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Department of Energy and Climate Change

Electricity Market Reform

Review of effective tax rates for renewable technologies

July 2013

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Contents

Glossary of terms

ACT	Advanced Conversion Technologies
AD	Anaerobic Digestion
Arup report	The report prepared for DECC, entitled '*Review of the generation costs and deployment potential of renewable electricity technologies in the UK*', dated October 2011
CAs	Capital allowances
Cambridge report	Report prepared for DECC by Cambridge Economic Policy Associates Ltd, entitled, '*Note on impacts of the CfD FIT support package on costs and availability of capital and on existing discounts in power purchase agreements',* dated June 2011
CfD	Contract for difference
CHP	Combined heat and power
DECC	Department of Energy and Climate Change
EfW	Energy from waste
EMR	Electricity Market Reform
ETR	Effective tax rate
HMRC	Her Majesty's Revenue and Customs
IBAs	Industrial buildings allowances
IFRS	International Financial Reporting Standards
IRR	Internal rate of return
LLAs	Long life allowances
MW	Megawatt
NQ	Non-qualifying
P&L	Profit and loss account
P&M	Plant and machinery
Post-tax WACC	A WACC which includes an adjustment for interest tax relief
PV	Photovoltaic
R&D	Research and development
RDAs	Research and development allowances
Straw Man	An outline of key parameters and assumptions used to demonstrate outcomes
TP	Transfer Pricing
UK	United Kingdom
UK GAAP	UK Generally Accepted Accounting Practice
VAT	Value added tax
WACC	Weighted average cost of capital

Background and scope

KPMG have been engaged to show the impact of tax on the cash flows arising on pro forma projects for three classes of electricity generating technologies: onshore wind, offshore wind and biomass conversions.

We have considered the timing and quantum of the corporation tax cash flows to assess the effect of tax on the pre-tax and post-tax rates of return and so illustrate representative effective tax rates arising.

For 22 other renewable technologies a high-level qualitative analysis has been performed to assess whether the ETR for offshore wind or biomass conversion is an appropriate proxy.

Background

The Department of Energy and Climate Change (DECC) wishes to benchmark and understand the drivers of the rates of return across various energy-generating asset classes so that it can structure its generic contract for differences ("CfDs") such that a 'reasonable' rate of return can be earned by the generator when the strike price of the CfD is set.

A 'reasonable' rate of return is considered as being in line with the wider market that is not too high (thereby generating excessive returns for the generator) nor too low (thereby reducing market interest).

Scope of ETR review

This paper illustrates an indicative effective tax rate ("ETR") of a project by reference to pre-tax and post-tax rates of return for three classes of electricity generating assets:

- Biomass conversions;
- Offshore wind; and
- Onshore wind

by examining the pattern of tax cash flows over the lifetime of the project to determine the pre-tax rates of return required to earn a target post-tax IRR.

Throughout the report the ETR refers to the effective rate of tax when considering the pre-tax nominal rate of return against a post-tax nominal rate of return.

A "straw man" overview has been prepared analysing the main components of expenditure, the expected operating life and the tax treatment of the cash flows for indicative projects for each of the asset classes. Our report outlines the main tax and commercial assumptions for each asset class, within Appendix I.

In order to ascertain the ETR for each technology class, a high-level numerical illustration has been prepared for each technology based on the analysis of the cash flows. Appendix II gives an example.

The report includes brief overview of alternative structuring arrangements and where changes to the underlying assumptions may affect the cash flows and payments of tax, with a consequential impact on the post-tax rate of return.

Our work does not include:

- Preparation of a detailed financial model;
- Performance of sensitivity analysis;
- Transfer pricing benchmarking or functional analysis.

It should also be noted that the structure of the legal wording of the CfD contract and the commercial arrangements are still being developed and there are several areas of tax variability which may arise that would affect project cash flows. This report does not examine any tax consequences of the CfD accordingly.

Addendum: analysis of other renewable technologies

As an extension to the original scope of the review, the characteristics of other renewable technologies have been assessed at a high level to determine whether the effective tax rates for offshore wind or biomass conversion could be applied to these other technologies.

The scope of the work, the approach taken and the results of this additional analysis are outlined in an addendum to this report at page 28, which is not referred to in the executive summary.

Executive summary

	Key observations	Implications	Page
Effective discounted tax rate	■ For each project the ETR may be determined by: – The timing and quantum of tax relief on capital expenditure by way of capital allowances claimed on a reducing balance basis over the lifetime of the project – The proportion of expenses incurred on capital items and operating expenditure (claimed broadly in line with when the expenditure arises), – The extent to which debt is used to finance the project and the corporation tax relief available on debt where the vanilla WACC is used as the target post tax rate of return	■ The standard rate of UK corporation tax of 20% is not an appropriate measure of the difference between pre-tax and post-tax nominal rates of return. ■ Where it is assumed that a project is wholly equity funded, the nature of the technology and profile of the relative proportion of capital and revenue expenditure will drive the discounted ETR above or below the standard rate. ■ Where projects are assumed to be highly geared, the discounted ETR (by reference to the vanilla WACC) is below the 20% UK corporation tax rate for all technologies.	8-12
Timing of corporation tax relief	■ As corporation tax relief for capital expenditure is claimed on a reducing balance basis, greater relief is taken in the early years of the project. ■ For projects with relatively high levels of capital expenditure (e.g., offshore and onshore wind), the ETR in the earlier years is shown to be lower than or equal to the standard rate of UK corporation tax of 20%, but increases over the life of the project.	■ For projects where a high proportion of the costs are incurred up-front, the discounted ETR is lower than the standard 20% rate of UK corporation tax. ■ The longer the timeframe over which the economic analysis is conducted, the higher the discounted ETR will be for each technology.	8-9
Offshore and onshore wind – no gearing	■ For projects where there is no gearing, the discounted ETR is 11.4% for onshore wind and 12.0% for offshore wind, both of which are lower than the future standard UK corporation tax rate of 20.0%.	■ For equity funded offshore and onshore wind projects, the standard rate of corporation tax is not likely to be a suitable proxy for the discounted ETR as it over-states the difference between pre-tax and post-tax rates of return. ■ The proportion of capital expenditure relative to revenue expenditure is greater for onshore wind than for offshore, and hence the discounted ETR was found to be lower for onshore wind, assuming no gearing.	16-17
Biomass conversion – no gearing	■ The on-going revenue expenditure, due to fuel costs, is significantly greater than the up-front capital expenditure. A greater proportion of the corporation tax relief is taken over the life of the project, rather than up-front through capital allowances. Furthermore, the proportion of capital expenditure qualifying for capital allowances is significantly lower for biomass conversion (c 60%) than for wind (over 90%). ■ The effect was that the ETR for a biomass conversion project financed fully by equity was found to be 21.0%, and thus slightly higher than the UK standard rate of corporation tax.	■ It is not possible to apply the same ETR for offshore or onshore wind projects to a biomass conversion project. ■ The standard corporation tax rate of 20% may understate the ETR to apply to biomass conversion projects where there is no gearing. Our analysis suggests that a 21.0% ETR is more appropriate.	18

Executive summary (cont.)

	Key observations	Implications	Page
Capital allowances	■ 85-90% of the capital expenditure on offshore and onshore wind may be expected to qualify for capital allowances, whereas the qualifying proportion for biomass conversion was 60%. ■ Our expectations are that the proportion of capital expenditure qualifying for capital allowances will be between 60-90% for most renewable technology projects, i.e., within the range covered by our review.	■ Capital allowances do have an impact on project cash flows and can be expected to reduce the ETR by up to a third from the standard rate of UK corporation tax in an ungeared project, depending on the technology and the profile of the capital expenditure. ■ Although each project is different, the effect on the discounted ETR can be predicted with a reasonable degree of certainty using cash flow tax analysis as the ability to claim capital allowances is based on the nature of the expenditure which (local factors aside) is expected to be broadly similar for each project of a specific technology.	20-24
Effect of gearing on ETR	■ The level of gearing affects the discounted ETR only where it is calculated by reference to the vanilla WACC. Where the post-tax WACC is used, incorporating the corporation tax benefit of the interest into the target return, the discounted ETR is the same as for an ungeared project with the same post-tax WACC. ■ For all three technologies, gearing up to the maximum level which may be available from commercial lenders produces a significant reduction in the discounted ETR in the project company, where it is calculated by reference to the vanilla WACC; 7.9% for onshore wind, 8.4% for offshore wind and 14.2% for biomass conversion.	■ It is not possible to predict the exact level of leverage that will be used by each generator. The level of debt that may be raised is likely to be determined by more than the nature of the technology. ■ Where the post-tax WACC is used, the discounted ETR from straw man 1 is appropriate. ■ In determining the value of the relief to an investor, and the effect on the returns received, the quantum of the tax relief (driven by the amount of debt taken out and the rate of interest) and the timing of the interest deductions should be factored in. Where the benefit of corporation tax relief of interest is taken in earlier periods of the project, the greater the value of the relief is to an investor.	25-26
Structuring	■ The analysis undertaken has been on the basis that the operator of the project takes the full risk, and no arrangements are in place to transfer risk and profits to other parties (e.g., through tolling and similar arrangements) or to allow early year tax losses to be sold to shareholders by group relief. ■ Similarly it is assumed that purchases are all on an arm's length basis and that anti-avoidance legislation prevents the artificial diversion of profits overseas through alternative pricing arrangements.	■ Commercial arrangements that may be entered into, as well as the gearing levels, may mean that the discounted ETR and the pre-tax and post-tax rates of return vary significantly between projects.	27

Financial analysis

Review of effective tax rates for renewable technologies

Financial analysis – approach

Our review assesses the extent to which the underlying commercial factors, capital allowances and gearing levels affect the pre-tax rates of return for each technology, given a set post-tax IRR.

In order to analyse the effect of taxation on the rates of return, the discounted effective tax rate has been used which is affected by the quantum and timing of the corporation tax relief of the project.

Approach

The objective of the analysis is to understand the tax cash flows of a project against the other cash flows to ascertain for each technology:

- the difference between the pre-tax and post-tax nominal rates of return, and
- the key tax and commercial drivers affecting this difference.

An illustrative summary showing the cash flows for a generic project has been developed to analyse the returns for each technology (see Appendix II).

The analysis in is nominal terms. Variations in the cash flows and the resulting rates of return will be analysed with respect to changes in the following key variables:

- The quantum and timing of corporation tax relief ("capital allowances") available on capital expenditure incurred during the project, and
- The quantum of corporation tax relief available for interest payments on debt used to finance the project.

Once the parameters have been set governing the tax relief for each project, it will be possible to determine the revenues and nominal pre-tax internal rate of return ("IRR") that is necessary in order to earn the desired nominal post-tax internal rate of return.

Key output – "discounted" effective tax rate

Because of the effect of discounting, the effect of tax can be expressed as the "discounted" ETR, calculated using an example as follows:

Computation of the discounted ETR		
Pre-tax IRR	*11.4%*	[A]
Post- tax IRR	*9.0%*	[B]
Tax effect	*2.4 points*	[C] = [A] - [B]
'Discounted' ETR	*21.1%*	[D] = [C]/[A]

The definitions of pre-tax and post-tax IRR are discussed further on page 11.

By contrast the "nominal" ETR is calculated by reference to the nominal pre-tax and tax cash flows in any one period, or over the project as a whole.

The difference between the pre-tax and post-tax nominal IRR gives an indication of the both the quantum and timing of corporation tax relief.

Where there is a smaller difference between the pre-tax and post-tax cash flows, there will be little difference between the pre-tax and post-tax IRR, and a lower discounted ETR.

Therefore the greater the extent that capital allowances are available in earlier periods on up-front capital expenditure, the lower the taxable profits are in these earlier periods. Where corporation tax losses are created and utilised, such that no corporation tax is payable in a particular period, pre-tax and post-tax cash flows will be identical.

When the deductions for capital allowances are diminished under the reducing balance method of calculation, the nominal ETR increases over time. However, the effect of discounting these later cash flows diminishes the impact of the higher nominal effective tax rate.

For each technology, a schedule showing the nominal ETR in each period was prepared to demonstrate the profile of the nominal ETR over the entire project.

Nominal ETR over the whole project

For most electricity generation projects it is reasonable to assume that the nominal effective tax rate over the entire length of a project (i.e., the sum of the project's net tax payments as a proportion of the total net cash flows) is greater than 20%, on the grounds that an element of the capital expenditure does not attract corporation tax relief.

Because of the effect of discounting, we have considered the discounted ETR, rather than the ETR of total aggregate costs and revenues of a project, when analysing the difference between pre-tax and post-tax IRRs.

Financial analysis – approach: base case and straw man

In order to understand the effect of the underlying commercial characteristics on the discounted ETR, a base case scenario has been developed using common capital allowances and gearing assumptions.

The straw man scenarios have been created by adjusting the capital allowances claims and gearing levels on a technology by technology basis.

The maximum gearing levels have been agreed with DECC based on experience of KPMG and the Cambridge report on costs of capital.

Base case

A "base case" has been prepared showing the broad position for each technology in which common simplifying assumptions have been used regarding the capital allowances and gearing levels:

- It is assumed that 90% of the construction expenditure will qualify for writing down allowances at 18% per annum on a reducing balance basis, and
- All projects are to be equity funded.

The base case derives the pre-tax IRR required in order to earn the post-tax nominal hurdle rate, or target IRR, of 9.3% for onshore wind and 10.9% for offshore wind and biomass conversion when discounting back to the final investment decision assumed to be 1 January 2012.

The base case provides an illustration of how the different commercial characteristics of each technology affects the tax profile and the different pre-tax returns required to earn a fixed post-tax nominal IRR.

For example, the operating expenditure is higher, relative to capital expenditure, for biomass conversion than for offshore and onshore wind, due to the costs of acquiring the fuel for the plant. Offshore and onshore wind units require relatively higher levels of capital expenditure, and lower annual operating costs.

Similarly, the capital expenditure for offshore and onshore wind is mainly for the construction of the turbines, whereas biomass conversions have much greater level of expenditure on infrastructure improvements to the site to allow for the fuel to be brought in and stored.

The commercial and tax assumptions used in preparing the base case are discussed in more detail below, and at Appendix I.

Financial analysis – straw man scenarios

For each of the technologies, a "straw man" scenario has been developed to adjust the capital allowances and gearing assumptions to assess the effect on the pre-tax nominal rate of return (see page 11).

Capital allowances

For each technology, a review has been undertaken to assess the quantum and type of capital allowances that may be expected for a typical project. The details and methodology of this review is discussed at pages 20 to 24.

The results from the review have been used to compute the capital allowances claim in the period of the straw man to determine the cash tax flows of the project.

Gearing

Gearing is shown as a sensitivity. For each technology, the straw man has been prepared on the basis that the up-front capital expenditure on the project has been funded by shareholder debt up to the maximum level that is generally provided by third party commercial lenders and assuming repayment of the principal in accordance with commercially available terms.

Within the straw man, the assumptions on the cost of finance and levels of debt capacity for each project have been agreed with DECC based on recent experience of similar projects as well as the report prepared by Cambridge Economic Policy Associates Ltd for DECC, entitled '*Note on impacts of the CfD FIT support package on costs and availability of capital and on existing discounts in power purchase agreements*'. These are outlined in detail at Appendix I.

Where ranges have been provided, the upper end of the range has been used to give the maximum potential tax benefit.

It should be noted that there is a degree of variability across projects, with the amount of debt and the terms on which the debt is issued being determined according the different requirements and circumstances of the project operator.

Financial analysis – approach: key tax rules

Corporation tax relief for capital expenditure is taken through capital allowances. The quantum and timing of the relief (at 18%, 8% or 100% per annum) depends on the nature of the assets and capital expenditure incurred.

Expenditure incurred on buildings and supporting structures does not attract any corporation tax relief.

No corporation tax relief is available on dividends paid out by the project company.

By contrast, relief is available on interest paid on debt used to finance the project, subject to that interest being charged on arm's length terms and other anti-avoidance rules not being in point.

Overview of the UK corporation tax rules

Capital allowances

Corporation tax relief for capital expenditure is taken through capital allowances. The quantum and timing of the relief depends on the nature of the capital expenditure incurred. Capital expenditure incurred on onshore wind, onshore wind and biomass conversions is broadly expected to fall into one of the following categories:

- Main pool: capital expenditure classified as plant and machinery, and where the expected useful economic life of the asset is less than 25 years, qualifies for corporation tax relief at 18% per annum on a reducing balance basis (also known as "plant and machinery", "P&M" or "main pool allowances").
- Special rate pool: for certain defined integral features to a building and for plant and machinery where the expected useful economic life of the asset is 25 years or more, capital allowances of 8% per annum on a reducing balance basis may be claimed (also known as "long life allowances", "LLAs" or "special rate allowances").
- 100% allowances: where the capital expenditure meets the qualifying criteria Research and Development Allowances ("RDAs") giving 100% relief may be claimed in the year in which the expenditure was incurred. Similarly, 100% Enhanced Capital Allowances are also available for specifically defined energy-saving assets
- Non-qualifying assets: following the abolition of industrial buildings allowances in 2008, expenditure on buildings and structures no longer qualifies for corporation tax relief.

The quantum and timing of corporation tax relief for capital expenditure is dependent on the nature of the assets acquired and expenditure incurred. This is expected to vary for each renewable technology.

Corporation tax relief for financing costs

Where a project is fully funded through equity, no incremental tax relief may be claimed on the remittance of project returns as no corporation tax deductions are available for dividends paid.

To the extent that a project is financed through debt, and an element of the project return is remitted through interest on that debt, an additional corporation tax benefit should be incorporated into the financial analysis.

A corporation tax deduction may be taken for interest payable on loan finance, subject to the amount and terms of the debt being on a commercial, arm's length basis and no other anti-avoidance rules applying.

The amount of any corporation tax relief that may be available is therefore determined by the gearing levels and interest rate terms that a third party lender would require when financing the project.

During the course of our analysis, the taxation of dividends and interest received by the project company's shareholder, including any withholding tax suffered on such payments, was considered outside the scope of our analysis.

Financial analysis – approach: rate of return

The calculation of the discounted ETR is determined by the definition of the post-tax rate of return.

There are two alternative rates of return that may be used: the vanilla WACC and the post-tax WACC, which incorporates the benefit of the corporation tax relief on interest into the project return.

The difference between vanilla WACC and the post-tax WACC is therefore the corporation tax benefit of the gearing.

For the straw man analysis with gearing, two versions have been prepared.

Straw man 2a calculates the discounted ETR on a vanilla WACC basis.

Gearing and the target rate of return

In order to calculate the discounted ETR, it is necessary to confirm how the post-tax nominal hurdle rate (or weighted average costs of capital ("WACC")) is defined, especially in the case where an element of return is in the form of interest on debt.

Definition of IRR for calculating the discounted ETR

The following definitions of IRR are referred to in the straw man analysis undertaken, together with the mathematical formulae:

- "Vanilla WACC": weighted average return on debt and equity.

  [G x Rd] + [(1-G) x Re]

- "Post-tax WACC": weighted average return on debt and equity adjusted for tax relief on interest

  [G x Rd x (1-t)] +[(1-G) x Re]

- "Pre-tax WACC": weighted average return on debt and equity before tax

  [G x Rd] + [(1-G) x Re / (1-t)]

Where:

- G = Gearing ratio
- Rd = Return on debt
- Re = Return on equity
- t = Corporation tax rate

It can be seen from the formulae above, that the definition of the post-tax return, and specifically whether the vanilla WACC or the post-tax WACC is used, will have an effect on the discounted ETR calculated.

Our understanding is that DECC's electricity modelling uses pre tax real hurdle rates/WACCs to assess the financial returns from potential generation investments.

The straw man scenarios have been derived using an investment appraisal approach whereby the pre-tax returns are calculated in order to give an investor a certain return based on the vanilla WACC, above.

The differential between the pre-tax WACC, vanilla WACC and post-tax WACC can be summarised as follows:

Pre-tax WACC – X%

Vanilla WACC – Y%

Post-tax WACC – Z%

CT on revenue, deductions on opex, capital allowances and interest deductions

Post-tax WACC already allows for the benefit of CT deduction for interest resulting in a lower value and higher 'discounted' ETR when compared to the Vanilla WACC

DECC's assessment is that the evidence it uses for post tax nominal hurdle rates is consistent with a post-tax WACC definition.

Where there is no gearing, this has no impact as the post-tax WACC and vanilla WACC are identical. However, there is a divergence in the vanilla and post-tax WACC once gearing is incorporated into a project.

It should be noted that we have not considered the tax rate ("t" in the formulae above) that should be used to translate the vanilla WACC to the post-tax WACC

Straw man analysis – vanilla WACC versus post-tax WACC

In order that the results from the financial analysis of the straw man scenarios can be used by DECC for their own financial modelling purposes two versions of the straw man have been prepared:

Financial analysis – approach: rate of return

Straw man 2b calculates the discounted ETR where the target rate of return is the post-tax WACC.

Straw man analysis – vanilla WACC versus post-tax WACC

- Straw man 2a determines the discounted ETR where the targeting of the vanilla WACC is used to determine the pre-tax WACC.
  - For each of the technologies, the pre-tax WACC is calculated based on a target vanilla WACC of 9.3% of onshore wind and 10.9% for offshore wind and biomass conversion (assumed rate of return used to illustrate the discounted ETR).
- Straw man 2b determines the discounted ETR where the post-tax WACC is targeted to determine the pre-tax WACC.
  - As agreed with DECC, to determine the discounted ETR where the post-tax WACC is targeted, straw man 2b includes interest payments but no tax deduction is taken the corporation tax computation as the tax deduction for interest is already incorporated in the targeted post tax WACC. In this case the calculated discounted ETR reflects the impact of capital allowances and for a given post-tax WACC value the calculated discounted ETR will be the same for straw man 1 and straw man 2b.
  - The pre-tax WACC is calculated by targeting the post-tax WACC at 9.3% for onshore wind and 10.9% for offshore wind and biomass conversion.

In summary, the discounted ETRs for each of the straw man scenarios are to be calculated as follows:

Scenario	Gearing	Post-tax WACC	Vanilla WACC	Pre-tax WACC	Discounted ETR
Base case	All equity	A	-	B	[B-A] / B
Straw man 1	All equity	X	-	Y	[Y-X] / Y
Straw man 2a	Gearing	-	Q	R	[R-Q] / R
Straw man 2b	Gearing	L	-	N	[N-L] / N

Financial analysis – approach: key commercial assumptions

In order to undertake the financial analysis of the cash flows for a typical project, certain commercial, financial and tax assumptions have been made.

The tax treatment of the cash flows is based on current legislation, guidance and practice as at June 2013. It is assumed that the anticipated reductions to the corporation tax rate announced in the 2013 Budget will come into effect, such that the 20% rate will apply from 1 April 2015.

The assumptions are discussed in detail at Appendix I to this report.

Financial analysis – framework assumptions

For each technology we have prepared a high-level financial illustration of the cash flows over a 15-year period in constructing and operating the following projects:

- Onshore wind farm with a capacity of 25MW and a project life of 24 years;
- Offshore wind farm with a capacity of 150MW and a project life of 23 years;
- Biomass conversion with a capacity of 1,000MW and a project life of 15 years.

The timeframe for the project is based on the standard assumptions provided by DECC.

It is assumed that the CfD price is in place for 15 years, with generation commencing on 1 January 2015. The assumption over the length of the CfD is based on DECC's emerging proposal that it should be 15 years for most renewable technologies, and 10 years for carbon capture and storage technologies, as outlined in the Draft Operational Framework published alongside the Energy Bill 2013.

For projects lasting longer than 15 years, revenue is determined by the forecasted wholesale market price for electricity, taken from the central scenario of *Annex F: Price and growth assumptions* within DECC's energy and emissions projection published on 15 October 2012.

The assumptions over the capital and operating costs per MW of capacity for each of the technologies, and the breakdown of the capital expenditure are based on the figures provided by DECC from the document entitled '*Call for Evidence to support the development of strike prices under Feed in Tariffs with Contracts for Difference (CfD) for Renewable Technologies*', dated 9 October 2012 and published by National Grid.

The breakdown of capital costs between the component elements was taken from the Arup report prepared for DECC, entitled '*Review of the generation costs and deployment potential of renewable electricity technologies in the UK*' ("the Arup report"), dated October 2011.

It is assumed that the reduction in the corporation tax rate to 20%, as announced by the Chancellor in the 2013 Budget, is to be enacted. Otherwise, the corporation tax treatment is based on the prevailing tax law, guidance and practice as at June 2013.

The full commercial and tax assumptions are outlined in detail at Appendix I to this report.

Results of financial analysis

Review of effective tax rates for renewable technologies

Base case – financial analysis

Holding constant the post-tax nominal IRR and the capital allowances on construction costs, the discounted ETR for offshore and onshore wind is similar.

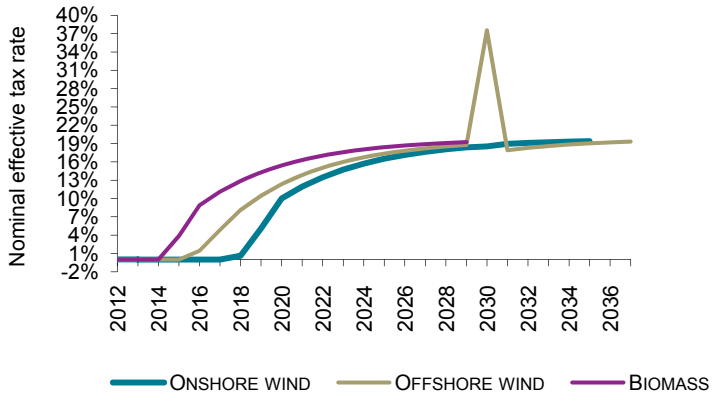
The discounted ETR is lower than the standard rate of UK corporation tax because the capital allowances claims are at their highest in the earliest years of the project, and diminish over the project's life.

For biomass conversion, where there is more capital expenditure on infrastructure and a higher proportion of operating costs, the discounted ETR is higher than for wind projects.

Technology	Gearing	Capital allowances	Post-tax nominal IRR	Pre-tax nominal IRR	Tax impact on IRR	Discounted ETR
Onshore wind	Nil – all equity	P&M – *90%* NQ – *10%*	9.3%	10.6%	1.3 points	12.3%
Offshore wind	Nil – all equity	P&M – *90%* NQ – *10%*	10.9%	12.5%	1.6 points	12.8%
Biomass conversion	Nil – all equity	P&M – *90%* NQ – *10%*	10.9%	13.8%	2.9 points	21.0%

NB figures rounded to one decimal place

Nominal effective tax rate over project life



- The spike in the ETR for offshore wind at year 16 is the result of revenues falling significantly once the CfD period has ended. In period 16, half the prior year's corporation tax liability is payable, while the net operating cash flows are much lower, resulting in a high effective tax rate (in cash terms) for the period.
- For biomass conversion and onshore wind, there is no comparable decline in revenues in the post-CfD period.

Commentary and conclusions

- In order to earn the post-tax nominal rate of return of 9.3% / 10.9%, it will be necessary for the project to earn a pre-tax nominal rates of return of 10.6%, 12.5% and 13.8% for a onshore wind, offshore wind and biomass conversion project, respectively.
- The discounted ETR for offshore and onshore wind is lower than the standard UK corporation tax rate of 20% This is due to nearly all (more than 90%) of the capital expenditure relating to the construction of the turbine and associated machinery on which capital allowances can be claimed.
- For biomass conversion, the discounted ETR is higher than for wind projects due to the plants requiring relatively high levels (26% of total capital expenditure) of supporting infrastructure (e.g., roads) and pre-development expenditure on which no tax relief is generally available. Over the whole 15 year project, the total effective tax rate is 24.2%; the effect of discounting reduces this to 21.0%, i.e., slightly higher than the main UK corporation tax rate.
- Furthermore, on biomass conversion projects there is a lower proportion of capital expenditure, relative to operating expenditure, and hence more of the corporation tax relief is claimed over the whole life of the project, rather than up-front through capital allowances.

Straw man – onshore wind

For all levels of gearing, the discounted ETR applicable for an onshore wind project was found to be lower than the 20% UK corporation tax rate.

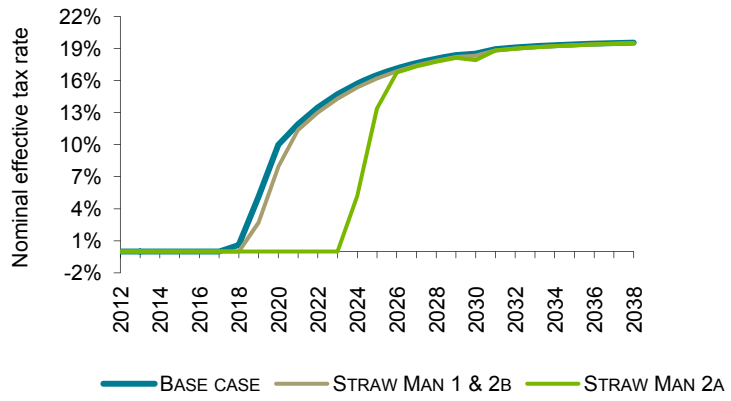
For an onshore wind project fully funded by equity, the pre-tax WACC required to earn a post-tax nominal IRR of 9.3% is 10.5%, giving a discounted ETR of 11.4%.

By financing the project with debt for up to 70% of the capital costs (the maximum generally available from commercial lenders), the discounted ETR calculated by reference to the vanilla WACC is reduced to 7.9%.

Scenario	Gearing	Capital allowances	Post-tax WACC	Vanilla WACC	Pre-tax WACC	Tax impact on WACC	Discounted ETR
Base case	Nil – all equity	P&M – *90%* on construction costs	9.3%	9.3%	10.6%	1.3 points	12.3%
Straw man 1	Nil – all equity	P&M – 86% *on total capex* LLAs – *5% on total capex* NQ – *9% on total capex*	9.3%	9.3%	10.5%	1.2 points	11.4%
Straw man 2a	70% debt at 6.5% interest	P&M – 86% LLAs – *5%* NQ – *9%*	-	9.3%	10.1%	0.8 points	7.9%
Straw man 2b	70% debt at 6.5% interest	P&M – 86% LLAs – *5%* NQ – *9%*	9.3%	9.7%	10.5%	1.2 points	11.4%

NB figures rounded to one decimal place

Onshore wind – nominal effective tax rate over 24-year project life



Commentary and conclusions

- From the base case assumptions of no debt and 90% capital allowances on all construction expenditure, the analysis demonstrates that a full capital allowances claim and the introduction of the maximum level of debt results in a reduction of the discounted ETR from 12.3% to 7.9%, where the vanilla WACC is used.
- Straw man 2a demonstrates that by increasing the leverage of the project to the maximum level available from commercial sources has the most significant impact on the discounted ETR reducing the discounted ETR by up to 30% compared with when the project is fully funded by equity. Only in 2023 does the project begin to generate sufficient taxable profits such that corporation tax liabilities are payable.
- Straw man 2b shows that if the target rate of return is the post-tax WACC, the ETR reverts back to that for a fully equity funded project.

Straw man – offshore wind

For all levels of gearing, the discounted ETR applicable for an offshore wind project was found to be lower than the 20% UK corporation tax rate.

For an offshore wind project fully funded by equity, the pre-tax return required to earn a post-tax nominal IRR of 10.9% is 12.4%, giving a discounted ETR of 12.0%.

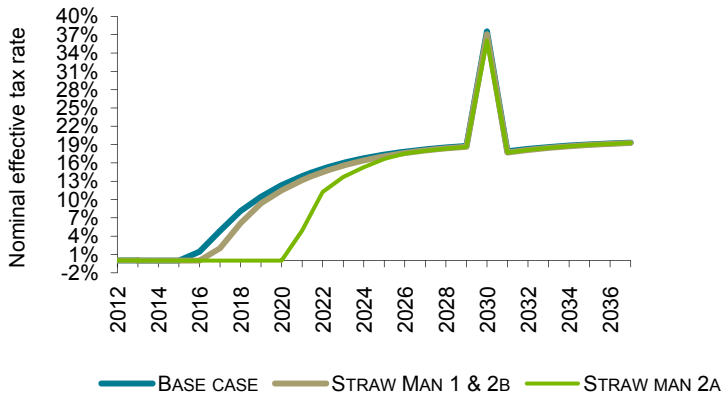
The spike in the effective tax rate at year 16 results from the revenues falling significantly following the end of the CfD period.

With 70% gearing the discounted ETR (calculated by reference to the vanilla WACC) is reduced to 8.4%. The ETR calculated by reference to the post tax WACC remains at 12.0%.

Scenario	Gearing	Capital allowances	Post-tax WACC	Vanilla WACC	Pre-tax WACC	Tax impact on WACC	Discounted ETR
Base case	Nil – all equity	P&M – *90%* on construction costs	10.9%	10.9%	12.5%	1.6 points	12.8%
Straw man 1	Nil – all equity	P&M – *90% on total capex* LLAs – *2% on total capex* NQ – *8% on total capex*	10.9%	10.9%	12.4%	1.5 points	12.0%
Straw man 2a	70% debt at 7.5% interest	P&M – *90%* LLAs – *2%* NQ – *8%*	-	10.9%	11.9%	1.0 points	8.4%
Straw man 2b	70% debt at 7.5% interest	P&M – *90%* LLAs – *2%* NQ – *8%*	10.9%	11.3%	12.4%	1.5 points	12.0%

NB figures rounded to one decimal place

Offshore wind – nominal effective tax rate over 23 year project life



- The spike in the ETR at year 16 is the result of revenues falling significantly once the CfD period has ended. In period 16, half the prior year's corporation tax liability is payable, while the net operating cash flows are much lower, resulting in a high effective tax rate (in cash terms) for the period.
- From the base case assumptions of no debt and 90% capital allowances on all construction expenditure, the result shows a full capital allowances claim and the introduction of significant levels of debt gives rise to a reduction in the ETR (calculated with reference to the vanilla WACC) from 12.8% to 8.4%.
- The ETR for offshore wind is marginally higher than that for onshore wind. On an equity-only basis, the ETR for offshore wind is higher than for onshore wind (12.0% versus 11.3% for onshore wind).
- Although a higher proportion of capital expenditure on offshore wind qualifies for capital allowances, offshore wind projects involve a higher proportion of revenue expenditure (e.g., in relation to on-going maintenance costs, helicopters etc), relative to up-front capital expenditure, and hence more of the corporation tax relief is claimed over the whole life of the project, rather than up-front.
- As for onshore wind, where vanilla WACC is used, the effect of gearing has a significant effect on the ETR, reducing it by 30%. Because of the higher interest rates charged for offshore projects the effect of debt is marginally more significant for offshore wind projects than for onshore wind. Where the post-tax WACC is targeted, the ETR reverts back to that for an ungeared project.

Straw man – biomass conversion

The on-going revenue expenditure, arising mainly from fuel costs, is significantly greater than the up-front capital expenditure.

A greater proportion of the corporation tax relief is therefore taken over the life of the project, rather than up-front through capital allowances. As a result, the discounted ETR is higher for biomass conversion than for wind, irrespective of the level of debt financing.

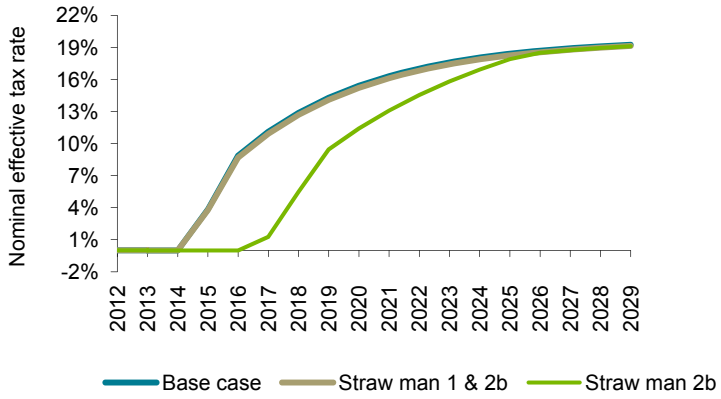
Without gearing, the discounted ETR is higher than the 20% UK corporation tax rate.

With a gearing ratio of 66.7% and by using the vanilla WACC, the discounted ETR can be reduced by over 30% (21.0% to 14.2%). The ETR reverts back to 21.0% where the post-tax WACC is targeted.

Scenario	Gearing	Capital allowances	Post-tax WACC	Vanilla WACC	Pre-tax WACC	Tax impact on WACC	Discounted ETR
Base case	Nil – all equity	P&M – 90% on construction costs	10.9%	10.9%	13.8%	2.9 points	21.0%
Straw man 1	Nil – all equity	P&M – 54% *on total capex* LLAs – 6% *on total capex* NQ – 40% *on total capex*	10.9%	10.9%	13.8%	2.9 points	21.0%
Straw man 2a	66.7% debt at 7.5% interest	P&M – 54% LLAs – 6% NQ – 40%	-	10.9%	12.7%	1.8 points	14.2%
Straw man 2b	66.7% debt at 7.5% interest	P&M – 54% LLAs – 6% NQ – 40%	10.9%	11.9%	13.8%	2.9 points	21.0%

NB figures rounded to one decimal place

Biomass conversion – nominal effective tax rate over 15-year project life



Commentary and conclusions

- Compared with wind projects, the significant proportion of non-qualifying infrastructure expenditure required for biomass conversions results in the discounted ETR for biomass conversion being higher than for wind projects, irrespective of the levels of debt.
- Reducing the proportion of capital expenditure qualifying for capital allowances from 91% (for onshore wind) to 60% (for biomass conversion) and incorporating additional revenue expenditure for fuel input costs increases the discounted ETR from 11.4% to 21.0%.
- The introduction of debt to the maximum gearing level (estimated to be up to 66%) reduces the ETR by a third, where an investor analyses a project . From the analysis for all three projects it can be seen that the effect of gearing can reduce the discounted ETR to 14.2% compared with the discounted ETR of 21.0% when the project is fully equity funded.
- As for onshore and offshore wind projects, in straw man 2b, where the post-tax WACC is targeted, the ETR reverts back to that for an ungeared project.

Commentary on results

Review of effective tax rates for renewable technologies

Commentary: capital allowances

For offshore and onshore wind projects, c 90% of the capital expenditure was found to qualify for allowances.

For biomass conversion, the non-qualifying costs of infrastructure improvements resulted in only c 60% of expenditure being eligible for allowances.

For technologies where a higher proportion of the expenditure qualifies for capital allowances, and where that expenditure qualifies for greater allowances in earlier periods, the lower the effective tax rate and the lower the differential between the pre-tax and post-tax IRR.

Summary of results

As discussed previously, the profile of the capital expenditure and hence the timing and quantum of tax relief will vary by technology.

For technologies where a higher proportion of the expenditure qualifies for capital allowances, and where that expenditure qualifies for greater allowances in earlier periods, the lower the effective tax rate and the lower the differential between the pre-tax and post-tax IRR.

In KPMG's experience, it is usually possible to claim capital allowances on at least 90% of the **construction** expenditure for each of the technologies. As shown by the table (see right), where there are **other** significant capital costs required (e.g., relating to pre-development and other infrastructure), the overall proportion of qualifying expenditure is in the order of 90-95% for wind projects and 60% for biomass conversion.

The differences in discounted effective tax rate between the technologies therefore relates to the proportion of capital expenditure incurred on construction of the turbines against the cost of other infrastructure (e.g., road connections to the generator), which do not generally qualify for capital allowances.

For wind power, where relatively little additional infrastructure is required, the overall capital allowances claim is higher and the effective tax rate lower, compared to biomass conversion.

Capital allowances profile of each technology

The capital allowances profile for **all** capital expenditure on a typical project for each technology is shown below:

	Onshore wind	Offshore wind	Biomass conversion
First year allowances	-	-	-
Main pool (18% pa)	86%	90%	54%
Special rate pool (8% pa)	5%	2%	6%
Non-qualifying	9%	8%	40%
Total	***100%***	***100%***	***100%***

Source: KPMG

From the Arup report, capital expenditure can be analysed into four categories:

- Pre-development costs, including the costs of obtaining planning, licensing, surveys, technical development costs public enquiries etc.;
- Construction costs;
- Grid connection costs;
- Other infrastructure costs, including road, rail and port upgrades required in order to supply the generator with the biomass input.

Pre-development and other infrastructure costs are generally considered to be non-qualifying for capital allowances purposes.

As a simplifying assumption, other infrastructure costs are to be treated as non-qualifying to reflect the structural work (including development of road links) required to bring the generation assets into use.

In line with HMRC practice, LLAs at 8% per annum are claimed in respect of grid connection costs.

Commentary: capital allowances (cont.)

The main capital costs for an onshore wind project are incurred on the construction of the turbines and other plant and machinery, most of which qualifies for plant and machinery allowances.

There is some variability in the analysis as HMRC do not always accept that the wind turbines have an expected economic life of less than 25 years.

For some projects there is a risk that expenditure will fall into the special rate pool (8% allowances per annum) rather than the main pool (18% allowances per annum).

Onshore wind

The most significant element of the capital expenditure for construction of an onshore wind project relates to the turbines, and this is reflected in the construction costs making up the major part of the overall capital costs. For each £100 of capital expenditure incurred on an onshore wind project the allocation is as follows:

Capital cost item	Onshore wind
Pre-development	£2
Construction	£88
Grid connection costs	£5
Other infrastructure	£5
Total	***£100***

Source: Arup report to DECC, October 2011 and DECC assumptions provided to KPMG.

We have reviewed a number of different projects in relation to onshore wind generation to assess the extent to which the construction costs and grid connection costs qualify for capital allowances.

It should be noted that the onshore wind projects costs include both the cost of construction and grid connection. For the biomass conversion and offshore wind projects reviewed, the grid connection costs have been excluded from the analysis of construction costs.

Typically the project will include the turbines, the associated foundations, monitoring equipment and electrical cabling to connect the turbines to the National Grid, all of which are plant based on first principles.

HMRC does not accept that all wind turbines fall outside of the long life asset legislation, and is analysing each case on its individual merits. Therefore there may be some variation in the extent to which expenditure falls within the main pool (18% allowance per annum) or the special rate pool (8% allowances per annum).

In our experience no turbines have yet had an estimated life of 25 or more years when brought into use.

Expenditure on grid connection costs, including cabling, switchgear and associated infrastructure, such as pylons and underground ducting, is typically a long life asset and allocated to the special rate (8%) pool. The relatively small amount of ineligible expenditure relates to hard landscaping not directly attributable to the turbine, such as access roads, fencing and substation buildings.

Of the £92 of capital expenditure incurred on construction and grid connection costs, capital allowances may be claimed as follows.

Project	Construction expenditure	Main pool (18%)	Special rate pool (8%)	Non-qualifying
Total expenditure analysed	**£188.6 m**	**£174.1 m**	**£8.9 m**	**£5.6 m**
%	*100%*	*92%*	*5%*	*3%*

Source: KPMG.

In summary, 92% of the £93 of the construction and grid connection costs qualifies for main pool capital allowances, and 5% of the £93 for special rate pool allowances, i.e., £86 and £5, respectively, of a standard project capital expenditure profile.

Commentary: capital allowances (cont.)

For an offshore wind project, the starting assumption is that all the construction expenditure qualifies for plant and machinery allowances at 18% per annum.

Infrastructure and pre-development costs represent a small proportion of the overall capital costs. Therefore corporation tax relief is available on over 90% of the capital expenditure.

Offshore wind

Similar to onshore wind, the most significant element of the capital expenditure is the turbines, and this is reflected in the construction costs making up the major part of the overall capital costs. For each £100 of capital expenditure incurred on an onshore wind project the allocation is as follows:

Capital cost item	Offshore wind
Pre-development	£3
Construction	£90
Grid connection costs	£2
Other infrastructure	£5
Total	***£100***

Source: Arup report to DECC, October 2011 and DECC assumptions provided to KPMG.

In line with the Arup report, the offshore grid connections have been excluded from the capital costs on the basis that they are not borne by the project developers but form part of the expenditure and assets within a specific OFTO company. The fees paid under the OFTO regime have been incorporated into the project's annual operating costs.

Typically the construction cost of a project will include the base, the turbine itself, and the subsea transmission cables to take the power from the turbine to the offshore substation platform, all of which are plant based on first principles. HMRC generally accepts that the assets are not long life, and hence the main pool (18%) plant and machinery allowances should apply to these assets.

The small amount of ineligible expenditure relates to a 'without prejudice' agreement reached with HMRC on some projects to treat certain civil works and operating and maintenance access structures as ineligible expenditure.

Project	Construction expenditure	Main pool (18%)	Special rate pool (8%)	Non-qualifying
Total	**£503.1 m**	**£500.7 m**	**£ -**	**£2.4 m**
%	*100%*	*99.5%*	*0%*	*0.5%*

Source: KPMG

In summary, 99.5% of the £90 of the construction costs qualifies for main pool capital allowances, and 0.5% is non-qualifying.

Commentary: capital allowances (cont.)

Although more than 90% of the construction expenditure qualifies for allowances, infrastructure costs making up 26% of the total capital expenditure are assumed to be non-qualifying and therefore the overall proportion of qualifying expenditure is c 60%.

It should be noted that there are limited numbers of claims that have been submitted for biomass conversions.

We have used CHP claims as a proxy for this analysis on the grounds that the nature and profile of the expenditure is similar to that for a biomass conversion project.

Biomass conversion

The majority of the capital costs on biomass conversion projects relates to the construction of the facilities, although relative to wind projects, additional infrastructure expenditure is required, such as a road and rail network upgrades or port improvements. In our experience there is often a great deal of uncertainty over whether such expenditure qualifies for capital allowances and hence a simplifying assumption has been made that no tax relief is available on these costs.

It is expected that the existing facility used for the biomass conversion will have appropriate connections to the grid and therefore additional expenditure is not required. For each £100 of capital expenditure incurred on a biomass conversion project the allocation is as follows:

Capital cost item	Biomass conversion
Pre-development	£12
Construction	£62
Grid connection costs	£ -
Other infrastructure	£26
Total	***£100***

Source: Arup report to DECC, October 2011 and DECC assumptions provided to KPMG.

As the technology for biomass conversion has only been relatively recently developed in the UK, there are very few usable samples of data and little in the way of an established body of practice and guidance over the capital allowances treatment. Therefore, it has been necessary to use a proxy where the capital expenditure incurred is of a similar nature and has a similar profile to a biomass conversion and where there is sufficient capital allowances data.

From our experience the capital expenditure incurred in converting units to biomass is expected to have a similar profile and be of a similar nature to the expenditure incurred when setting up a combined heat and power ("CHP") waste-to-energy plant. It is expected that the structural housing (if any) would be limited to cladding and framework around the plant, as is the case with CHP.

To that end we have analysed a number of CHP plants, which burn waste and other materials under similar conditions to biomass, and where there are sufficient capital allowances claims.

Typically the main components of the CHP plant comprise the boilers, turbines, condensers, generators, repositories, exhaust flues and filters associated with the generation process. In addition for biomass there are expected to be modifications to the storage facilities and material handling systems, which are all plant based on first principles.

As with the onshore wind turbines, HMRC does not accept that all CHP plant is not a long life asset, and is analysing each case on its individual merits, hence there is some variability in the extent to which certain capital expenditure falls within the special rate pool.

Where applicable, any structural work dedicated to the plant and machinery is eligible for plant and machinery allowances as a long life asset

The relatively low ineligible figure relates to structural steelwork and cladding surrounding the plant, which is necessary for both shelter and planning purposes. All of this expenditure is likely to have qualified for Industrial Buildings Allowances ("IBAs") prior to their abolition, which would have otherwise made the projects 100% qualifying.

Project	Construction expenditure	Main pool (18%)	Special rate pool (8%)	Non-qualifying
Total	**£224.7 m**	**£195.96 m**	**£20.1 m**	**£8.64 m**
%	*100%*	*87%*	*9%*	*4%*

Source: KPMG

In summary, 87% of the £62 of construction costs qualifies for main pool capital allowances, and 9% qualifies for special rate pool allowances and 4% is non-qualifying, i.e., £54, £6 and £2, respectively.

Commentary: capital allowances (cont.)

Both the nature of the technology and local factors and characteristics of a particular project will give rise to a degree of variability over the nature of the capital expenditure for each project and, as a consequence, the tax relief that can be obtained.

For newer technologies companies may be able to claim 100% research and development allowances where the capital expenditure meets the qualifying criteria. This may result in the discounted ETR being lower for certain technologies when the early project are being developed.

Other factors affecting capital allowances claims

The extent to which capital allowances are available on a specific item of capital expenditure is determined by the facts relating to the asset acquired or created and their interaction with the legislation and case law.

Although each project is different, the effect on the discounted ETR can be predicted with a reasonable degree of certainty using cash flow tax analysis as the ability to claim capital allowances is based on the nature of the expenditure which (local factors aside) from DECC's analysis is expected to be broadly similar for each project of a specific technology.

As each generation project has different characteristics, not only by reference to the technology, but also local factors, there is a degree of variability over the nature of the capital expenditure for each project and, as a consequence, the tax relief that can be obtained.

If a specific project were to have a higher proportion of non-qualifying capital expenditure, reducing the capital allowances claimed, the effective tax rate for the project would be expected to be higher than those shown in this report.

Research and development allowances ("RDAs")

For the more recently developed methods of renewable energy generation, it is possible that certain projects may qualify for the beneficial Research and Development tax reliefs. For example, expenditure may be incurred to solve the technological and scientific uncertainties arising in developing the renewable technologies such that the plants can generate electricity at an appropriate commercial scale.

Broadly, where capital expenditure is treated as research and development in accordance with generally accepted accounting practice, 100% allowances are available for the expenditure in the year in which it is incurred, rather than the relief being spread over the project at 18%/8% on a reducing balance basis.

If RDAs are available for capital expenditure, additional tax losses will arise in the early periods of the project. The point at which there are corporation tax liabilities arising in respect of the project is extended further into the future. The difference between the pre-tax and post-tax IRR, and the discounted effective tax rate is lower, compared with the position had main pool and special rate allowances been claimed.

In summary, the conclusions from the capital allowances work undertaken on wind and biomass may differ from other technologies, especially where that technology is developing and is yet to become more widely used.

Commentary: project gearing

Our analysis of the effect of debt has been using simplified assumptions whereby debt is provided at the commencement of the project and repaid within 10 years of commencement of generation.

Alternative financing structures have not been considered.

Our analysis indicates that the level of gearing is dependant on the wider circumstances of the generator rather than the specific characteristics of the technology.

Gearing for renewable electricity projects

The introduction of debt financing into the project has been examined on a simplified basis whereby debt is provided at the start of the project and interest repaid from operating cash flows as it is accrued. The debt is repaid in instalments over the CfD period and generally repaid in full before the end of the CfD period.

The payment of interest is assumed to form an element of the shareholder return, which is fully tax deductible. Repayments of principal does not give rise to a corporation tax deduction.

For the purposes of our financial analysis the maximum lending available from commercial third party lenders is the most appropriate proxy, regardless of the finance structures which **could** be adopted.

Subordinate debt

For all projects, it might be possible in some instances to obtain relief for subordinate (shareholder debt) above the standard assumptions of gearing used in the analysis.

However this will very much depend on the risk profile of the project, and often, the identity of the groups supporting the project – larger groups can more easily raise debt (either at the project or wider corporate level) than smaller entities. For the purposes of consistency, we will assume that corporation tax relief will not be available on interest on any subordinate debt and hence this is not factored into our analysis here.

Overall, the level of corporation tax relief available in the UK for finance costs will be limited by transfer pricing and other anti-avoidance rules. These prevent, inter alia, groups from claiming tax relief on interest payable to connected parties which is over and above what would be payable were the lender an independent third party.

Analysis of the tax benefit of gearing

The corporation tax benefit of gearing arises in two ways:

- Quantum of the relief: determined by the level of gearing, and the repayment profile (i.e., the level of gearing in each year of the project) and the arm's length rate of interest paid on the debt.
- Timing of the relief: when the cash tax benefit of the interest is recognised in the project.

Continuing the assumptions adopted in the straw men, where there is no sale of losses for cash by way of group relief, the effect of gearing and the benefit of the corporation tax relief on the interest expense can be analysed in three separate phases:

- Early years of the project: no tax is payable in the first few years of the project both where there is no gearing and where there is debt finance given the impact of front-loading the capital allowances. The effect of gearing is to extend this initial phase.
- In the "middle" years of the project, the corporation tax payable under gearing is lower through additional losses in the initial phase of the project deferring the point until which losses are fully utilised and lower taxable profits as a result of the deductions for interest costs.
- Once the debt has been fully repaid (generally year 11 in the straw men) there is no subsequent tax benefit of the gearing.

Therefore the cash flows benefit arising from the corporation relief for the interest is often deferred until later periods in the project. The effect of deferring the corporation tax benefit of the interest diminishes the value of the relief for an investor.

Commentary: project gearing (cont.)

The corporation tax relief from financing the project with debt was found to have a significant effect on the discounted ETR where this is determined by the vanilla WACC.

Where the project is appraised by reference to the post-tax WACC, the discounted ETR where there is no gearing (that for straw man 1) may be used.

Analysis of the tax benefit of gearing (cont.)

When incorporating the tax benefit of the finance costs into the reconciliation of post-tax and vanilla WACC, both the timing and quantum of the relief should be taken into consideration, specifically:

- Gearing: an indicative weighted average of the gearing ratio is required to take into account discounting the declining ratio over the project life
- Headline corporation tax rate: because the tax benefit of the interest is deferred (absent full group relief), the 20% headline corporation tax rate may not be appropriate due to the effect of discounting

Analysis of the results

ETR for straw man 2a – vanilla WACC

The ability to claim corporation tax relief on interest expenses where debt has been used to finance each project results in the discounted ETR falling by up to a third based on gearing levels of up to 70%.

The corporation tax "shield" available through financing a project by debt can be seen to have a significant impact on a project's corporation tax cash flows, and therefore on the discounted ETR of a project when considering project returns based on the vanilla WACC.

From the results of our wider experience of the financial returns and financial models used in renewable electricity projects, the level of debt and gearing taken on varies significantly according to the individual circumstances of the generator. For example, the wider commercial and tax position of the generator's group may mean that there is no debt financing of the project. Alternatively, the debt may be raised in a jurisdiction outside the UK such that the UK entity is fully equity-funded, and the corporation tax relief for the project finance is taken overseas.

In summary, while it can be shown that the introduction of debt does give rise to a significant reduction in the discounted ETR using vanilla WACC, it is not possible to determine the typical ETR for each technology where it is assumed that debt finance could be used to a greater or lesser extent.

ETR for straw man 2b – post-tax WACC

Where the post tax rate of return has been adjusted to take into account the corporation tax benefit to the company arising on debt finance returns, the tax relief is eliminated at the project level. Therefore straw man 2b has the tax profile and discounted ETR equal to that of the fully equity funded project.

To the extent that DECC's analysis is based on post-tax WACC returns, rather than the vanilla tax WACC returns, the discounted ETR for an ungeared project can therefore be used.

Use of post-tax WACC

Where the post-tax WACC is used in the financial models prepared by DECC, the discounted ETR for an ungeared project is appropriate.

Commentary: project structuring

The analysis undertaken assumes that the straw man generator bears the full risk of the project and therefore earns the full profits.

The effect of limiting the risk profile of the generator, for example through the using of tolling arrangements, has not been considered.

Operators may transfer the risk profits from the UK to an overseas party, affecting the rates of return, cash flows and taxable profits of the project.

The tax profile of the generator may also be affected by its wider corporate structure. Interactions with other group companies may also affect the discounted ETR, for example where tax losses are surrendered to and from other group companies.

Commercial structure

The analysis undertaken assumes that the generator acts as a full entrepreneur in respect of the electricity project, and no tolling or other arrangements are in place to limit the risk of the UK entity. As such it is assumed that the full risks and rewards of generation are captured in both the target rates of returns and the pre-tax cash flows.

It is possible for a generator to operate under a "tolling" regime in which the major project risks, for example relating to the up-front capital expenditure and market supply risk, are taken by another party.

Under this arrangement, one company ("the entrepreneur") finances and controls the construction of the generation facilities and enters into contracts to sell electricity. It then enters into a tolling contract with the generating entity, which is responsible for the day-to-day operation of the generating assets. The generator is accordingly a limited risk provider of electricity to the entrepreneur and would generally earn a fixed mark-up on its operating costs.

The entrepreneur may be based outside the UK and have only a limited, or indeed no, taxable presence in the UK. By taking the main commercial risks for the project, the attribution of profit under international transfer pricing protocols would result in a large proportion of the tax on the project being borne by the entrepreneur.

To the extent that the tax cash flows under such an arrangement result in a lower total nominal UK tax cost over the whole life of the project, the discounted effective tax rate (and therefore the difference between the pre-tax and post-tax IRR) may be reduced.

Transfer pricing arrangements

It has been assumed that all capital and operating expenses are acquired on arm's length terms that there are no arrangements to set the purchase price for biomass input or intellectual property over a particular aspect of the technology, for example, to a level that results in profits being allocated to another entity outside the UK.

UK transfer pricing rules require companies to adopt arm's length pricing in calculating their taxable profits subject to UK corporation tax.

Corporate structure

As discussed in Appendix I, we have assumed that the electricity generation project is conducted through a UK corporate entity with no other activities.

No interaction between the UK corporate entity and other group companies, such as holding companies or financing entities, have been considered.

The effect of the single entity structure affects the project returns in that there is no potential to surrender tax losses arising in the early periods of the project as group relief. The surrender of tax losses to group companies in exchange for cash, or offset against other income within the project company, would accelerate the benefit of the losses in the project company and reduce the discounted ETR further.

Addendum

Financial analysis of other renewable technologies

Analysis of other renewable technologies

A qualitative approach has been taken to analyse 22 other renewable technologies to assess at a high level whether the ETR derived from the straw man analysis for offshore wind or biomass conversion projects could be an appropriate proxy.

The ratio of operating costs to capital costs, as well as expectations over the proportion of capital expenditure that may qualify for capital allowances for each technology are taken into consideration.

Where the capital allowances profile for a technology is expected to differ significantly from that of either wind or biomass conversion, it is proposed that the 20% rate of corporation tax be retained.

Analysis of other renewable technologies

Further to the work undertaken in respect of onshore wind, offshore wind and biomass conversion, a qualitative analysis has been undertaken to assess at a high level whether the results obtained could be applied to other renewable technologies which are to be subject to a CfD under the EMR regime.

Approach

No straw man financial analysis has been undertaken for these other technologies. Instead, the commercial and financial characteristics of each technology were analysed. The source information for this analysis was provided by DECC from the assumptions in the National Grid report, the Arup report and by drawing on KPMG's own experience where relevant.

To the extent that a technology can be allocated to one of the following categories, the wind or biomass ETR may be used as a proxy.

- Characteristics similar to wind, i.e.,
  - High ratio of capex to opex;
  - High (90%) proportion of capex qualifying for capital allowances
- Characteristics similar to biomass, i.e.,
  - Low ratio of capex to opex;
  - Medium-low (60%) proportion of capex qualifying for capital allowances

For certain technologies where there is insufficient information available on the capital allowances profile, or where the profile differs significantly from either a wind or biomass conversion project, it is proposed that the standard corporation tax rate of 20% should be retained.

Results

Technologies where an ETR of 12.0% can be used

For the technologies where the up-front capital expenditure represents a large proportion of the costs of a project (i.e., where up-front capital expenditure is at least four times greater than the annual operating expenditure), the front-loading of corporation tax relief to earlier years of the project, through the capital allowances mechanism, is expected to reduce the discounted ETR to below the main UK corporation tax rate of 20%.

The higher the proportion of capital expenditure qualifying for capital allowances, the greater the reduction in the discounted ETR.

For a number of technologies with relatively high levels of capital expenditure (solar, wave, advanced conversion technologies, anaerobic digestion, landfill gas and energy from waste), a large proportion of the capital expenditure, per the Arup report, is expected to relate to construction costs, which in turn may be expected to a large degree to qualify for capital allowances.

Where projects for certain CHP technologies will receive income separately from the CfD mechanism (e.g., for energy from waste technologies), such income has netted off against the annual operating expenditure in assessing relative levels of capital and operating expenditure. Such projects will show up as having low levels of operating expenditure relative to capital expenditure.

It should be noted that for a number of the technologies, there is limited guidance and precedent over the capital allowances position and therefore it is to be expected that there will be a degree of variability in the allowances available on any specific project.

Those technologies where the ETR for offshore wind can be used as a proxy is shown on page 31.

Analysis of other renewable technologies (cont.)

Where there is a high level of capital expenditure relative to operating expenditure, and it is expected that a significant proportion of the capital expenditure will qualify for capital allowances, the ETR for offshore wind is to be used as a proxy.

Conversely, where there is high operating expenditure relative to capital expenditure and the capital expenditure is of a similar nature to biomass conversion, the discounted ETR for biomass is used as a proxy.

For certain technologies, the nature of the capital expenditure is too different from biomass conversion or wind to make any direct comparison, and therefore the 20% corporation tax rate is suggested as the ETR.

Technologies where an ETR of 20.0% may be used

A number of the renewable technologies do not show similar characteristics to either offshore wind or biomass conversion. These are discussed below:

- Biomass (small, large and CHP) and sewage gas:
  - These technologies fall in between biomass conversion and offshore wind, both in relation to the proportion of capital expenditure (relatively more capital expenditure compared with biomass conversion but less than for offshore wind due to fuel costs) and the level of qualifying expenditure for capital allowances.
- Geothermal (power and CHP):
  - Although there is a high proportion of expenditure incurred on up-front capital items, the nature of the expenditure (on exploration, appraisal and drilling, as well as construction of the turbines) is very different to the biomass conversion or wind technologies.
  - There is little guidance or precedent over the level of capital allowances that may be claimed by a developer of a geothermal site.
  - It is therefore not possible to determine the likely capital allowances profile. In light of this uncertainty, it is proposed that the main corporation tax rate of 20% be adopted.
- Tidal and hydroelectic
  - A large proportion of the cost of tidal and hydroelectric projects are incurred up-front on the construction. The on-going operating costs are relatively insignificant for these technologies.
  - There is a significant element of uncertainty over whether capital expenditure incurred on the structures, foundations and moorings qualifies for capital allowances.
  - HMRC may be expected in the first instance to challenge any claim for the structural elements of a project. Although it may be possible to demonstrate that the expenditure does qualify for allowances, the position is sufficiently uncertain that neither the ETR for biomass conversion nor offshore wind is considered an appropriate proxy and thereby the 20% main rate of corporation tax should be retained.

Technologies where an ETR of 21.0% may be used

For bioliquid plants (both power and CHP), there are significant levels of pre-development and other infrastructure costs required, on which it is not expected that capital allowances would be available. This is similar to the profile of capital expenditure incurred on a biomass conversion project.

These technologies also require the cost of fuel to be factored into the operating costs.

With these characteristics being very similar to those used for preparing the straw man on biomass conversion, the 21.0% discounted ETR is considered an appropriate proxy for these bioliquid technologies.

Review of renewable technologies (cont.)

Renewable technologies where ETR for offshore wind (12.0%) can be used as a proxy

Project	Comment
Offshore wind R3	Capital allowances and opex/capex profile directly comparable to offshore wind.
Solar PV	Capital allowances and opex/capex profile expected to be similar to offshore wind analysis.
ACT – Standard	High ratio of capex relative to opex, which is similar to offshore wind. Capital allowances position is uncertain, given limited guidance and precedent available. Allowances expected to be lower than for offshore wind but higher than for biomass conversion. On balance offshore wind ETR expected to be closest proxy.
ACT – Advanced	High ratio of capex relative to opex, which is similar to offshore wind. Capital allowances position is uncertain, given limited guidance and precedent available. Allowances expected to be lower than for offshore wind but higher than for biomass conversion. On balance offshore wind ETR expected to be closest proxy.
ACT – CHP	High ratio of capex relative to opex, which is similar to offshore wind. Capital allowances position is uncertain, given limited guidance and precedent available. Allowances expected to be lower than for offshore wind but higher than for biomass conversion. On balance offshore wind ETR expected to be closest proxy.
AD Power	High ratio of capex relative to opex, which is similar to offshore wind. Capital allowances position is uncertain, given limited guidance and precedent available. Allowances expected to be lower than for offshore wind but higher than for biomass conversion. On balance offshore wind ETR expected to be closest proxy.
AD CHP	High ratio of capex relative to opex, which is similar to offshore wind. Capital allowances position is uncertain, given limited guidance and precedent available. Allowances expected to be lower than for offshore wind but higher than for biomass conversion. On balance offshore wind ETR expected to be closest proxy.
EfW Power	All costs relate to capex, therefore tax relief on expenditure accelerated to a greater extent than wind through the capital allowances regime. A lower proportion of capex is incurred on non-qualifying pre-development and infrastructure costs, compared with biomass conversion. The proportion of qualifying capex is therefore expected to be higher than for biomass conversion, but slightly lower than wind. Overall, the ETR is expected to be closer to offshore wind than the 20% main corporation tax rate.
EfW CHP	All costs relate to capex, therefore tax relief on expenditure accelerated to a greater extent than wind through the capital allowances regime. A lower proportion of capex is incurred on non-qualifying pre-development and infrastructure costs, compared with biomass conversion. The proportion of qualifying capex is therefore expected to be higher than for biomass conversion, but slightly lower than wind. Overall, the ETR is expected to be closer to offshore wind than the 20% main corporation tax rate.
Landfill Gas	High ratio of capex relative to opex, which is similar to offshore wind. Capital allowances position is uncertain, given limited guidance and precedent available. Allowances expected to be lower than for offshore wind but higher than for biomass conversion. Overall, the ETR is expected to be closer to offshore wind than the 20% main corporation tax rate.
Wave	High ratio of capex relative to opex, which is similar to offshore wind. Capital allowances position is uncertain, given limited guidance and precedence available, although high proportion of construction expenditure on plant and machinery expected to be qualifying. Overall, the ETR is expected to be closer to offshore wind than the 20% main corporation tax rate.

Review of renewable technologies (cont.)

Renewable technologies where main rate of corporation tax (20.0%) can be used as a proxy

Project	Comment
Biomass – Small	Lower proportion of infrastructure expenditure, therefore higher capital allowances than for biomass conversion, and lower ETR. Greater proportion of opex than capex than for wind but lower compared with biomass conversion
Biomass – Large	Lower proportion of infrastructure expenditure, therefore higher capital allowances than for biomass conversion, and lower ETR. Greater proportion of opex than capex than for wind but lower compared with biomass conversion
Biomass – CHP	Lower proportion of infrastructure expenditure, therefore higher capital allowances than for biomass conversion, and lower ETR. Greater proportion of opex than capex than for wind but lower compared with biomass conversion
Geothermal – Power	High ratio of capex relative to opex, which is similar to offshore wind. Capital allowances profile is unknown. The nature of capital expenditure is not comparable to other technologies and therefore using offshore wind or biomass conversion as a proxy is not considered appropriate.
Geothermal – CHP	High ratio of capex relative to opex, which is similar to offshore wind. Capital allowances profile is unknown. The nature of capital expenditure is not comparable to other technologies and therefore using offshore wind or biomass conversion as a proxy is not considered appropriate.
Sewage Gas	High ratio of capex relative to opex, which is similar to offshore wind. A higher proportion of capex is incurred on non-qualifying pre-development and infrastructure costs, compared with offshore wind, but a lower proportion compared to biomass conversion. Capital allowances position is uncertain, given limited guidance and precedent available. The proportion of qualifying capex is therefore expected to be slightly higher than for biomass conversion, but lower than wind. Overall, the ETR is expected to be closer to the 20% main corporation tax rate rather than offshore wind.
Hydroelectric	High ratio of capex relative to opex, which is similar to offshore wind. Significant capital expenditure is expected to be incurred on structures, foundations and moorings and therefore the profile of the expenditure is very different to biomass conversion or wind. It is uncertain as to whether HMRC would agree to capital allowances relief on such structural expenditure. In light of this uncertainty, the main rate of corporation tax would seem an appropriate proxy.
Tidal – shallow	High ratio of capex relative to opex, which is similar to offshore wind. Capital allowances position is uncertain, given limited guidance and precedent available. Structures, foundations and moorings are expected to make up a large proportion to the capital costs and therefore the profile of the expenditure is very different to biomass conversion or wind. It is uncertain as to whether HMRC would agree to capital allowances relief on such expenditure. In light of this uncertainty, the main rate of corporation tax would seem an appropriate proxy.
Tidal – deep	High ratio of capex relative to opex, which is similar to offshore wind. Capital allowances position is uncertain, given limited guidance and precedent available. Structures, foundations and moorings are expected to make up a large proportion to the capital costs and therefore the profile of the expenditure is very different to biomass conversion or wind. It is uncertain as to whether HMRC would agree to capital allowances relief on such expenditure. In light of this uncertainty, the main rate of corporation tax would seem an appropriate proxy.
Tidal – range	High ratio of capex relative to opex, which is similar to offshore wind. Capital allowances position is uncertain, given limited guidance and precedent available. Structures, foundations and moorings are expected to make up a large proportion to the capital costs and therefore the profile of the expenditure is very different to biomass conversion or wind. It is uncertain as to whether HMRC would agree to capital allowances relief on such expenditure. In light of this uncertainty, the main rate of corporation tax would seem an appropriate proxy.

Review of renewable technologies (cont.)

Renewable technologies where ETR for biomass conversion (21.0%) can be used as a proxy

Project	Comment
Bioliquids – Power	Proportion of non-qualifying pre-development and other infrastructure expenditure is similar to biomass conversion. Capital allowances profile expected to be similar High level of opex required, relative to capex.
Bioliquids – CHP	Proportion of non-qualifying pre-development and other infrastructure expenditure is similar to biomass conversion. Capital allowances profile expected to be similar High level of opex required, relative to capex.

Appendix I

Financial analysis – commercial and tax assumptions

Appendix I – Commercial and tax assumptions

Note on sources

The assumptions over the capital and operating costs per MW of capacity for each of the technologies, and the split of capital cost between the different stages of the construction process, are based on the figures published in the Arup report prepared for DECC, entitled '*Review of the generation costs and deployment potential of renewable electricity technologies in the UK*' ("the Arup report"), dated October 2011 and figures provided by DECC from the document entitled '*Call for Evidence to support the development of strike prices under Feed in Tariffs with Contracts for Difference (CfD) for Renewable Technologies*', dated 9 October 2012 and published by National Grid. Where there are commercial assumptions relied upon in this report, it has been noted below.

In setting up the straw men for each of the technologies, the maximum gearing levels available for onshore and offshore wind projects was estimated by reference to the report prepared for DECC by Cambridge Economic Policy Associates Ltd from June 2011, '*Note on impacts of the CfD FIT support package on costs and availability of capital and on existing discounts in power purchase agreements*' ("the Cambridge report").

For projects lasting longer than 15 years, revenue is determined by the forecasted wholesale market price for electricity, taken from the central scenario of *Annex F: Price and growth assumptions* within DECC's energy and emissions projection published on 15 October 2012.

Common commercial assumptions

Timescale of analysis	■ Commencement of generation and the receipt of revenues under the CfD is 1 January 2015. ■ The revenues and costs are shown on a calendar year basis. Financial statements and corporation tax returns are prepared and submitted for the year to 31 December.
Length of CfD	■ For all asset classes, the CfD is assumed to last 15 years.
Macroeconomic assumptions	■ All cash flows are shown on a nominal basis. ■ The revenue earned under the CfD and the operating expenditure increase by an annual inflation rate of 3% (KPMG assumption).
Structure of generating entity	■ Each project is held within a separate limited company, incorporated in the UK, with no other activities or assets.
Operating model	■ The project company is an entrepreneur for the generation of electricity. No tolling or other arrangements are in place to limit the risk and profits that may be earned by the generator.
Surplus cash balances	■ Any surplus cash balances not used to pay off interest or principal on the debt are to be remitted to the companies' shareholders in each period such that no interest income is earned on any surplus cash balances.
Income under CfD	■ Income is assumed to be received from the sale of electricity as it is generated. There is no timing difference in respect of payments to/from the counterparty body under the CfD.

Appendix I – Commercial and tax assumptions (cont.)

Common commercial assumptions (cont.)

Revenue and costs in post-CfD period	■ From year 16 onwards (i.e., from 1 January 2030 onwards), electricity is assumed to be sold at the open market wholesale price of £81 per MWh in 2012 prices, inflated up to nominal prices at 1 January 2030 using inflation of 3% per annum. ■ Income is assumed to be received from the sale of electricity as it is generated. There is no timing difference in respect of payments to/from the counterparty body under the CfD. ■ It is assumed that from 1 January 2030, the wholesale electricity price and the operating costs for a project increase at an inflation rate of 3% per annum.
Decommissioning	■ The costs and tax relief for decommissioning and shutting down the power plants are assumed to fall outside the operating period and therefore not considered within this analysis.
Foreign exchange	■ As noted in the Arup report, the capital and operating expenditure is subject to fluctuations in foreign exchange. It is assumed that foreign exchange differences have no effect on the capital and operating costs during the course of the project.

Common tax assumptions

Applicable tax	■ The financial analysis have been prepared on the basis of current UK tax law, guidance and practice. Where any changes to the law and guidance have been announced affecting the periods under review (e.g., future changes to the rate of corporation tax), these have been incorporated into the analysis.
Tax residency	■ Each project is held within a separate limited company, incorporated in the UK and tax resident in the UK.
Accounting for project cash flows	■ It is assumed that there is no material difference between the timing of the cash flows and the treatment of those revenues and costs under UK GAAP / IFRS accounting principles.
Commencement and cessation of trade	■ The commencement of trade for tax purposes is assumed to be 1 January 2015, i.e., the date on which the asset commences generation. As the companies are assumed to be special purpose vehicles with no other activity, the commencement of trade cannot be brought forward to accelerate the capital allowances claims. Capital allowances are therefore only claimed as at 1 January 2015. ■ There is no assumed cessation of trade at the end of the generation period.
Corporation tax rate	■ The corporation tax rate of 20%, announced by the Chancellor in the 2013 Budget, will apply from 1 April 2015 and has been reflected within the financial analysis.
	■ The reduction in the rate of corporation tax to 20% from 1 April 2015 is not expected to be enacted through legislation until mid 2014.

Appendix I – Commercial and tax assumptions (cont.)

Common tax assumptions (cont.)

Payment of corporation tax	■ It is assumed that the corporation tax rate liabilities will be paid under the quarterly instalments regime. Half of the corporation tax liability arising in respect of a period is paid in the period, with the remaining balance payable in the subsequent year.
Taxation of the CfD	■ As discussed above, the revenue received under the CfD is to be taxed as it is received, rather than through any other method (for example, by taxing movements on the fair value of the CfD recognised under IFRS).
Losses	■ The company is not assumed to be part of any group for UK tax purposes. Therefore no losses can be surrendered to other group companies for cash and no losses can be surrendered to the company. ■ Any losses arising in a period can be carried forward indefinitely against future trading profits or carried back against the prior year's taxable profits.
Operating expenditure – capital/revenue	■ It has been assumed that 5% of the operating expenditure (but not fuel costs) may be deemed to be capital in nature for tax purposes and that a revenue deduction may not be available when the expense in incurred. Capital allowances at the main pool rate of 18% per annum have been claimed.
Non-deductible expenditure	■ It is assumed that there are immaterial levels of non-deductible expenditure relating to fines, penalties, third party entertaining etc.
Capital allowances rates	■ It is assumed that capital allowances are claimed to their full extent in each period of the project, at the prevailing rate as at the time of this report (i.e., 18% per annum for the plant and machinery pool, 8% for the special rate pool etc). ■ An annual investment allowance of £25,000 is available as a deduction against the first £25,000 of qualifying capital expenditure incurred in any period. On grounds of materiality no benefit has been taken for this allowance.
Decommissioning	■ In line with the commercial assumptions on decommissioning, no corporation tax relief for decommissioning expenditure or accounts provisions has been considered as part of the financial analysis.
Transfer pricing and other anti-avoidance rules	■ All transactions entered into by each company are assumed to be on an arm's length basis, such that no adjustments are required to the companies' taxable profits. ■ There are assumed to be no restrictions under UK anti-avoidance rules (including transfer pricing, worldwide debt cap or unallowable purpose) in respect of the corporation tax deductions for finance costs.
VAT and other taxes	■ All costs and revenues are represented net of VAT. It is assumed that VAT does not represent a cost to the project operator and all input VAT is recoverable in full. ■ We have not considered other taxes, such as payroll taxes and customs duties, and have assumed that such costs are captured within the operating and capital expenditure assumptions provided.

Appendix I – Commercial and tax assumptions (cont.)

Project specific assumptions

	Onshore wind	Offshore wind	Biomass
Length of project	24 years	23 years	15 years
Size of project	25 MW	150 MW	1,000 MW
Hours per annum	8,760 hrs	8,760 hrs	8,760 hrs
Load factor	30%	42%	-
Availability percentage	-	94%	65%
Output per annum	65,700 MWh	518,767 MWh	5,694,000 MWh
Capital costs			
- Pre-development cost per MW	£32,000 per MW	£100,000 per MW	£58,000 per MW
- Capital cost per MW	£1,500,000 per MW	£2,900,000 per MW	£440,500 per MW
Breakdown of capital expenditure	Pre-development – 2% Construction – 88% Grid connection – 5% Other infrastructure – 5%	Pre-development – 3% Construction – 90% Grid connection – 2% Other infrastructure – 5%	Pre-development – 12% Construction – 62% Grid connection – nil Other infrastructure – 26%
Length of construction period	3 years (1 January 2012 to 31 December 2014)	3 years (1 January 2012 to 31 December 2014)	1 year (1 January 2014 to 31 December 2014)
Operating expenditure (per MW per year)			
- Fixed costs	£31,800 per MW (yrs 1-15); £51,300 per MW (yr 16 onwards)	£165,000 per MW	£59,300 per MW
- Variable costs	£7,884 per MW	n/a	£7,972 per MW
- Other input costs	n/a	n/a	35.5% efficiency and £29.55 cost per MW £473,965 per MW
Total operating expenditure for asset	£39,684 per MW (yrs 1-15); £59,184 per MW (yr 16 onwards)	£165,000 per MW	£541,237 per MW
Post CfD income			
- Real price per MWh in 2030 (2012 prices)	£81 per MWh	£81 per MWh	-
- Nominal price per MWh in 2030	£138 per MWh	£138 per MWh	-
- Revenue per annum in 2030	£9,060,300	£71,538,000	-
Target nominal rate of return (see notes on page 11 with regards to vanilla WACC versus post-tax WACC)	9.3%	10.9%	10.9%

Appendix I – Commercial and tax assumptions (cont.)

Project specific assumptions (cont.)

	Onshore wind	Offshore wind	Biomass
Commercial debt			
- Gearing ratio	70%	70%	66.7%
- Cost of borrowing	6.5%	7.5%	7.5%
- Repayment terms	Within 15 years, but effect of cash sweep results in full repayment by year 10. Repayment commences in the second period post-commencement of generation.	Within 15 years, but effect of cash sweep results in full repayment by year 10. Repayment commences in the second period post-commencement of generation.	Within 10 years. Repayment commences in the second period post-commencement of generation.
Comments	As a simplifying assumption, debt repayments will be made from two years from the commencement of generation with full repayment of the debt being made by the end of year 10. In KPMG's experience, the loan facilities offered by banks can be in place for up to 15 years, however the repayment terms usually result in debt being repaid in full to the banks after 10 years of generation. It is assumed that debt is repaid annually. High-level analysis shows the effect of using repayments every six months has an immaterial effect on the discounted ETR. It might be possible in some instances for operators to obtain relief for subordinate (shareholder debt) above the standard assumptions of gearing above, however this will very much depend on the risk profile of the project and, often, the identity of the groups supporting the project; larger groups can more easily raise debt (either at the project or wider corporate level) than smaller entities. For the purposes of consistency, it is assumed that corporation tax relief will not be available on interest on any subordinate debt and hence is not factored into our analysis.	As a simplifying assumption, debt repayments will be made from two years from the commencement of generation with full repayment of the debt being made by the end of year 10. In KPMG's experience, the loan facilities offered by banks can be in place for up to 15 years, however the repayment terms usually result in debt being repaid in full to the banks after 10 years of generation. It is assumed that debt is repaid annually. High-level analysis shows the effect of using repayments every six months has an immaterial effect on the discounted ETR. It might be possible in some instances for operators to obtain relief for subordinate (shareholder debt) above the standard assumptions of gearing above, however this will very much depend on the risk profile of the project and, often, the identity of the groups supporting the project; larger groups can more easily raise debt (either at the project or wider corporate level) than smaller entities. For the purposes of consistency, it is assumed that corporation tax relief will not be available on interest on any subordinate debt and hence is not factored into our analysis.	As a simplifying assumption, debt repayments will be made from two years from the commencement of generation with full repayment of the debt being made by the end of year 10. In KPMG's experience, the repayment of debt is usually within 10 years of operation. It is assumed that debt is repaid annually. High-level analysis shows the effect of using repayments every six months has an immaterial effect on the discounted ETR. It might be possible in some instances for operators to obtain relief for subordinate (shareholder debt) above the standard assumptions of gearing above, however this will very much depend on the risk profile of the project and, often, the identity of the groups supporting the project; larger groups can more easily raise debt (either at the project or wider corporate level) than smaller entities. For the purposes of consistency, it is assumed that corporation tax relief will not be available on interest on any subordinate debt and hence is not factored into our analysis.

Appendix II

Illustrative cash flows and tax calculation

Appendix II – Illustrative cash flow and tax calculation

Onshore Wind - Straw Man 1

Model check: OK Sheet check: OK

Illustration only

		Capex	Capex	Capex	Opex	Opex	Opex	Opex	Opex	Opex	Opex	Opex	Opex	Opex	Opex	Opex	Opex	Opex	Opex	Opex	Opex	Opex	Opex	Opex	Opex
Year:		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Capex Period Number:		1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Period Number:		0	0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Cash Flow Statement (Excluding Financing)																										
Revenue	€'000	-	-	-	5,222	5,379	5,540	5,706	5,878	6,054	6,235	6,423	6,615	6,814	7,018	7,229	7,445	7,669	7,899	8,136	8,380	8,631	8,890	9,157	9,431	9,714
Operating Expenditure																										
Operating Expenditure (rev)	€'000	-	-	-	(342)	(371)	(1,000)	(1,030)	(1,061)	(1,093)	(1,125)	(1,159)	(1,194)	(1,230)	(1,267)	(1,305)	(1,344)	(1,384)	(1,426)	(2,190)	(2,256)	(2,323)	(2,393)	(2,465)	(2,539)	(2,615)
Operating Expenditure (capital)	€'000	-	-	-	(50)	(51)	(53)	(54)	(56)	(58)	(59)	(61)	(63)	(65)	(67)	(69)	(71)	(73)	(75)	(115)	(119)	(122)	(126)	(130)	(134)	(138)
	€'000	-	-	-	**(392)**	**(1,022)**	**(1,053)**	**(1,084)**	**(1,117)**	**(1,150)**	**(1,185)**	**(1,220)**	**(1,257)**	**(1,294)**	**(1,333)**	**(1,373)**	**(1,414)**	**(1,457)**	**(1,501)**	**(2,305)**	**(2,374)**	**(2,446)**	**(2,519)**	**(2,594)**	**(2,672)**	**(2,752)**
Capital Expenditure																										
Pre-development costs	€'000	(268)	(276)	(284)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction	€'000	(11,209)	(11,545)	(11,892)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grid connection	€'000	(645)	(664)	(684)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other infrastructure	€'000	(645)	(664)	(684)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	€'000	**(12,767)**	**(13,150)**	**(13,544)**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pre-Tax Cash Flow	€'000	**(12,767)**	**(13,150)**	**(13,544)**	**4,230**	**4,357**	**4,488**	**4,622**	**4,761**	**4,904**	**5,051**	**5,202**	**5,358**	**5,519**	**5,685**	**5,855**	**6,031**	**6,212**	**6,398**	**6,755**	**6,958**	**7,166**	**7,381**	**7,603**	**7,831**	**8,066**
Corporation Tax Payments	€'000	-	-	-	-	-	-	-	(128)	(388)	(574)	(677)	(767)	(848)	(921)	(988)	(1,050)	(1,103)	(1,165)	(1,238)	(1,310)	(1,361)	(1,411)	(1,462)	(1,513)	(1,564)
Post-Tax Cash Flow	€'000	**(12,767)**	**(13,150)**	**(13,544)**	**4,230**	**4,357**	**4,488**	**4,622**	**4,633**	**4,515**	**4,477**	**4,526**	**4,592**	**4,671**	**4,764**	**4,867**	**4,981**	**5,103**	**5,234**	**5,517**	**5,648**	**5,805**	**5,970**	**6,141**	**6,318**	**6,501**
Return																										
Pre-tax Nominal IRR		10.5%																								
Post-tax Nominal IRR		9.3%																								
Calculations																										
Corporation Tax																										
Revenue	€'000	-	-	-	5,222	5,379	5,540	5,706	5,878	6,054	6,235	6,423	6,615	6,814	7,018	7,229	7,445	7,669	7,899	8,136	8,380	8,631	8,890	9,157	9,431	9,714
Operating Expenditure (rev)	€'000	-	-	-	(342)	(371)	(1,000)	(1,030)	(1,061)	(1,093)	(1,125)	(1,159)	(1,194)	(1,230)	(1,267)	(1,305)	(1,344)	(1,384)	(1,426)	(2,190)	(2,256)	(2,323)	(2,393)	(2,465)	(2,539)	(2,615)
Commercial Debt Interest	€'000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Allowable Subordinate Debt Interest	€'000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Allowances	€'000	-	-	-	(6,044)	(4,995)	(4,133)	(3,424)	(2,841)	(2,361)	(1,967)	(1,642)	(1,374)	(1,154)	(972)	(822)	(699)	(597)	(513)	(451)	(400)	(358)	(323)	(295)	(272)	(253)
Disallowable Items	€'000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Taxable Profits (Losses)	€'000	-	-	-	**(1,165)**	**(587)**	**407**	**1,252**	**1,976**	**2,600**	**3,143**	**3,622**	**4,047**	**4,430**	**4,779**	**5,102**	**5,403**	**5,687**	**5,960**	**6,419**	**6,677**	**6,931**	**7,184**	**7,437**	**7,692**	**7,951**
Losses Carried Forward / (Utilised)	€'000	-	-	-	1,765	587	(407)	(1,252)	(633)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCTCT	€'000	-	-	-	-	-	-	-	**1,283**	**2,600**	**3,143**	**3,622**	**4,047**	**4,430**	**4,779**	**5,102**	**5,403**	**5,687**	**5,960**	**6,419**	**6,677**	**6,931**	**7,184**	**7,437**	**7,692**	**7,951**
Tax	€'000	-	-	-	-	-	-	-	(257)	(520)	(629)	(724)	(809)	(886)	(956)	(1,020)	(1,081)	(1,137)	(1,192)	(1,284)	(1,335)	(1,386)	(1,437)	(1,487)	(1,538)	(1,590)
Tax Payable in Period	€'000	-	-	-	-	-	-	-	**(128)**	**(388)**	**(574)**	**(677)**	**(767)**	**(848)**	**(921)**	**(988)**	**(1,050)**	**(1,103)**	**(1,165)**	**(1,238)**	**(1,310)**	**(1,361)**	**(1,411)**	**(1,462)**	**(1,513)**	**(1,564)**
Tax Losses																										
Losses b/f	€'000	-	-	-	-	(1,765)	(2,352)	(1,945)	(693)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Losses Arising in Period	€'000	-	-	-	(1,765)	(587)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Losses Utilised in Period	€'000	-	-	-	-	-	407	1,252	633	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Losses c/f	€'000	-	-	-	**(1,765)**	**(2,352)**	**(1,945)**	**(693)**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Allowances																										
First Year Allowances																										
Pool b/f	€'000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Additions	€'000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Allowances at 100.0%	€'000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pool c/f	€'000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plant & Machinery Allowances																										
Pool b/f	€'000	-	10,312	20,934	31,875	26,178	21,508	17,679	14,542	11,970	9,862	8,136	6,721	5,563	4,615	3,839	3,204	2,685	2,262	1,916	1,666	1,463	1,300	1,169	1,065	983
Additions	€'000	10,312	10,622	10,940	50	51	53	54	56	58	59	61	63	65	67	69	71	73	75	115	119	122	126	130	134	138
Allowances at 18.0%	€'000	-	-	-	(5,746)	(4,721)	(3,881)	(3,192)	(2,628)	(2,165)	(1,786)	(1,475)	(1,221)	(1,013)	(843)	(703)	(583)	(496)	(421)	(366)	(321)	(285)	(257)	(234)	(216)	(202)
Pool c/f	€'000	**10,312**	**20,934**	**31,875**	**26,178**	**21,508**	**17,679**	**14,542**	**11,970**	**9,862**	**8,136**	**6,721**	**5,563**	**4,615**	**3,839**	**3,204**	**2,685**	**2,262**	**1,916**	**1,666**	**1,463**	**1,300**	**1,169**	**1,065**	**983**	**919**
Long Life Allowances																										
Pool b/f	€'000	-	1,205	2,447	3,725	3,427	3,153	2,901	2,669	2,455	2,259	2,078	1,912	1,759	1,618	1,489	1,370	1,260	1,159	1,066	981	903	830	764	703	647
Additions	€'000	1,205	1,241	1,278	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Allowances at 8.0%	€'000	-	-	-	(298)	(274)	(252)	(232)	(213)	(196)	(181)	(166)	(153)	(141)	(129)	(119)	(110)	(101)	(93)	(85)	(78)	(72)	(66)	(61)	(56)	(52)
Pool c/f	€'000	**1,205**	**2,447**	**3,725**	**3,427**	**3,153**	**2,901**	**2,669**	**2,455**	**2,259**	**2,078**	**1,912**	**1,759**	**1,618**	**1,489**	**1,370**	**1,260**	**1,159**	**1,066**	**981**	**903**	**830**	**764**	**703**	**647**	**595**
Total Capital Allowances Claim	€'000	-	-	-	**(6,044)**	**(4,995)**	**(4,133)**	**(3,424)**	**(2,841)**	**(2,361)**	**(1,967)**	**(1,642)**	**(1,374)**	**(1,154)**	**(972)**	**(822)**	**(699)**	**(597)**	**(513)**	**(451)**	**(400)**	**(358)**	**(323)**	**(295)**	**(272)**	**(253)**