Department of Energy & Climate Change

CHP FOCUS

CHP Outreach Workshop

Programme: Reducing Energy Costs with Combined Heat & Power

Birmingham 16th June 2015

Department of Energy & Climate Change

CHP FOCUS

CHP Benefits and Support Mechanisms

Mahmoud Abu-ebid

CHPQA Programme Director

Department of Energy & Climate Change

CHP FOCUS

Talk Coverage - Fiscal Measures & GQCHP

Existing measures:

- CCL Exemption (on fuel input and electricity output)
- Carbon Reduction Commitment (CRC) (Zero Carbon Heat)
- Business Rates Exemption (embedded schemes)
- Hydrocarbon Oil Duty Relief
- Enhanced Capital Allowance
- 1ROC/MWh of electricity from EfW GQCHP
- 2 ROCs/MWh for dedicated biomass GQCHP (April 2009)
- CPS – exemptions for supplies of fossil fuels to CHP where the fuel is used to generate heat (fuel for heat equivalent)

New measures:

- CPS – exemptions for supplies of fossil fuels to CHP where the fuel is used to generate Good Quality electricity used on site (April 2015)
- Renewable Heat Incentive (RHI) ….. 4.1 p/kWh of heat for Biomass fuelled GQCHP
- Contract for Difference (CfD will replace the RO for all new projects from 1st April 2017)

Department of Energy & Climate Change

CCL benefit for GQCHP

CHP FOCUS

Conventional Methods

CCL applied

Heat

Electricity

CCL applied

Gas

- CCL on Electricity Consumed
- CCL on fuel to Boiler

CHP

Electricity

Heat

Gas

Worth about 10% of Energy bills

- NO CCL on Electricity Consumed
- NO CCL on fuel to CHP

Department of Energy & Climate Change

CHP FOCUS

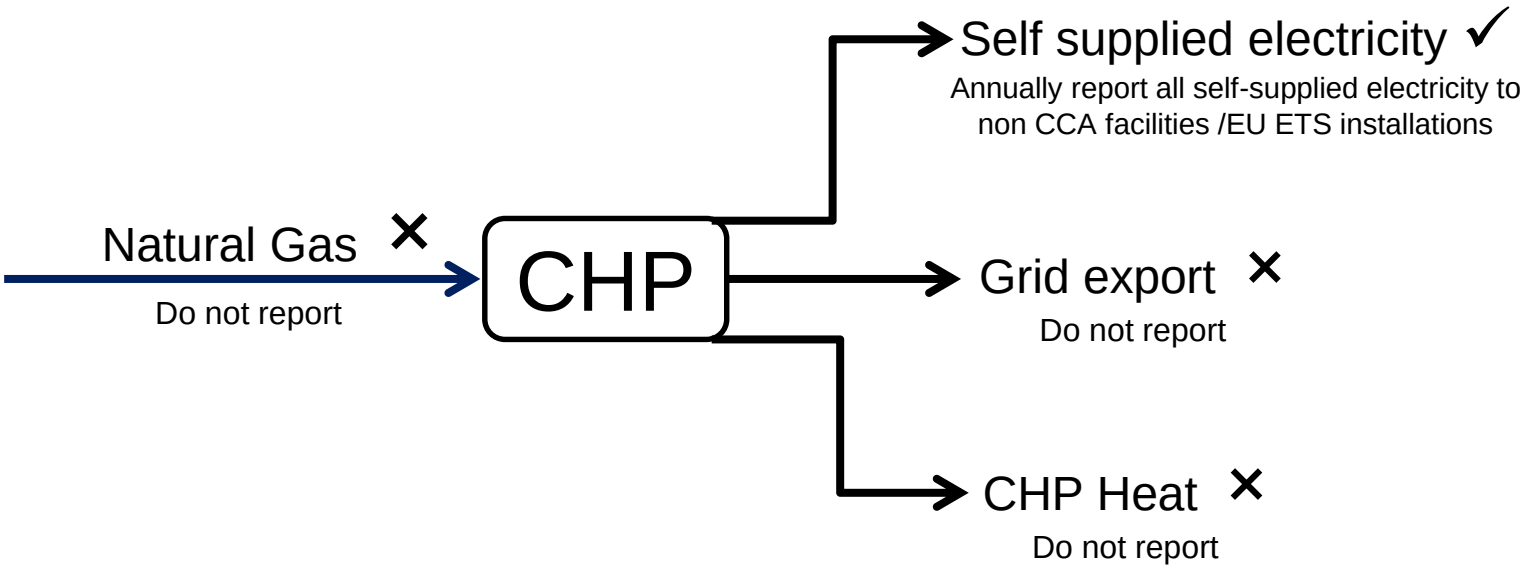
CRC Energy Efficiency Scheme (CRC)

- Captures emissions not covered by existing measures such as EU ETS and CCAs
- A mandatory CO2 emissions trading scheme affecting large non-energy intensive businesses and **public sector organisations**
- Began in April 2010
- Applicable to **organisations** with total electricity consumption > 6,000 MWh/y (based on half hourly meters). Averaging at about 1 – 2 MW_e electricity demand.
- Many Hospitals and Universities are caught by CRC

Department of Energy & Climate Change

CHP FOCUS

Current simplified arrangements



- **CHP at EU-ETS or CCA installations.... Is out of CRC**
- **CHP at non-ETS/CCA ... Only electricity used on site to be reported**
- **No CRC on Heat (Zero Carbon)**
- **Incentivising higher electrical efficiency and heat recovery**

Department of Energy & Climate Change

CHP FOCUS

CHP Business Rate Exemption

- Exemption applies to specific CHP scheme plant and machinery in possession of a full or partial SoS (CHP) exemption certificate
- Not available to Stand alone CHP prepared on the receipts and expenditure (R&E) valuation methodology
- Available to Embedded CHP (in hospitals, leisure centres, universities etc.) on plant and machinery named in the Valuation and Rating (Plant and Machinery) England Regulations.

Department of Energy & Climate Change

CHP FOCUS

Hydrocarbon Oil Duty Relief

- CHP fully or partially certified as “Good Quality CHP” with a SoS (CHP) Exemption Certificate that use fuel oil
- Eligible to claim a refund on the oil used to generate electricity
- Relief is allowed only after the oil has been used to produce the electricity. Therefore, not allowed on unused oil held as stock.

Department of Energy & Climate Change

CHP FOCUS

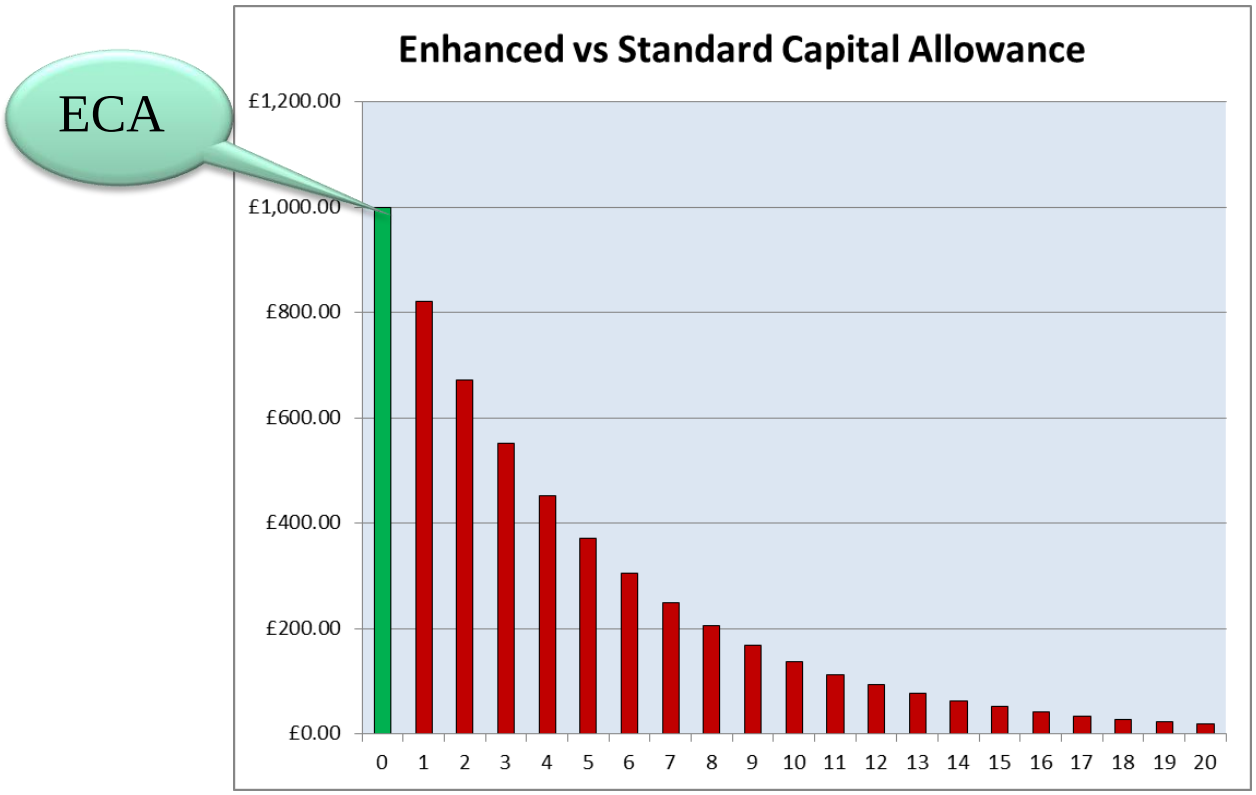
CHP ECA Eligibility

- Good Quality CHP is eligible for Enhanced Capital Allowance (ECA)
- Not available to Public sector organisations (Hospitals, LAs, etc)
- Not available for companies where the main business is electricity production.
- CHP schemes provided as part on an Energy Services contract can claim ECA …Public sector organisations interested in CHP can benefit from this
- If qualified (partial or full) as GQCHP then investors can claim ECA on all eligible expenditure.

Department of Energy & Climate Change

CHP FOCUS

ECA Benefit



In Summary …ECA benefit is worth in the order of 10% of total Capital investment

Department of Energy & Climate Change

CHP FOCUS

ECA Process

- Applicants must identify heat load
- This need to meet the “Useful Heat” definition (i.e economically justified heat loads)
- Need to obtain CHPQA certificate from the CHPQA programme and a Certificate of Energy Efficiency from DECC

A CHPQA Certificate is required to obtain an EE Certificate

Department of Energy & Climate Change

CHP FOCUS

CHP & ROCs

Current arrangement:

- GQCHP fuelled by biomass can get 2.0 ROCs/MWh (0.5 ROC uplift)
- 1.0 ROC/MWh for EfW Good Quality CHP
- 1.0 ROC for Co-fired CHP

  - Only for schemes certified as GQ CHP
  - The 0.5 ROC CHP uplift available for plant accredited up to March 2015 (Sept 2015 in NI)**…..Extended to March 2017 but only if technology and / or fuel source does not, and never has, met the RHI eligibility criteria.**

Department of Energy & Climate Change

CHP FOCUS

CCL and CPS

- Government has introduced **a floor price for carbon** to stabilise price signals to investors in low carbon technologies
- This has been implemented through the CCL system, introducing new rates levied upon supplies of taxable commodities to **power generators** (including CHP); these rates are known as CCL carbon price support (CPS) rates
- CPS rates came into effect from 1 April 2013

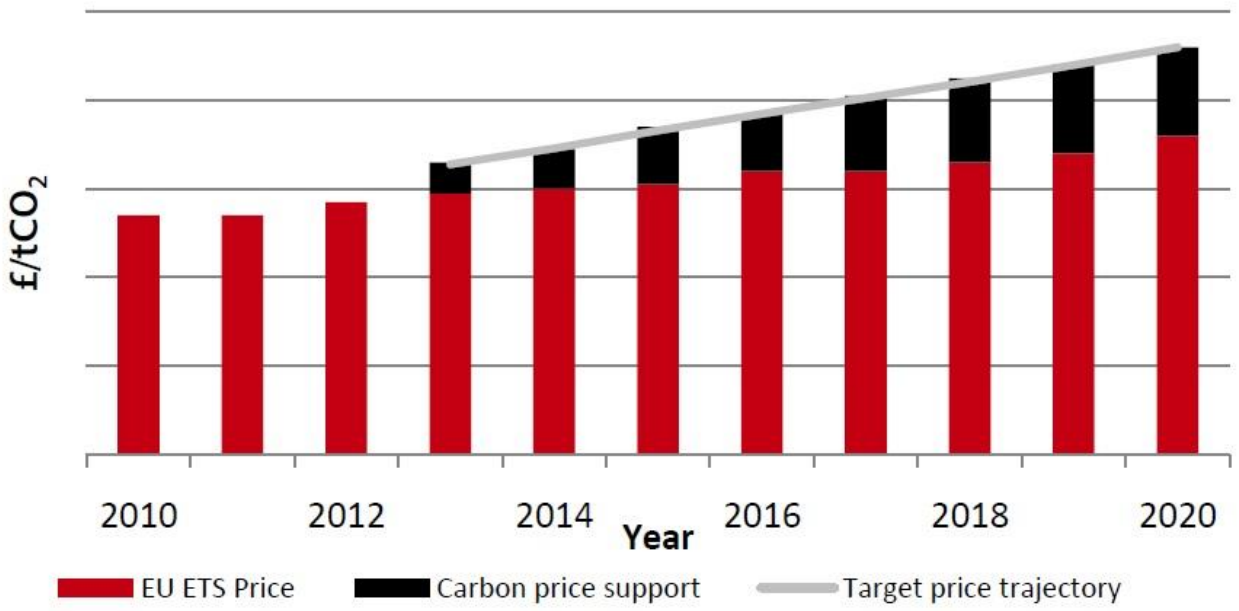
- Schemes of 2 MWe and below are exempt from CPS, as long as they have CHPQA certificate.
- GQCHP > 2 MWe certified by CHPQA are exempt from CPS rates on fuel that is attributable to the scheme's heat output.
- Extra exemption from April 2015……..

Department of Energy & Climate Change

CHP FOCUS

Background

Chart 4.A: Illustration of the carbon price support mechanism



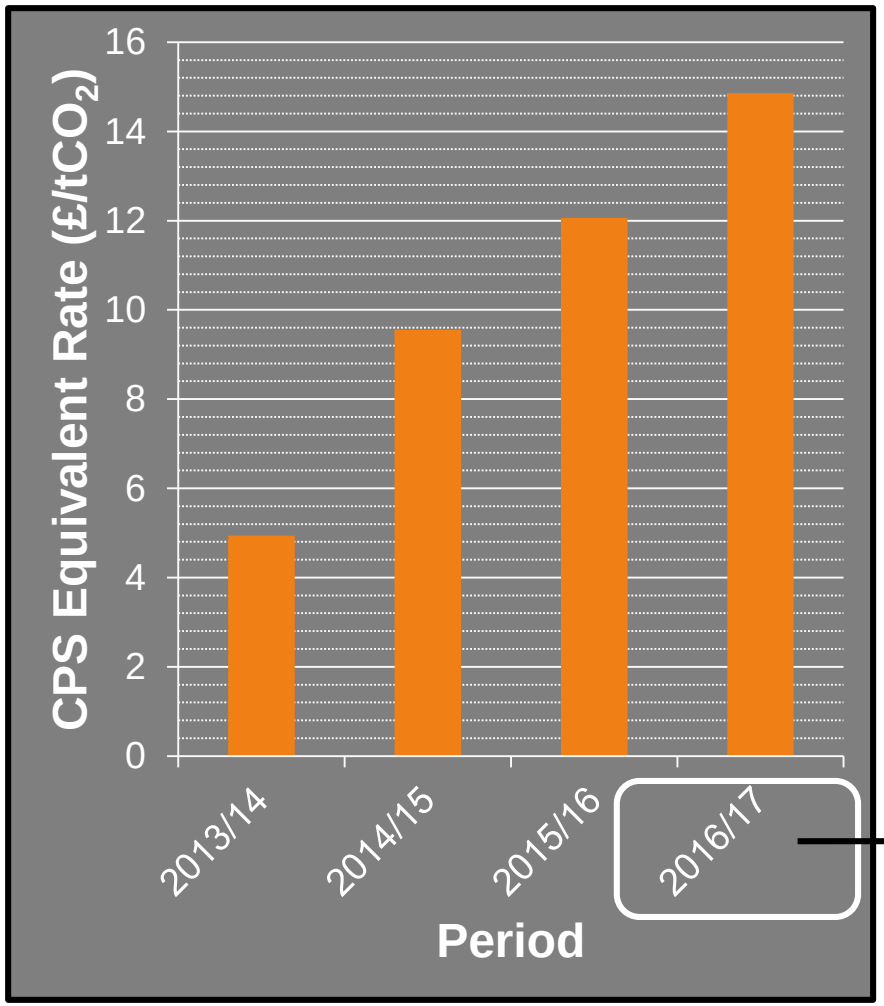
Source: HM Treasury, 2010

Department of Energy & Climate Change

CHP FOCUS

CPS Rates

Recent announcement (budget 2014) -carbon price floor frozen at 2015 level until 2020



Commodity	Units	2013/14	2014/15	2015/16	2016/17
Natural Gas	£/kWh	0.00091	0.00175	0.00334	0.00331
LPG	£/kg	0.01460	0.02822	0.05307	0.05280
Coal	£/GJ	0.44264	0.85489	1.56860	1.54790
Fuel Oil	£/litre	0.01568	0.03011	0.05730	0.05711
Gas Oil	£/litre	0.01365	0.02642	0.04990	0.04916

Rates for 2016/17 are Indicative

Department of Energy & Climate Change

CHP FOCUS

NEW FISCAL MEASURES

Department of Energy & Climate Change

CHP FOCUS

Recent developments on CPS

- With effect from 1 April 2015 the government introduced an exemption from the CPS for fossil fuels that are used in CHPs to generate QPO used onsite.

As announced at Budget 2014, ……from 1 April 2015 the government will exclude from the carbon price support rates, fossil fuels that are used by CHPs to generate good quality electricity that is self-supplied or supplied under exemption from the requirement to hold a supplier licence. (Finance Bill 2015)

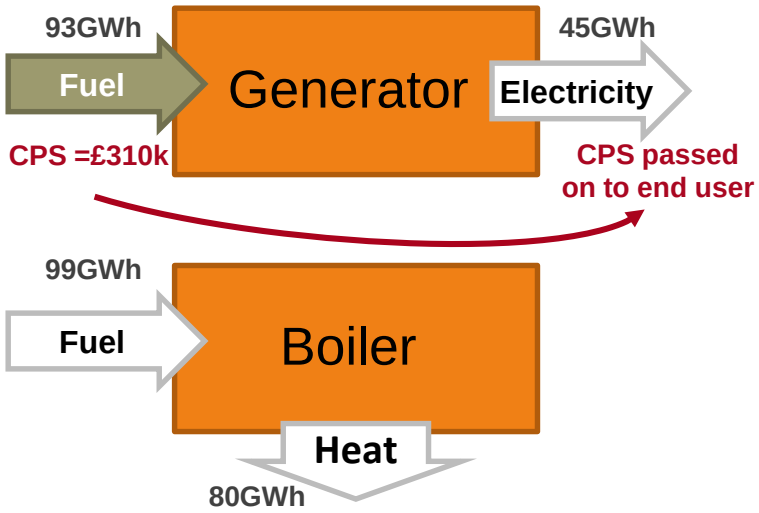
- For more details on how to determine your liabilities, please refer to HMRC Excise Notice CCL1/6.

Department of Energy & Climate Change

CHP FOCUS

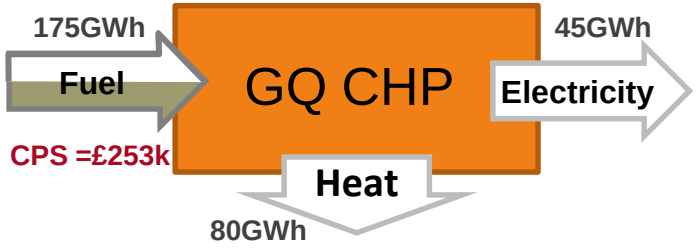
Benefit from being GQCHP

Separate Generation



CPS liability = £310k

Good Quality CHP



$$\text{Fuel subject to CPS} = \text{TFI} - \left(\frac{\text{QHO}}{81\%}\right) = 175 - \frac{80}{81\%} = 76\text{GWh}$$

CPS liability = £253k

With the additional exemption fully qualified Schemes consuming all electricity on site, will get the full benefit (100% exemption)

Department of Energy & Climate Change

CHP FOCUS

Renewable Heat Incentive

- Non-domestic scheme launched in November 2011
- Provides support for variety of renewable heat technologies, including
  - Biomass (including biomass in MSW)
  - Biogas
  - Geothermal
- Support extends to eligible heat-only and **CHP installations**
- Current tariff for Biomass installations > 1MW is 2.0 p/kWh
- CHP must have been commissioned or converted to CHP operation on/after 15th July 2009

- Current band for large biomass schemes (>1MW$_{th}$) is £20/MWh)
- CHP cannot claim both RHI support and CHP uplift under the RO

Department of Energy & Climate Change

CHP FOCUS

RHI Expansion

- **A specific tariff for biomass-fuelled GQCHP of 4.1p/kWh**
- Schemes will need to **be certified by CHPQA** in order to benefit from CHP tariff
- EfW CHP plants will only be eligible for the biomass tariff (2.0p/kWh)
- CHP RHI eligible heat is not the same as QHO
- CHP scheme boundaries for CHPQA certification not always the same as for RHI
- Only heat produced via the engine/turbine will qualify,
- This will need to be metered separately.

Department of Energy & Climate Change

CHP FOCUS

Contract for Difference (CfD)?

- Regulations for CfD came into force in Great Britain on 1/8/2014
- CfD will replace the RO for all new projects from 1/4/2017. Whilst the CfD regime will commence in GB from 2014 and for Northern Ireland from April 2017.
- Applicable to biomass/waste, but not bio-liquid CHP
- Paid difference between 'strike price' (cost of investing in the specific low carbon technology) and the 'reference price' (average market price for electricity in GB market). If 'reference' exceeds 'strike' price, generator must pay difference.

Department of Energy & Climate Change

CHP FOCUS

Contract for Difference (CfD)

	Strike Prices £/MWh (2012 prices)				
	2014/15	2015/16	2016/17	2017/18	2018/19
Advanced Conversion Technologies (with or without CHP)	155	155	150	140	140
Anaerobic Digestion (with or without CHP)	150	150	150	140	140
Dedicated Biomass (with CHP)	125	125	125	125	125
Energy from Waste (with CHP)	80	80	80	80	80
Geothermal (with or without CHP)	145	145	145	140	140

Department of Energy & Climate Change

CHP FOCUS

CHP-specific CfD Eligibility

- Two eligible technologies :
  - *dedicated-biomass with CHP* and
  - *EfW with CHP*.
- AD and ACT (gasification or pyrolysis) eligible for CfDs, without being CHP.

Department of Energy & Climate Change

CHP FOCUS

Final message

1- Biomass CHP can obtain ROC uplift* and ECA

Or

2- Standard ROC (no uplift) and RHI but no ECA

And

3- From 2017 can only apply for CfD & RHI but no ECA

*The 0.5 ROC CHP uplift was available for plant accredited up to March 2015 (Sept 2015 in NI)…..Extended to March 2017 but only if technology and / or fuel source does not, and never has, met the RHI eligibility criteria. **So Solid Biomass fuelled CHP Schemes accredited by Ofgem on or after 1 April 2015 are not able to claim the CHP 0.5 ROC uplift. This situation also applies to additional capacity added to existing schemes.**

To Qualify for any of the fiscal benefits available for GQCHP, the scheme needs to be certified by CHPQA…….

Department of Energy & Climate Change

CHP FOCUS

Introduction to CHPQA

Department of Energy & Climate Change

CHP FOCUS

Why CHPQA?

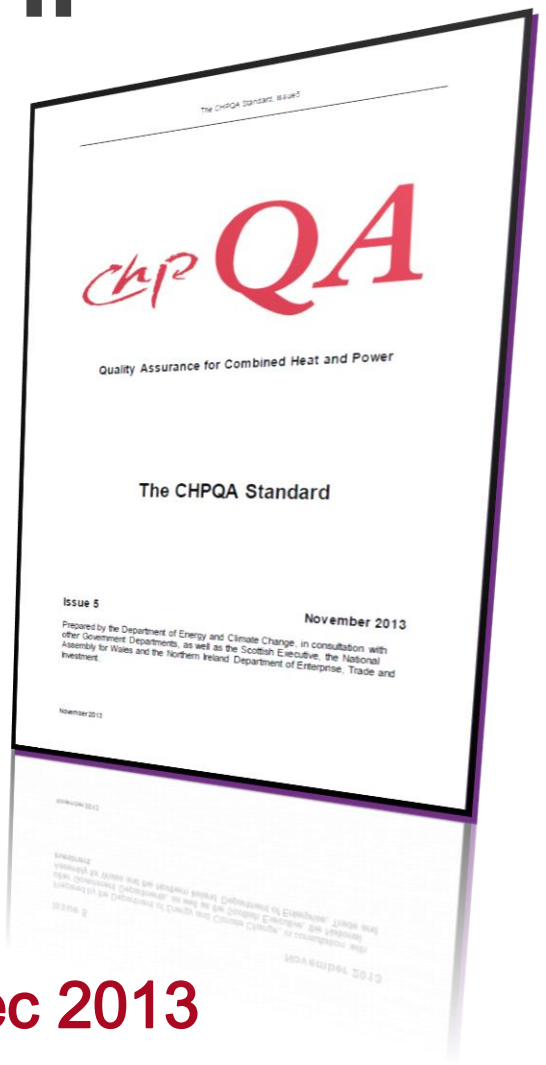
- In 2001 the Government introduced the Climate Change Levy (CCL) on fuel and electricity
- Decided to exempt CHP from CCL
- Needed a tool for measuring the Quality of CHP Schemes
- A rigorous system is needed to:
  - ensure that incentives are targeted fairly
  - ensure that it only benefits schemes making significant environmental savings
- CHPQA provides the methods and procedures needed to assess and certify the quality of the full range of CHP Schemes

Department of Energy & Climate Change

CHP FOCUS

Definition of GQCHP

- It is based on Quality Index NOT overall efficiency
- Is a function of electricity and heat delivered
- **All laid out in the CHPQA Standard**



For Existing Schemes:

- Quality Index (QI) >100 and
- Power generation efficiency of ≥ 20%

For Upgraded & New Schemes:

- Quality Index (QI) >105 and
- Power generation efficiency of ≥ 20%.

Issue 5 was published in Dec 2013

Department of Energy & Climate Change

CHP FOCUS

CHPQA QI Formulas

The general definition for QI is:

$$QI = (X \times \eta_{power}) + (Y \times \eta_{heat})$$

Where:

Power Efficiency (η_{power}) = CHP_{TPO}/CHP_{TFI}

and

Heat Efficiency (η_{heat}) = CHP_{QHO}/CHP_{TFI}

X and Y are parameters which depend on the type of fuel used and size of scheme (MW_e)

Department of Energy & Climate Change

CHP FOCUS

CHPQA Standard (Issue 5) QI Formulae– For Conventional Fuels

Size Of Scheme (CHP_{TPC})	QI Definition
CONVENTIONAL FOSSIL FUELS SCHEMES	
Natural gas (inc. Reciprocating Engines)	
≤1MW_e	$QI = 249 \times \eta_{power} + 115 \times \eta_{heat}$
>1 to ≤10MW_e	$QI = 195 \times \eta_{power} + 115 \times \eta_{heat}$
>10 to ≤25MW_e	$QI = 191 \times \eta_{power} + 115 \times \eta_{heat}$
>25 to ≤50MW_e	$QI = 186 \times \eta_{power} + 115 \times \eta_{heat}$
>50 to ≤100MW_e	$QI = 179 \times \eta_{power} + 115 \times \eta_{heat}$
>100 to ≤200MW_e	$QI = 176 \times \eta_{power} + 115 \times \eta_{heat}$
>200 to ≤500MW_e	$QI = 173 \times \eta_{power} + 115 \times \eta_{heat}$
>500MW_e	$QI = 172 \times \eta_{power} + 115 \times \eta_{heat}$
Oil	
≤1MWe	$QI = 249 \times \eta_{power} + 115 \times \eta_{heat}$
>1 to ≤25MWe	$QI = 191 \times \eta_{power} + 115 \times \eta_{heat}$
>25MWe	$QI = 176 \times \eta_{power} + 115 \times \eta_{heat}$
Coal	
≤1MWe	$QI = 249 \times \eta_{power} + 115 \times \eta_{heat}$
>1 to ≤25MWe	$QI = 191 \times \eta_{power} + 115 \times \eta_{heat}$
>25MWe	$QI = 176 \times \eta_{power} + 115 \times \eta_{heat}$

Issue 5 of the standard formulae will apply from 1st January 2014 and will be used for the 2015 certification of all schemes

Department of Energy & Climate Change

CHPQA Standard (Issue 5) QI Formulae– For Alternative Fuels

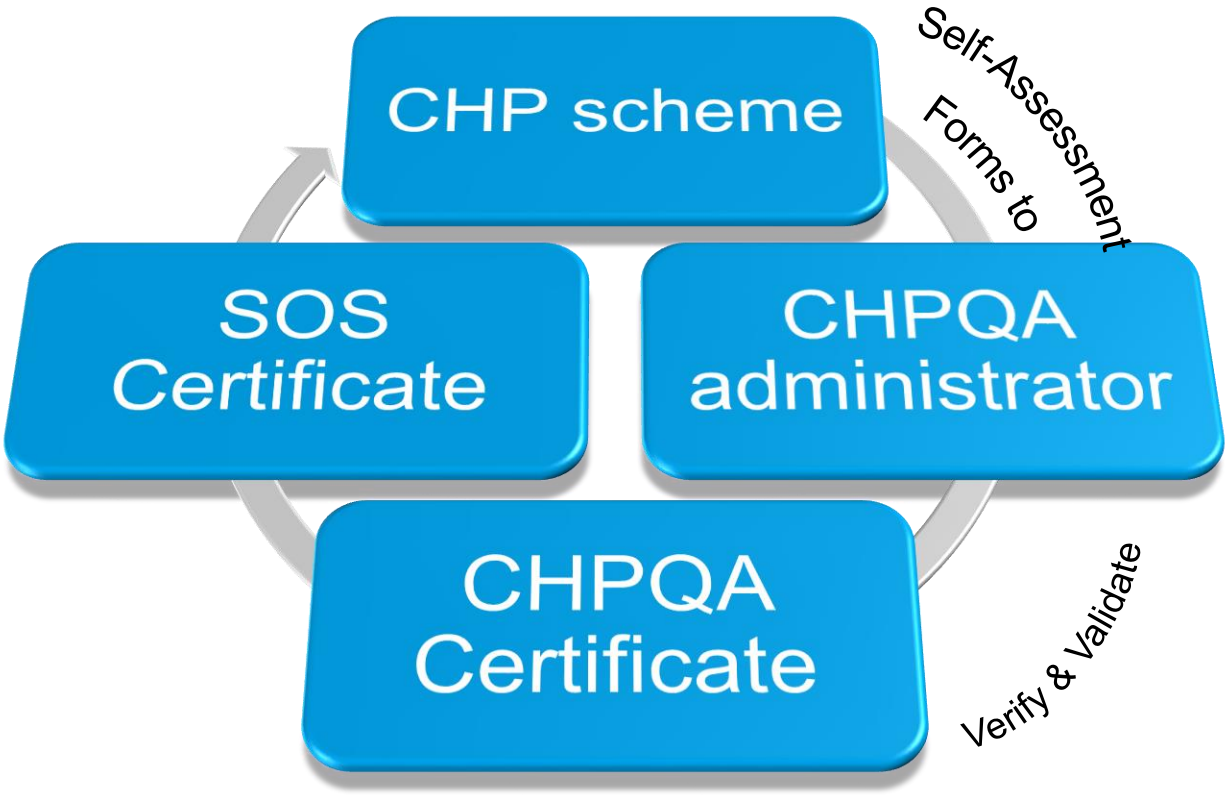
CHP FOCUS

SPECIAL CASES						
FUEL CELL SCHEMES	QI =	180 x	η_{power}	+	120	x η_{heat}
ALTERNATIVE FUEL SCHEMES						
Category A (e.g. AD gas, sewage gas, landfill gas)						
≤1MWe	QI =	238 x	η_{power}	+	120	x η_{heat}
>1 to ≤25MWe	QI =	225 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	193 x	η_{power}	+	120	x η_{heat}
Category B (e.g. synthesis gas)						
≤1MWe	QI =	275 x	η_{power}	+	120	x η_{heat}
>1 to ≤25MWe	QI =	251 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	193 x	η_{power}	+	120	x η_{heat}
Category C e.g. Fatty Acid Methyl Ester, Pyrolysis oil etc.)						
≤1MWe	QI =	245 x	η_{power}	+	120	x η_{heat}
>1 to ≤25MWe	QI =	191 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	176 x	η_{power}	+	120	x η_{heat}
Category D (e.g. Tallow, Used Cooking Oil)						
<=1MWe	QI =	245 x	η_{power}	+	120	x η_{heat}
>1 to ≤25MWe	QI =	226 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	176 x	η_{power}	+	120	x η_{heat}
Category E (e.g. Municipal waste, sewage sludge, paper sludge etc.)						
≤1MWe	QI =	370 x	η_{power}	+	120	x η_{heat}
>1 to ≤10MWe	QI =	370 x	η_{power}	+	120	x η_{heat}
>10 to ≤25MWe	QI =	370 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	220 x	η_{power}	+	120	x η_{heat}
Category F (e.g. Logs, Energy crops, Agricultural residues etc.)						
≤1MWe	QI =	348 x	η_{power}	+	130	x η_{heat}
>1 to ≤10MWe	QI =	348 x	η_{power}	+	130	x η_{heat}
>10 to ≤25MWe	QI =	348 x	η_{power}	+	130	x η_{heat}
>25MWe	QI =	220 x	η_{power}	+	120	x η_{heat}
Category G (e.g. Contaminated waste wood)						
≤1MWe	QI =	352 x	η_{power}	+	120	x η_{heat}
>1 to ≤10MWe	QI =	338 x	η_{power}	+	120	x η_{heat}
>10 to ≤25MWe	QI =	338 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	220 x	η_{power}	+	120	x η_{heat}
Category H (e.g. Wood pellets, straw, clean waste wood etc.)						
≤1MWe	QI =	329 x	η_{power}	+	120	x η_{heat}
>1 to ≤10MWe	QI =	293 x	η_{power}	+	120	x η_{heat}
>10 to ≤25MWe	QI =	286 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	220 x	η_{power}	+	120	x η_{heat}
Category I (e.g. by-product gases produced in industrial processes)						
≤1MWe	QI =	294 x	η_{power}	+	120	x η_{heat}
>1 to ≤25MWe	QI =	221 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	193 x	η_{power}	+	120	x η_{heat}
Category J (e.g. waste gases such as carbon monoxide, or waste heat such as the exhaust gas from high temperature processes, or as a product of exothermic chemical reactions).						
≤1MWe	QI =	329 x	η_{power}	+	120	x η_{heat}
>1 to ≤25MWe	QI =	299 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	193 x	η_{power}	+	120	x η_{heat}
Category K (e.g. liquid waste-non renewable)						
≤1MWe	QI =	275 x	η_{power}	+	120	x η_{heat}
>1 to ≤25MWe	QI =	260 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	176 x	η_{power}	+	120	x η_{heat}

Department of Energy & Climate Change

CHP FOCUS

Self Assessment & Certification



Department of Energy & Climate Change

CHP FOCUS

Roles and Responsibilities

- CHPQA Administrator/Managed by Ricardo-AEA
- DECC
- Other Government Departments (HMRC, VOA)
- Ofgem - for issuing ROCs, RHI

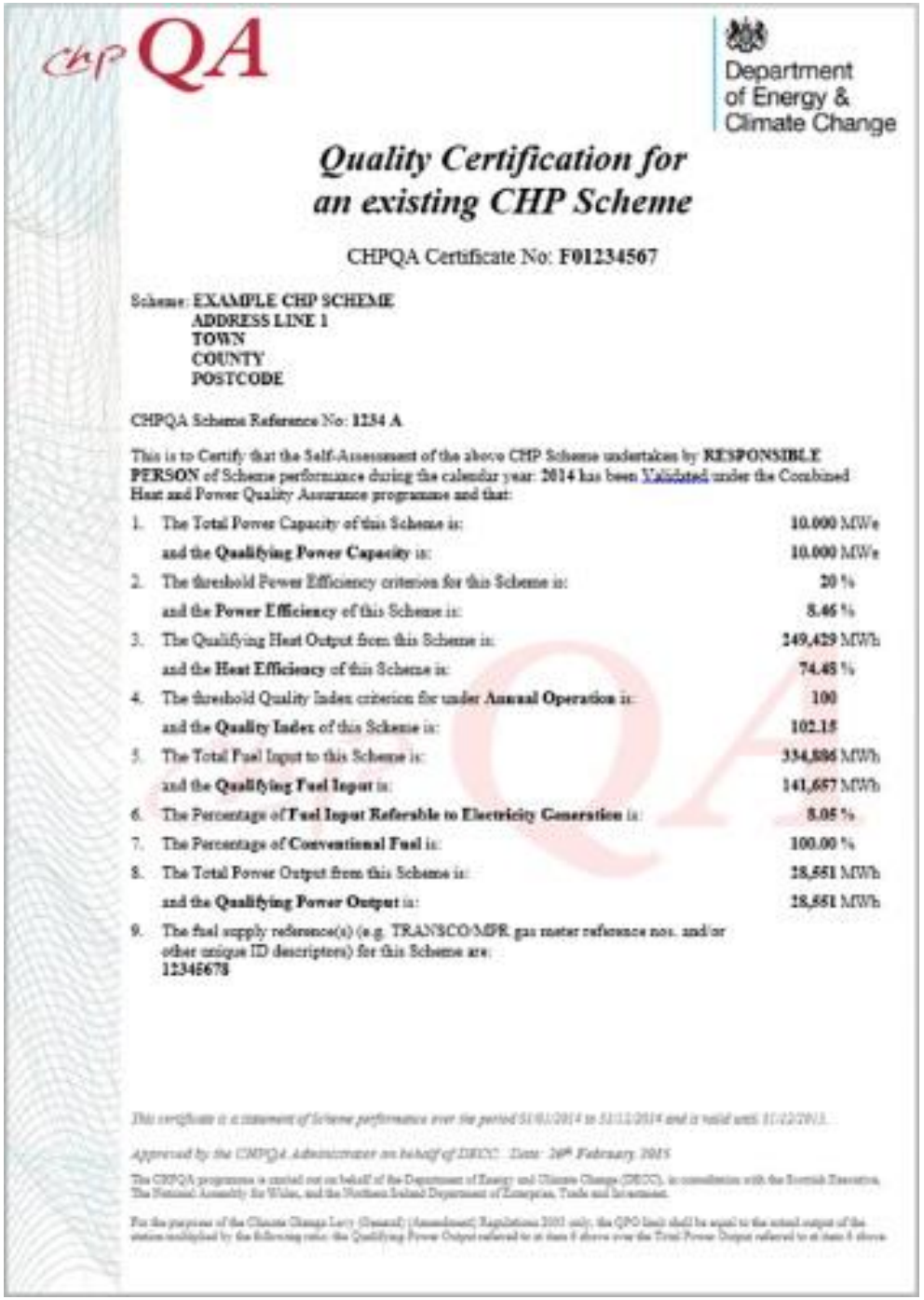
Department of Energy & Climate Change

CHP FOCUS

CHPQA Submission

- **A range of forms have been developed :**
  - F1 (contact details);
  - F2 (scheme description);
  - F4 (scheme actual performance in previous calendar year) and
  - F3 (scheme predicted performance for new and upgraded schemes).
- **Simplified procedure and forms for small single reciprocating engine based schemes (<2MW$_e$).**
  - Only have to provide three figures per year**.**

Department of Energy & Climate Change



CHP QA

Department of Energy & Climate Change

Quality Certification for an existing CHP Scheme

CHPQA Certificate No: **F01234567**

Scheme: **EXAMPLE CHP SCHEME**
ADDRESS LINE 1
TOWN
COUNTY
POSTCODE

CHPQA Scheme Reference No: **1234 A**

This is to Certify that the Self-Assessment of the above CHP Scheme undertaken by **RESPONSIBLE PERSON** of Scheme performance during the calendar year: **2014** has been Validated under the Combined Heat and Power Quality Assurance programme and that:

1.	The Total Power Capacity of this Scheme is:	**10.000** MWe
	and the **Qualifying Power Capacity** is:	**10.000** MWe
2.	The threshold Power Efficiency criterion for this Scheme is:	**20** %
	and the **Power Efficiency** of this Scheme is:	**8.46** %
3.	The Qualifying Heat Output from this Scheme is:	**249,429** MWh
	and the **Heat Efficiency** of this Scheme is:	**74.48** %
4.	The threshold Quality Index criterion for under **Annual Operation** is:	**100**
	and the **Quality Index** of this Scheme is:	**102.15**
5.	The Total Fuel Input to this Scheme is:	**334,886** MWh
	and the **Qualifying Fuel Input** is:	**141,657** MWh
6.	The Percentage of **Fuel Input Referable to Electricity Generation** is:	**8.05** %
7.	The Percentage of **Conventional Fuel** is:	**100.00** %
8.	The Total Power Output from this Scheme is:	**28,551** MWh
	and the **Qualifying Power Output** is:	**28,551** MWh

9. The fuel supply reference(s) (e.g. TRANSCO/MPR gas meter reference nos. and/or other unique ID descriptors) for this Scheme are:
12345678

This certificate is a statement of Scheme performance over the period 01/01/2014 to 31/12/2014 and is valid until 31/12/2015.

Approved by the CHPQA Administrator on behalf of DECC. Date: 20th February 2015

The CHPQA programme is carried out on behalf of the Department of Energy and Climate Change (DECC), in consultation with the Scottish Executive, The National Assembly for Wales, and the Northern Ireland Department of Enterprise, Trade and Investment.

For the purposes of the Climate Change Levy (General) (Amendment) Regulations 2003 only, the QPO limit shall be equal to the actual output of the station multiplied by the following ratio: the Qualifying Power Output referred to at item 8 above over the Total Power Output referred to at item 8 above.

CHP FOCUS

Department of Energy & Climate Change

CHP FOCUS

CHPQA Contact Numbers

- Helpline Number: **01235 75 3004**
- E-mail: chpqainfo@chpqa.com
- CHPQA Administrator
  The Gemini Building
  Fermi Avenue
  Harwell International Business Centre
  Didcot, Oxfordshire
  England OX11 0QR
- Website: **https://www.gov.uk/combined-heat-power-quality-assurance-programme**

Department of Energy & Climate Change

CHP FOCUS

To summarise…

There are number of incentives available for CHP schemes and you should be aware of them while planning or developing these projects…

Thank You