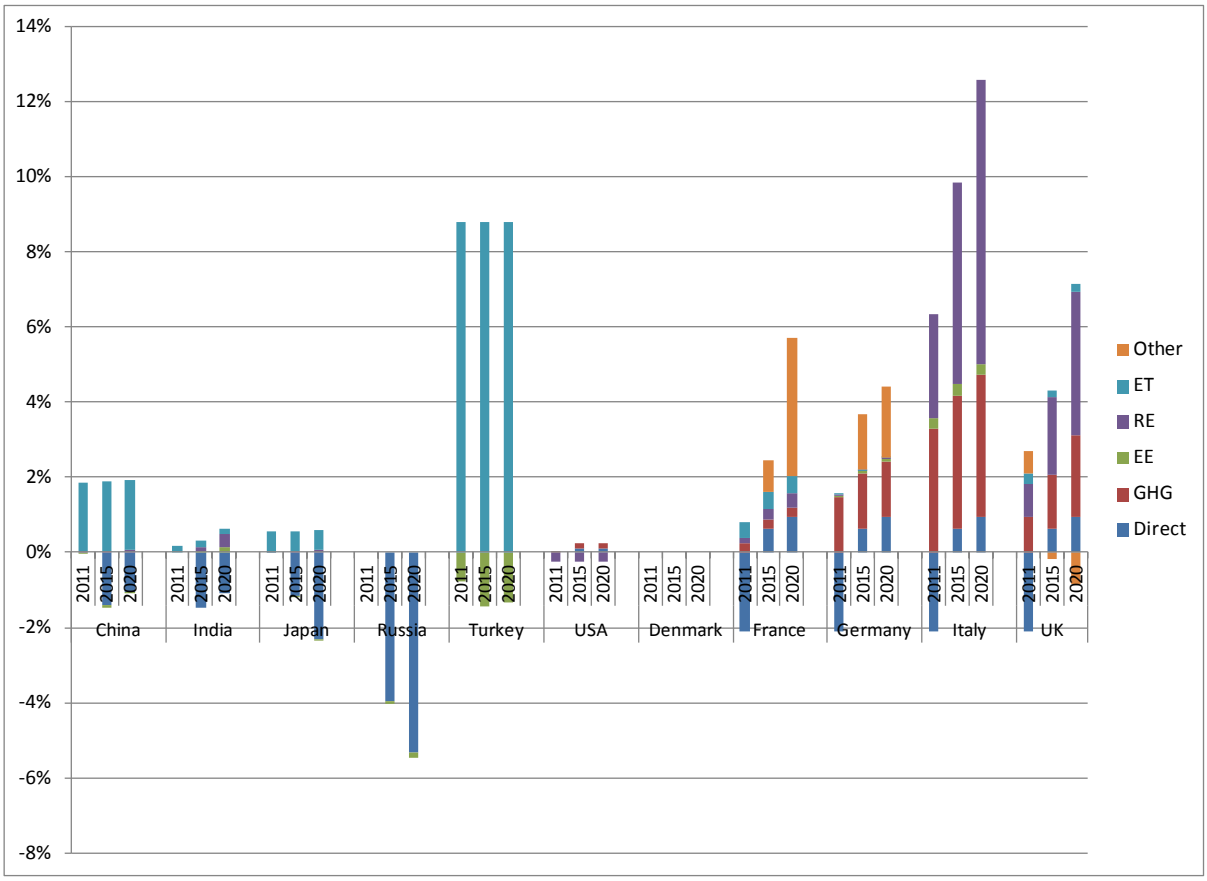
[113] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011.

Figure 4-21: Industrial gases sector - indicative incremental costs of energy and climate change policies expressed as £ / tonne production (2010) prices - Sensitivity using market forecasts of EUA prices[114]



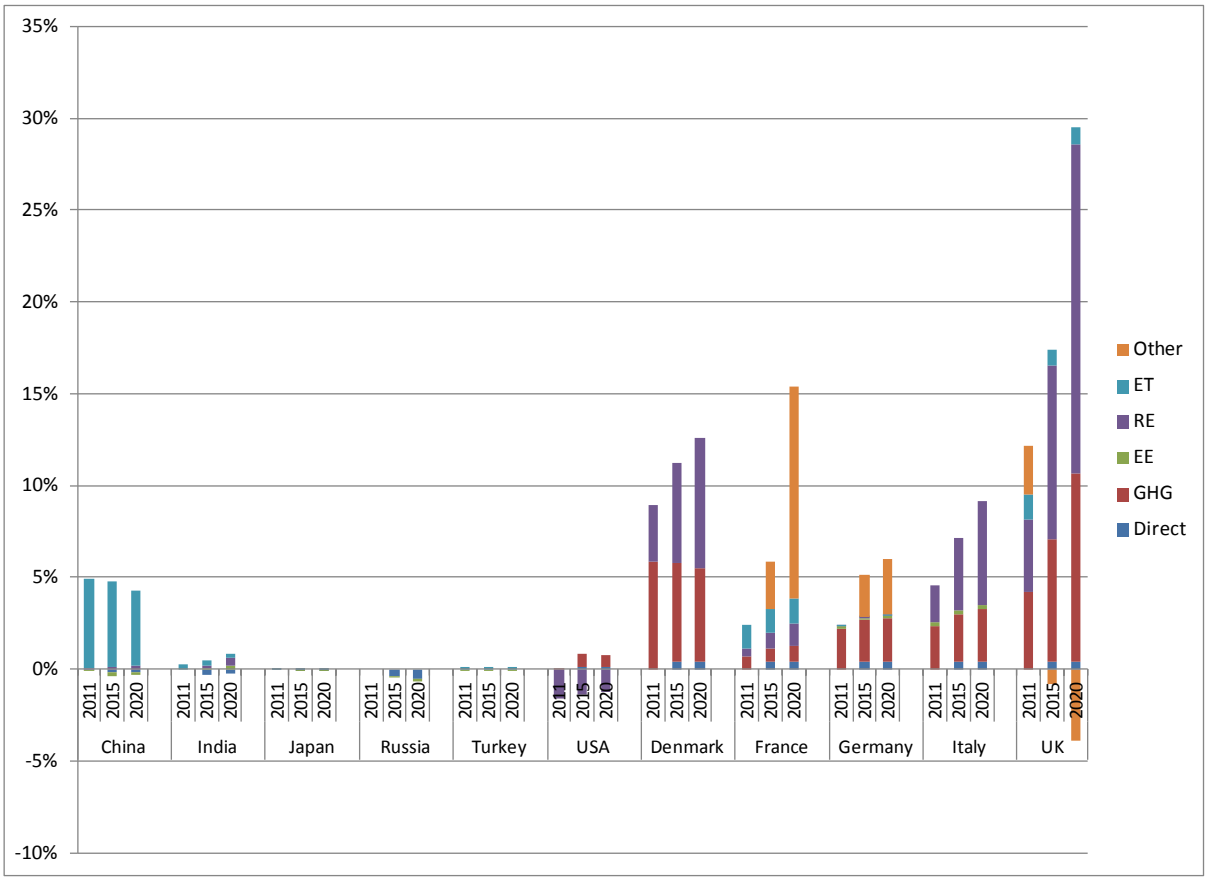
[114] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011, .

Figure 4-22: Steel sector - indicative incremental costs of energy and climate change policies expressed as % of GVA (2010) prices - Sensitivity using market forecasts of EUA prices[115]



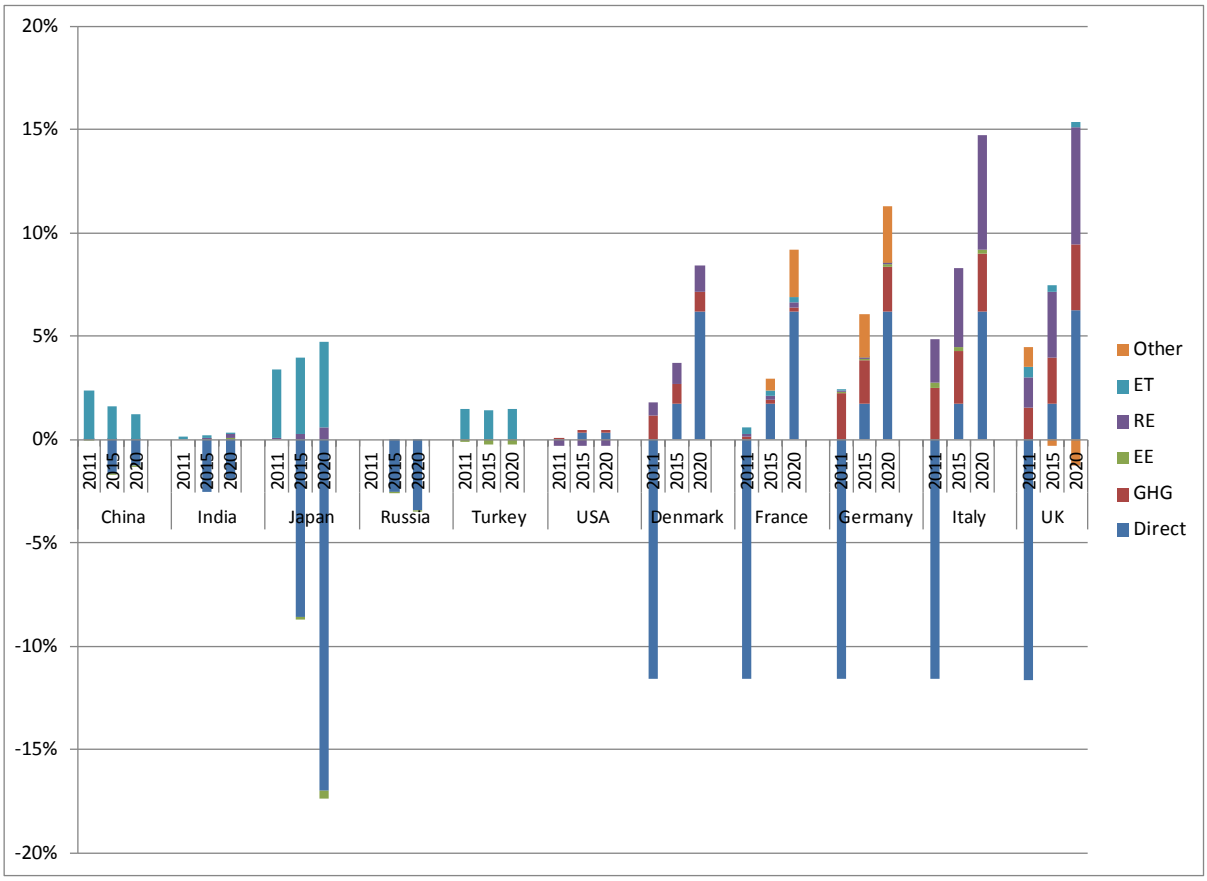
[115] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011, .

Figure 4-23: Aluminium sector - indicative incremental costs of energy and climate change policies expressed as % of GVA (2010) prices - Sensitivity using market forecasts of EUA prices[116]



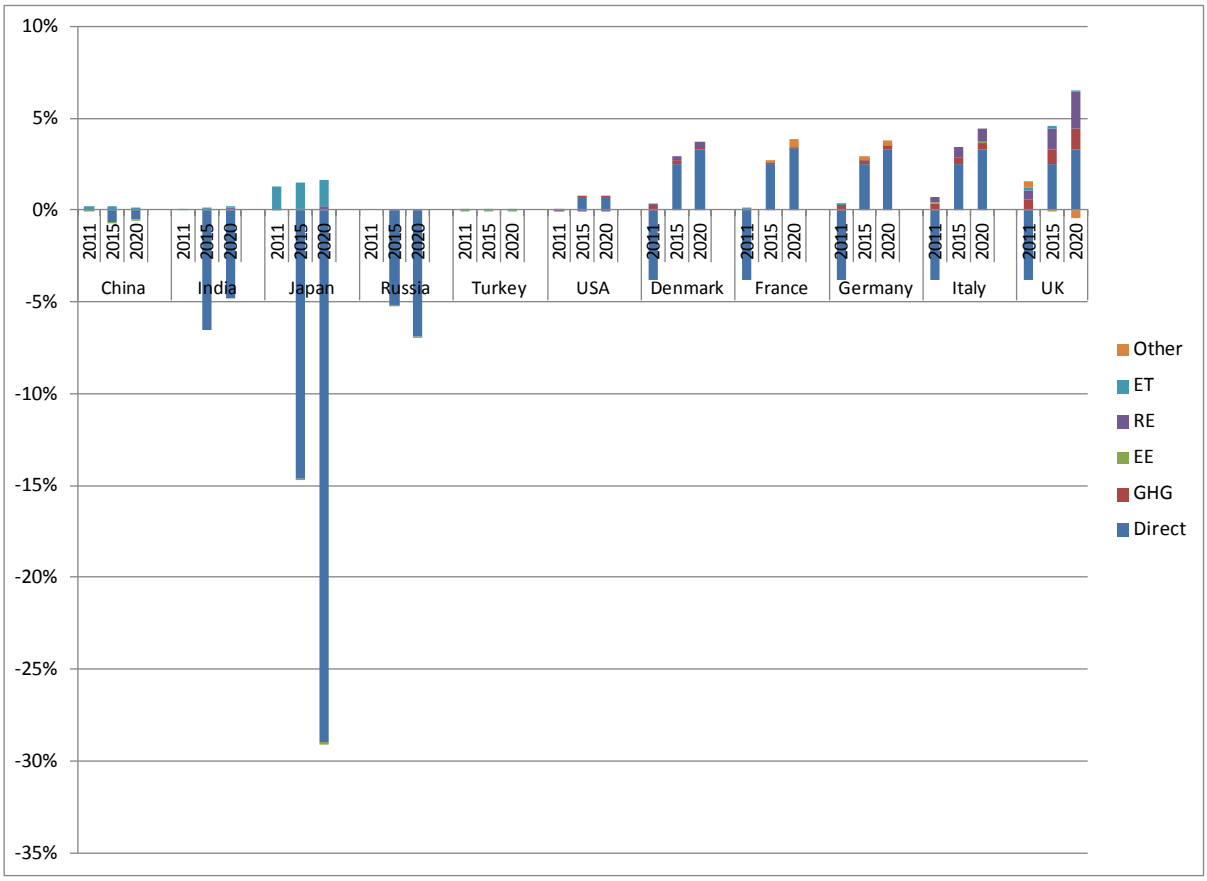
[116] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011, .

Figure 4-24: Cement sector - indicative incremental costs of energy and climate change policies expressed as % of GVA (2010) prices - Sensitivity using market forecasts of EUA prices[117]



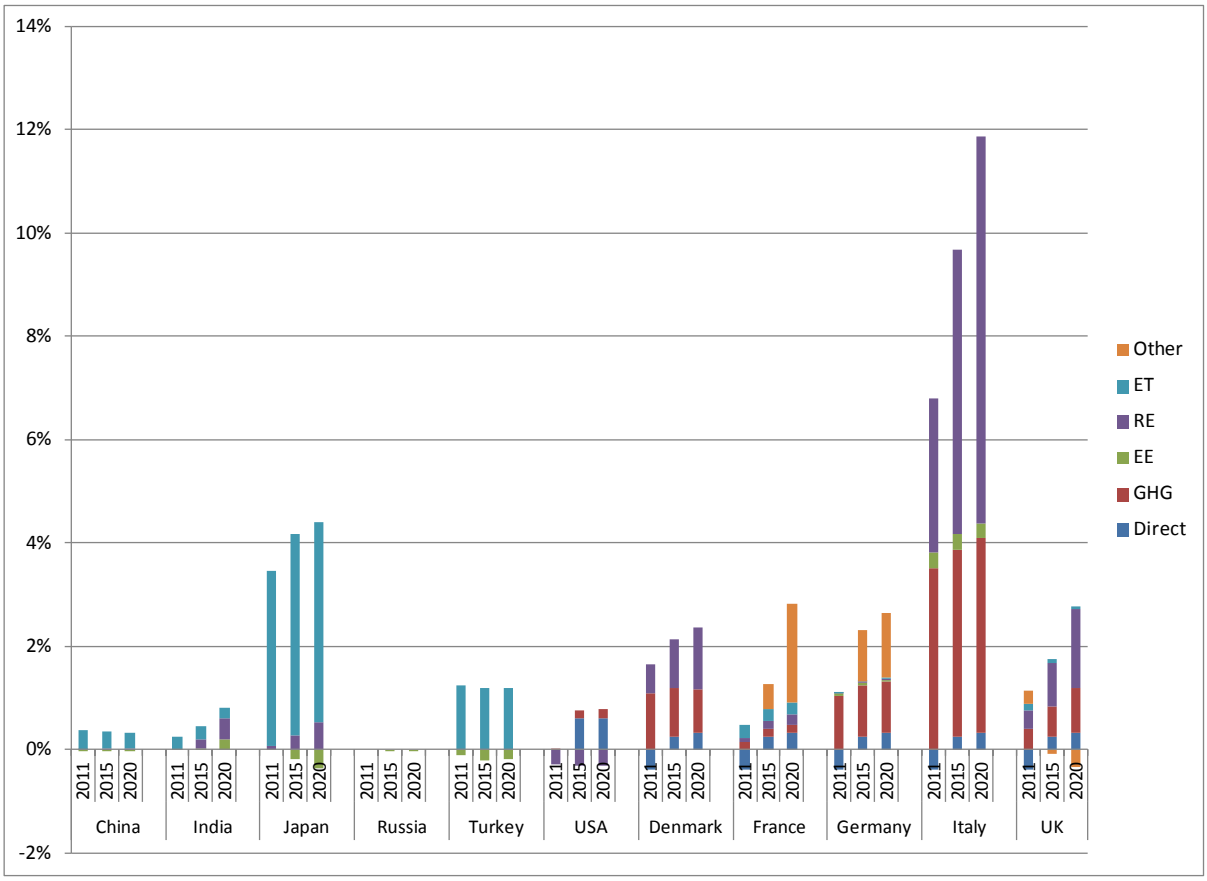
[117] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011, .

Figure 4-25: Fertiliser sector - indicative incremental costs of energy and climate change policies expressed as % of GVA (2010) prices - Sensitivity using market forecasts of EUA prices[118]



[118] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011, .

Figure 4-26: Industrial gases sector - indicative incremental costs of energy and climate change policies expressed as % of GVA (2010) prices - Sensitivity using market forecasts of EUA prices[119]



[119] Corresponds to the top end of renewables costs paid by EIIs in DECC's *Estimated impacts of energy and climate change policies on energy prices and bills*, 2011,.

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