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What lessons have been learned in reforming the Renewables Obligation? An analysis of internal and external failures in UK renewable energy policy

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ABSTRACT

Despite operating a delivery programme for RES-E since 1990, UK targets and policy goals have not been achieved. In response, the Government reformed the RO. This article re-examines UK renewable energy policy by analysing the internal and external failures of the various mechanisms to determine if Government has learnt from previous experience in reforming the RO. Government did not learn from their own actions during the NFFO/RO transition, evidenced by high-levels of similarity in internal/external failures. The reformed-RO is expected to significantly increase deployment, has provided a 'renewables package' by comprehensively addressing both internal/external failures but major internal failures (price/financial risk) still remain, resulting in contiguous failures over two decades and two mechanism changes (NFFO, RO, RO/reformed-RO). Success will again be heavily dependent on a select few technologies and new/untested measures to combat external failures. Mechanism-extension to 2037 is probably the single most important factor underlying potential deployment increases. However, introducing a FIT-like system via the sheer number of 'bolt-on' reforms to counter policy failures indicates loss of direction and clarity. Overall, although Government appears to have learnt some of its lessons from the past two-decades, significant doubt remains whether renewable energy policy objectives will be met via the latest mechanism change.

1. Introduction

The United Kingdom (UK) Government has committed itself to moving towards a low carbon economy, evidenced by strong policies towards the promotion of renewable energy and reducing greenhouse gas (GHG) emissions. In particular, there are three main drivers towards a low carbon economy – security of supply, fossil fuel depletion and climate change. In addition, other benefits for the UK include the full economic exploitation of alternative energy sources, to encourage UK industry to develop capabilities for both domestic and export markets with resultant employment growth in a developing renewables sector and to assist the UK to meet increasingly ambitious renewable energy deployment and greenhouse gas (GHG) emission reduction targets. These policy objectives are clearly stated in a number of UK Energy White Papers during the last two decades and form the current basis for policy (Department of Energy, 1988; Department of Trade and Industry [DTI], 1994, 2003, 2007a).

The UK has had a specific delivery programme for the generation of electricity from renewable energy sources (RES-E) since 1990. There have been two main policy instruments: the Non-Fossil Fuel Order (NFFO), a centralised bidding system that ran from 1990 to 1998, and the Renewables Obligation (RO), a variant of the Renewable Portfolio Standard (RPS) – a tradable green certificate (TGC)/quota system that came into effect in April 2002 (Mitchell et al., 2006).

The 2007 'White Paper on Energy: Meeting the Energy Challenge' (Department of Trade and Industry, 2007a) detailed the government's intentions with regard to reforming the RO: primarily this includes introducing banding to provide differentiated levels of support for different technologies. The reasoning behind reforming the RO is that the UK Government, based primarily on modelling by Oxford Energy Research Associates OXERA (2007) and Ernst and Young (2007), indicate that leaving the RO unchanged means that the 2010 (10%), 2015 (15%) and 2020 (proposed 30–35%) targets will not be achieved (Department of Business and Enterprise and Regulatory Reform (BERR), 2008a). Historically, the UK has failed to meet RES-E targets: for 2009, RES-E contributed 6.6% of electricity generated against the yearly target of 9.1% whilst all renewables (electricity, heat and transport) accounted for only 3% of UK total primary energy requirements (Department of Energy and Climate Change (DECC),

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2010a). OXERA (2007) modelling indicates that the non-reformed RO would only attain 7.9% in 2010, 11.4% in 2015 and 12% in 2020. In contrast, it is anticipated that a banded RO will increase renewables deployment by over 40% for the period 2009–2015 compared to the existing RO (DTI, 2006).

Currently, the NFFO and RO have not delivered deployment at expected levels, created mentors nor promoted energy diversity/security. Of significance, UK policy objectives have not been met and overall this will negatively impact GHG emission reduction targets – including a legally binding target of cutting carbon dioxide emissions by at least 80% in 2050 (DECC (Department of Energy and Climate Change), 2009a).

This paper is concerned with whether or not the UK Government has learned from the past performance, mistakes and difficulties of renewable energy policy with particular regard to reforming the RO (hereafter termed the 'reformed RO'). This will be attempted by analysing the internal and external failures of the NFFO, RO and reformed RO. Internal (or structural) failures are failures (barriers) due to the design of the mechanism itself, whereas external failures are those barriers out with the mechanisms direct control. The reasoning behind this is that, by introducing clearly defined variables, it will facilitate a comparison of the different mechanisms employed over the last two decades and help determine the potential of the reformed RO for the near future. In other words, it will show whether or not the Government has been able to learn from the past and understand and successfully incorporate these lessons for UK renewable energy policy and deployment as it evolves to meet the demands of the move to a low carbon economy, primarily through the reformed RO. This research will be of particular relevance given the new Conservative–Liberal Democrat coalition government's proposal to introduce a large-scale feed-in tariff mechanism for renewable electricity generation.

This article will be set out as follows: Section 2 will examine the NFFO and the RO in order to determine the internal and external failures that have affected the performance of these mechanisms. Section 3 provides an overview of the 2009 RO reform process. This section will also examine the additional changes that came into effect in April 2010 in addition to further proposed changes. Section 4 will determine the internal and external failures of the reformed RO. Section 5 will look specifically at the proposals of the new coalition government, and examine the likely impact of these failures on future renewable energy deployment. Finally, Section 6 will analyse the impact of internal and external failures on UK renewable energy policy in order to show whether or not the Government has learned from past experiences in supporting renewable energy.

2. Policy instruments in the UK: the NFFO and the RO – 1990–2009

The European Union (EU) recently adopted a new Renewables Directive (2009/28/EC) to substantially increase Europe's use of renewable energy, with legally binding targets for Member States: increasing the overall share of renewables in energy use to 20% by 2020 and reducing overall greenhouse gas emissions (GHG) by at least 20% below 1990 levels by 2020 (Europa, 2009). The UK has been set a target of 15% of total energy consumption from renewables. In line with the sectoral approach, this will require around 30–35% of renewable electricity generation by 2020 with an aspirational target of 15% by 2015 (DECC (Department of Energy and Climate Change), 2009b). Given that the adoption of such targets coincides with the reform of the RO and the increasing urgency of addressing UK renewable energy policy failures, an analysis of this process is both timely and necessary. In order to evaluate the likely impact of the reform on meeting the RES-E targets and hence on renewable energy deployment, it is necessary to establish the wider historical context of the UK's choice of policy instruments to support renewable electricity generation.

The problems of the NFFO and non-reformed RO are well documented (cf. Komor, 2004; Edge, 2006; Lauber, 2004; Lipp, 2007; Mitchell and Connor, 2004; Mitchell et al., 2006; Ringel, 2006; Toke and Lauber, 2007). It is clear from Table 2.1 that both mechanisms have been under-performing, particularly with regard to set targets. Part A shows that only 30% of all NFFO projects actually reached the commissioning stage over a 14-year period, and when individual technologies are examined, except for landfill gas (478 MW: 68% of contracted projects operational) the rate of deployment has consistently and significantly fallen short even for the next two most deployed technologies: wind (219 MW: 19%) and waste (235.5 MW: 17%). Although Part B shows that renewable deployment under the RO has increased in comparison to the NFFO, failure to reach the annual Obligation targets highlights that the mechanism is not working as intended. For the 2010 target of 10% to be reached, RES-E generation will have to increase overall by 3.4% in one year, an unprecedented annual increase.

What is important for the purpose of this article are the reasons why both these mechanisms have not worked as intended. Fig. 2.1 shows that there is a high degree of similarity between the two mechanisms with regard to both internal and external failures: finite and limited duration of subsidies due to limited mechanism lifespan, excessive focus on competition and low costs, mechanism uncertainty, unresolved planning and electricity grid network issues and policy uncertainty/excessive change. Those areas in which the mechanisms differ are also interesting. This is because it reveals that the RO introduced three new failures (two internal and one external) in contrast to removing only one internal failure: subsidy bundling (renewables and nuclear power were included under the NFFO from 1990 to

Table 2.1
Set target outcomes for the NFFO and RO.

A. Total numbers and capacity of projects offered in the NFFO by contacts given and commissioning in 2004

Technology	Contracted projects		Commissioned projects (March 2004)	
	Number	Capacity[a]	Number	Capacity[a]
Biomass	32	256.0	9	10.5
Hydro	146	95.4	68	47.4
Landfill gas	329	699.7	226	474.8
Municipal/industrial Waste	90	1398.2	20	235.5
Sewage gas	31	33.9	24	25.0
Wave	3	2.0	1	0.2
Wind	302	1153.7	93	219.8
Total	**933**	**3638.9**	**441**	**1109.2**

B. Percentages of electricity derived from renewable sources in the United Kingdom

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Target	–	–	3.0	4.3	4.9	5.5	6.7	7.9	9.1
Actual RES-E Generation (as %)	1.6	1.9	2.4	3.58	4.23	4.55	4.96	5.5	6.6

Notes: (Part A) Data from Edge (2006). Part (B) Data from BERR (Department of Business and Enterprise and Regulatory Reform) (2008b) and DECC (2010a). Actual RES-E Generation of overall renewables percentage has been revised to the international basis. Targets for the RO commenced one year after the operation of the RO (2003) for the end of the first period (2002–2003).

[a] In MW declared network capacity.

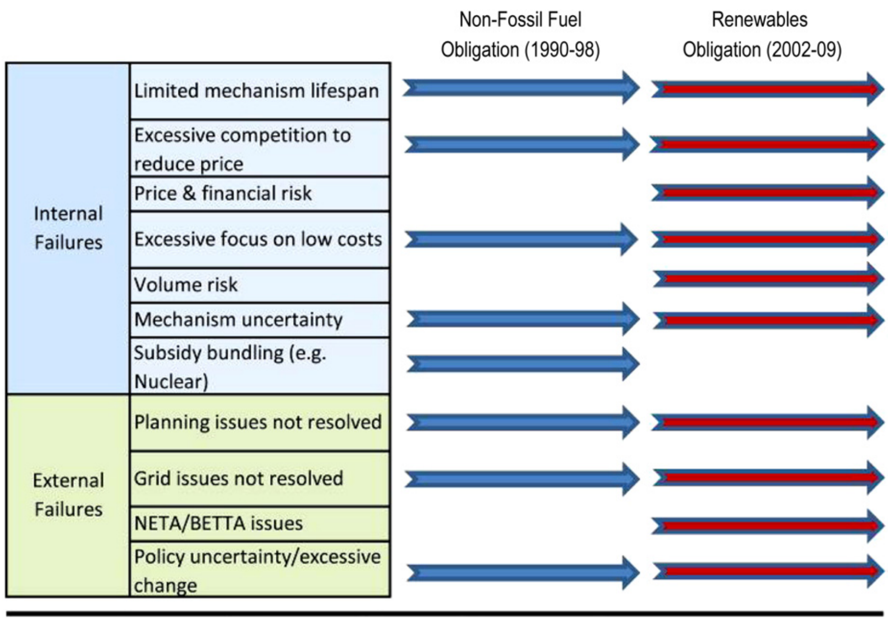

Fig. 2.1. The internal and external failures of the NFFO and RO.

1998 with the result that the vast majority of the subsidy was allocated to nuclear power). Importantly, the non-reformed RO increased price/financial risk (typically short-term contracts, the removal of the NFFO priority access contracts and generators not knowing what they will be paid for each contract due to ROC and wholesale electricity price fluctuations as these revenue streams depend on supply and demand). This resulted in making it difficult to obtain finance. In addition, volume risk was introduced along with the British Electricity Trading and Transmission Arrangements (BETTA, formerly NETA) in 2005 (see also Fig. 6.1).

In summary, the RO is a high-risk mechanism. It is a more market-based mechanism than the NFFO, leaving price and technology choice (no requirements on what type of RES-E to be purchased) to the market whilst the Government set the quantity (Obligation target) to be achieved. This lack of support for different renewable energy technologies (RETs) – no technology banding like the NFFO) – has led to the establishment of a single market for all RETs. Combined with an emphasis on costs and thus increasing market competition meant that the RO primarily benefited the cheaper, more mature technologies (primarily onshore wind and co-firing) with the more expensive technologies effectively being priced out of the mechanism and perhaps even made permanently uncompetitive through a lack of market access (e.g. wave, tidal, solar photovoltaic and energy crops) (Foxon et al., 2005). The RO was specifically designed to be technologically blind because the DTI (Department of Trade and Industry) (2001, p. 3)

> [Believed] that a banded obligation would segment the market unnecessarily, and would lead to the Government dictating the relative importance of each technology… that it is no longer the Government's job to pick winners or to introduce artificial distortions in the marketplace.

The primary result of this has been to stifle rather than stimulate innovation and the necessary introduction of capital subsidies for certain technologies to combat the RO price cap that effectively excluded them (e.g. offshore wind).

This has led to a number of issues that have had a negative consequence for deployment levels. The RO has led to a focus on onshore wind power, leading to increased opposition from the public and problems with regard to planning permission (an external failure). This has been exacerbated for two reasons: because of the increased risks and resultant difficulties in obtaining finance and the complex nature of the mechanism itself, the RO militates against small, independent and community-based projects – those projects proven to reduce opposition and hence planning difficulties (Malloy, 2006). By design, then, the RO is a stronger supporter of large, usually multi-national companies with impressive assets that have vertically re-integrated – thus they can take on the RO risks themselves, and as such block new entrants/smaller and/or community based developments that could alleviate planning and acceptance barriers at least to some extent by promoting renewable projects from the bottom-up, by actively informing and involving the local population where such projects would be developed and the public in general (Mitchell and Connor, 2004; Lipp, 2007).

The internal and external failures examined here have helped to establish a high-risk market for renewables in the UK, resulting in higher costs of renewable energy to consumers than necessary given the current technology costs (Carbon Trust and Consulting, 2006). Butler and Neuhoff's (2008, p. 1855) analysis of the various costs of renewables between the RO and Germany's REFIT mechanism revealed that once

> [T]he difference in the wind resource is taken into account, the price paid for wind energy [onshore] is lower in Germany than in the UK, and that this is likely to remain the case over the medium term… despite the fact that the feed-in tariff adopted in Germany does not expose project developers to price competition.

The under-performance of the NFFO and non-reformed RO has also negatively impacted on UK energy policy objectives. As Table 2.2 shows, despite long standing policy aims over two decades and previous UK Governments from both sides of the political spectrum (both Conservative and Labour), a number of policy aims have arguably not been achieved at all (full economic exploitation of alternative energy sources, developing a UK domestic/export renewable industry sector, to meet set RES-E/renewable energy targets) or not as successfully as should have

Table 2.2
Key UK energy policy objectives relevant to renewables from 1988 onwards.
Sources: [1]Department of Energy (1988), Connor (2003). [2]Department of Trade and Industry (1994). [3]Department of Trade and Industry (2000). [4]Department of Trade and Industry (2003), Mitchell et al. (2006). [5]Department of Trade and Industry, 2007a. [6]Department of Business and Enterprise and Regulatory Reform (BERR) (2008a). [7]Department of Energy and Climate Change (2009b). [8]Scottish Parliament (2009).

Non-Fossil Fuel Obligation (1990–98)
1988[1]
1. Stimulate full economic exploitation of UK alternative energy resources
2. Establish and develop options for the future
3. Encourage UK industry to develop capabilities for domestic and export markets
1994[2]
1. To place greater emphasise on the environmental benefits of renewables
2. To acknowledge the barriers to increased installation
Renewables Obligation (2002 onwards)
2000[3]
1. To assist the UK to meet national and international targets for the reduction of emissions including greenhouse gases
2. To help provide secure, diverse, sustainable and competitive energy supplies
3. To stimulate the development of new technologies necessary to provide the basis for the continuing growth of the contribution of renewables into the longer term
4. To assist the UK renewables industry to become competitive in home and export markets, and in doing so, provide employment
5. To make a contribution to rural development
2003[4]
1. To put the UK on a path to cut carbon dioxide emissions by some 60% by about 2050, with real progress by 2020
2. To maintain the reliability of energy supplies
3. To promote competitive markets in the UK and beyond, helping to raise the rate of sustainable economic growth and to improve our productivity
4. To be more pro-active in addressing the barriers to renewables and combined heat and power (CHP) – planning permission, distribution and transmission issues
5. Set a non-binding target of 15% RES-E for 2015
6. Setting carbon trading as the centre of environmental policy (not the renewable-specific RO mechanism)
2007[5]
1. Reforming the planning system and improving grid access (transmission and distribution) for renewables
2. Proposal to reform the Renewables Obligation (proposed for 1 April 2009)
2008[6]
1. A RES-E sectoral (non-binding) target of 30–35% of RES-E for 2020 (overall 15% of UK total primary energy requirements by 2020)
2. Climate Change (England and Wales) Act: legally binding cut in carbon dioxide emissions by at least 80% in 2050 and 26% by 2020[7]
2009
1. Climate Change (Scotland) Act: the same as above except a 30% cut by 2020[8]

Note: Early policy objectives are generally continued and/or reiterated in later publications.

occurred (GHG emission reductions, the least cost rationale, security and diversity of supply). As stated previously, renewables deployment has increased overall under the RO in contrast to the NFFO, but the reformed RO will inherit not only the benefits but the problems. This is reminiscent of the state that occurred when the RO replaced the NFFO, indicating a failure of the Government to learn from past experiences at the NFFO/RO mechanism transition in developing the RO during the last seven years. As discussed in the following section, what will be of importance is whether or not the reform of the RO has successfully addressed the internal and external failures or in contrast exacerbated or created new failures to renewable energy policy in the UK.

3. The reform of the Renewables Obligation

It is not the intention of this paper to examine the actual 2009 reform of the RO in depth (cf. Wood and Dow (2010); Wood (2010); in addition, cf. BERR (Department of Business and Enterprise and Regulatory Reform) (2008c, 2008d), for an explanation of the reform), however it is important to note the main changes to the mechanism and the Governments underlying reasons for doing so.

Although the policy goals remain fundamentally the same as before, the government has recognised that deployment levels will fail to meet the set RES-E targets for 2010, 2015 and 2020 if the RO was maintained in its non-reformed form (see Section 2). As such, the reasoning behind reform of the RO is that

> It will provide the flexibility necessary to increase the deployment of renewable electricity generation in the years following 2009 and respond to the UK share of the EU 2020 target… [by over-coming the] constraints on the availability and deployment of the cheaper forms of renewables which mean that, to meet the Government's long-term targets for renewable energy, we will need a significant contribution from renewable sources that are currently more expensive.
>
> (DTI, 2007b, p. 3)

In addition, the Government has recognised the urgent need to resolve issues of planning and grid constraints that, in conjunction with the reform of the RO, will be able to improve the situation for renewables in the UK by reducing development costs and risks to investors.

Table 3.1 shows the five proposed bands with their associated technologies and corresponding support levels (ROCs/MWh). New RO-eligible technologies include Geopressure and Tidal Impoundment. The design of the banding structure takes into account the level of maturity and level of risk facing the particular RETs – from low-risk/mature (Established 1 Band) up to high-risk technologies in the development stage that require far more support in order to reduce costs and risks (Emerging Band) in addition to

Table 3.1
Technology bands and levels of support (ROCs/MWh).

Band	Technologies	Level of support
Established 1[a]	Landfill gas	0.25
Established 2[a]	Sewage gas; co-firing on non-energy (regular) biomass	0.50
Reference	Onshore wind; hydroelectric; co-firing of energy crops; EfW[b] with CHP[c]; Geopressure; other not specified[d]	1.0
Post-demonstration	Dedicated regular biomass	1.5
Emerging	Offshore wind[e]; wave; tidal stream; dedicated biomass burning energy crops (with or without CHP); Dedicated regular biomass with CHP; solar photovoltaic; geothermal; tidal impoundment (tidal lagoons and tidal barrages < 1 GW); fuels created using an advanced conversion technology[f]; microgeneration (< 50 kW)[g]	2.0
Enhanced 1	Tidal stream	3.0
Enhanced 2	Wave	5.0

Note: Enhanced bands only operate within the Renewables Obligation Scotland (ROS).

[a] Technologies in the established bands are banded down.
[b] EfW – energy from waste.
[c] CHP – combined heat and power.
[d] Projects that apply for accreditation under the RO and future technologies that have not been allocated a particular band will join the RO in the reference band until the next banding review.
[e] Initially allocated 1.5 ROCs/MWh, offshore wind will receive 2 ROCs/MWh dependent on specific criteria (see text).
[f] Includes anaerobic digestion, gasification and pyrolysis).
[g] Microgeneration eligible rules have changed with the introduction of a small-scale feed-in tariff on 1 April 2010 (see text).

technology-specific issues. In line with the Governments aim to promote the development of renewables at a reasonable cost to consumers using a market-based mechanism with emphasis strongly placed on economic efficiency (i.e. at least cost), the decision to band the RO was decided primarily by assessing the expected current and forward costs over the next few years for each technology. The principal costs were defined as capital costs (e.g. wind) and fuel costs (e.g. for biomass). Ernst and Young carried out an analysis and informal consultation, and the findings of this cost–benefit analysis were then utilised in modelling the electricity market by OXERA (2007). As the consultation report (DTI, 2007b, p. 13) states

> We have found that these costs seem to fall into loose groupings, which reflect at least in general terms the market and technological development have reached to date… [And] taking these sources of cost into account the Government has identified groups which can in the initial phase of a banded RO be treated in similar fashion.

The situation for microgeneration has changed with the introduction of small-scale feed-in tariffs (FIT) on the 1 April 2010 (DECC, 2009c). Microgenerators (50 kW declared net capacity and below) for anaerobic digestion, hydro, solar PV and technologies will not be eligible for the RO and will move to the FIT support system. For small generators (> 50 kW up to 5 MW declared net capacity), the conditions are more complex: if they applied for accreditation under the RO before 15 July 2009 they will remain in the RO and cannot transfer to FITs; if commissioned and applied for accreditation before 1 April 2010 they can elect to transfer to FITs; if commissioned on or after 1 April 2009 and have not applied for accreditation under the RO before the FIT scheme comes into force they are required to make a one-off choice between the two support mechanisms when applying for accreditation. Once moved to the FIT scheme, generators cannot return to the RO unless they cease to be FIT-eligible. In addition, any generator selling electricity under an NFFO agreement is not eligible to join the FIT, thus remaining eligible for RO support. Also, any microgenerators with a declared net capacity < 50 kW and > 5 MW are not supported by FITs and thus will be supported by the RO (including where adding additional capacity leads to exceeding the 5 MW FIT limit).

Table 3.2 summarises the main changes that constitute the reformed RO. With regard to the broad approach to banding the RO, the government chose the multiple-fractional ROC approach. This approach awards more than 1 ROC/MWh (multiple ROCs) to some technologies and less than 1 ROC/MWh (fractional ROCs) to others (see Table 3.1). The creation of a banded multiple ROC obligation has a fundamental effect on the way in which the mechanism operates because the banded multiple ROC obligation "*breaks the existing direct link between the overall size of the electricity market and the actual amount of renewable electricity which would be required to meet the RO.*" (DTI, 2007b, p. 11). This means that the decisions on the bands might have the effect of putting more ROCs into the market than the number of MWh generated (net banding up) or fewer ROCs than MWh (net banding down), thus affecting the net neutrality of the RO. Although net banding up or down becomes inevitable, the setting of bands and the need to achieve a broad balance between the additional supply of ROCs by banding up certain technologies and reduced supply by banding down certain technologies becomes important, particularly in terms of retaining credibility of the RO as the key mechanism for achieving the Governments renewable energy targets.

In order to maintain a stable and predictable system for investors and developers, the review process (which will determine changes to support levels over time to reflect changes in RET costs and other market developments) will occur on a time basis rather than being triggered by the deployment of a particular volume of generation capacity. This will happen every 3–5 years with any changes to banding being announced 18 months prior to the introduction of the changes. Implementation of the changes will be linked to the EU ETS scheme – 1 April 2013 and the 1 April 2018. This was decided because the support level required for renewables in the future is to be increasingly dependent on the carbon price.

Early banding reviews can be triggered in extreme circumstances with a broad set of criteria to trigger the early review (a review can be triggered following one or a combination of the criteria being met). These include: if another major support scheme with an impact on renewables starts, ends or is subject to significant changes; co-firing cap creates significant distortions in the ROC market; over-compliance of the obligation; other unforeseen event with a significant impact on the RO's operation; significant changes in grid connection/transmission; demonstrated significant variation in net costs for a specific technology that changes the economic rationale for setting banding levels; and if a new technology with the ability for large-scale deployment arises.

There is also the process for setting the bands during future review periods. The success of a banded mechanism will strongly depend on the correct inclusion of the appropriate RETs to the appropriate band. A number of criteria have been established in

Table 3.2
The main changes to the renewables obligation (BERR, 2008c; DTI, 2007b).

1. Banding
(a) Five bands to be created[a] (Established 1, Established 2, Reference, Post-Demonstration and Emerging)
(b) Technologies with similar costs (based on an assessment of expected current and forward costs over the next few years for each technology) are grouped together.
(c) Banding based on a multiple-fraction ROC approach
(d) The frequency of banding settings will be linked to the EU ETS scheme – currently expected to be 1 April 2013 and 1 April 2018
(e) Any changes will be announced 18 months prior to the introduction of such changes as specified in a review; reviews of bands will occur every 3–5 years[b]

2. Grandfathering
(a) Trigger point for grandfathering based on the date of planning consent
(b) Any reduction in the number of ROCs/MWh will only apply to future projects with the exception of co-firing
(c) Co-firing and microgeneration will not benefit from the principle of grandfathering
(d) No intention to curtailing ROC entitlement of capacity before 2027 (except co-firing)

3. Level of obligation
(a) The government is committed to maintain RO levels above renewable generation up to a total of 20%
(b) This will be done on a guaranteed headroom basis of 8%[c]

4. Co-firing and biomass sustainability
(a) Although the cap on the proportion of a supplier's obligation that can be met by co-fired ROCs will remain at 10%, an emergency criterion review would be triggered if co-fired ROCs (except co-firing energy crops) surrendered exceeded 10% of the total Obligation.
(b) A requirement to report annually to OFGEM on the sustainability of biomass used in generation, with the exception of stations with a capacity of 50 kW and under
(c) Deeming the biomass fraction of waste with a deemed level of 50% fossil fuel energy content will be permitted (this will increase to 65% in line with the governments waste policy.

5. Funding for RO administration costs
Administration costs will be taken from the buy-out fund with the government making up the difference in the event of a shortfall[d]

[a] Seven including both ROS Enhanced bands.
[b] However, see in text regarding the trigger criteria for allowing early reviews to occur as in the case for offshore wind.
[c] This was not a commitment to increase RO levels to 20% by 2020; however, see Section 3.1 regarding changes to this as part of the 2009 consultation on the RO.
[d] Previously these costs were paid by OFGEM through license fees from the gas and electricity network operators.

order help achieve this. These criteria include: taking into account full project costs (planning, construction, grid issues), income (wholesale price of electricity, avoided costs of the EU Emissions Trading Scheme (EU ETS), CCL, Landfill Tax), supporting the aim to maximise deployment in a sustainable manner, taking into account net neutrality, taking into account the cost-effectiveness and long-term potential of various RETs in delivering the set targets (for renewable generation) and wider strategic issues (e.g. sustainability, carbon emission reductions).

The position of those who have made significant investments will be protected (in terms of the numbers of ROCs they receive) under the principle of grandfathering as established in the 2006 Energy Review Report (DTI, 2006). Previously co-firing (except with energy crops) and microgeneration did not benefit from grandfathering; however, the new coalition government has extended grandfathering for dedicated biomass, energy from waste, anaerobic digestion and advanced conversion technologies (DECC, 2010b). In addition, the government is seeking to permit those projects in receipt of grants coming into operation after 11 July 2006 (the date of the 2006 Energy Review) using technology that will be banded up under the proposed changes to repay the relevant proportion of the grant they received and thus move up to the new band. This option should smooth generation growth by mitigating against delays while investors and others wait for the introduction of higher bands.

3.1. *Additional changes to the RO after the 2009 reform – 2010 and beyond*

In 2009 the UK Government published their consultation and response to the 'Consultation on Renewable Electricity Financial Incentives' to look at further measures to drive deployment of new renewable generation to meet the 2020 targets (DECC, 2009c). Essentially this was reforming the reformed RO in the same year that it was reformed. Table 3.3 shows the changes. These can be broken down into two categories: the agreed proposals that came into effect on 1 April 2010 and proposals requiring further consultation or discussion.

With regard to the agreed proposals, the RO is to be extended until 31 March 2037 as previously announced in the 2008 pre-Budget report. The duration of a maximum support period for projects was also set at 20 years. This support will apply to projects which achieve accreditation on or after 26 June 2008 up to the 2037 end date for the ROS, including any additional (new) or refurbished or replaced capacity. The offshore wind early banding review has resulted in the banding-up of this technology to the Emerging technologies Band (2 ROCs/MWh). This will only apply, however, to projects that receive full accreditation between 1 April 2010 and 31 March 2014, the implementation date of the next scheduled banding review. In addition, the cap on co-firing of regular biomass will be maintained at 12.5%.

The headroom margin has been increased from 8% to 10%. Prior to the 2009 RO reform, the level of the Obligation was set by a series of rising targets up to 2015/16. Headroom works by providing a set margin between predicted generation (supply of ROCs) and the Obligation level (demand of ROCs) and is designed to increase industry certainty in the RO and ensure that the value of ROCs will be protected in the event that increased deployment will in turn increase the risk of over-compliance due to weather or market conditions in a given year. Indeed, one of the aims of introducing headroom is to stabilise ROC prices by preventing fluctuations in value as has occurred where the gap between deployment and the Obligation level has varied considerably. The 2009 reform also established the level of obligation at 20% in order to maintain RO levels above renewable generation up to 20%. This has been removed in April 2010 as it would otherwise act as a barrier towards the 2020 RES-E target (around 30–35%) by placing an upper limit on the RO below what is actually required.

The method by which the Obligation level is calculated for each Obligation period formed part of the consultation, due to the fact that headroom was invoked for the 2010/11 Obligation period, rather than the target of 10.4%. This was due to predictions of electricity being lower than expected, in large part due to the current economic downturn. This has led to agreement for a new timetable process, involving closer interaction with industry and developers, testing (of load factors, electricity demand

Table 3.3
Changes to the Renewable Obligation in the 2009 consultation.

	Proposal
Agreed proposals	
(a) Extending the lifetime of the RO	The RO will be extended until 31 March 2037
(b) New projects should receive minimum 20 years support	Eligibility for the 20-year support will apply to projects which reeive full accreditation on or after 26 June 2008, up to the 2037 end date for the RO
(c) Treatment of additional (new) or refurbished capacity	Additional capacity will qualify for the full 20 years support, up to the 2037 end date for the RO (further consultation required on definitions for new or refurbished capacity)
(d) Changes to the current headroom mechanism	The current headroom level will change from 8% to 10% as part of the 2010 Order. It will operate alongside the current fixed targets until 2015 (and removal of 20% Obligation level)
(e) A temporary increase in the offshore wind band	Offshore wind will be allocated 2 ROCs/MWh for projects which achieve accreditation between 1 April 2010 and 31 March 2014
(f) Changes to the co-firing cap	Co-firing of regular biomass cap will remain unchanged at 12.5%
(h) ROC revocation	Ofgem will be able to offset presented ROCs found to be issued incorrectly from a generator's future output. Ofgem will have 6 years from the date of allocation to verify these ROCs
(i) Calculating the obligation level	DECC led process to a new timetable and process involving closer involvment with industry/developers, testing (load factors, electricity demand predictions, exploring intermittency issues and looking at co-firing assumptions
Further consultation	
(j) Stations outside the UK	No changes should be introduced with regard to extending eligibility under the RO to renewable generation outside the UK without further consultation (likely to occur in 2010)
(k) Price stabilisation mechanism	A mechanism to stabilise revenue from electricity prices for renewable electricity generator. However, this requires further discussion

Note: Agreed proposals are those changes to the RO that implemented on 1 April 2010. Further consultation refers to proposals that are still undergoing consultation.

predictions), exploring intermittency issues and looking at co-firing assumptions.

The consultation also contained two proposals where further deliberation is required: extending the RO to stations outside the UK and introducing a price stabilisation mechanism (see Table 3.3). Both proposals would represent major and fundamental changes to the way all the UK Obligations currently operate. The UK Government has indicated that it is "open to the participation in the RO of generating projects outside the UK… under certain conditions" (DECC, 2009d, p. 45). Although this proposal could theoretically help meet the particularly ambitious and legally-binding 2020 renewable energy targets, the specifics would be complex: what level of support would be offered (ROC per MWh); should eligibility be dependent on a direct and exclusive connection to the UK; would reciprocal arrangements with other countries be required; how to calculate such additional capacity into the RO; does it offer genuine savings to the UK; would capping the amount of generation be required; could it be limited to generation from countries that had already met their target? There would also be the danger that if accepted this could undermine the growth of domestic capacity. This could impact on the Scottish Government's ambition to become an exporter of RES-E to Europe. The price stabilisation mechanism could be used to stabilise revenue from electricity prices for renewable electricity generators and possibly even for ROC price revenue. An appropriately in-depth analysis of such mechanisms is out with the scope of this article, in terms of what type of mechanism would be most suitable and how it would actually operate. However, the impact of such a proposal (even whether or not it is implemented) is significant. The previous (Labour) Government also commenced what can only be described as an overhaul of the current UK electricity market as proposed in the March 2010 Budget. The new Conservative–Liberal Democrat coalition government will continue these reviews and issue a consultation document in autumn 2010 with a white paper scheduled for spring 2011. In addition, the new Conservative–Liberal Democrat coalition government has proposed significant changes to UK renewable (and energy) policy, including establishing a carbon price and some form of feed-in tariff mechanism for large-scale RES-E generation. Given the importance and potential impact of all these changes (even whether or not they are implemented), they will be considered in more detail in Section 5.

4. The internal and external failures of the reformed RO

Table 4.1 summarises the main internal and external failures identified in this paper for the NFFO, the RO and the reformed RO. Despite the changes, the reformed RO will still remain a strongly market-based mechanism where the market will determine price and technology choice in order to meet the deployment targets. Indeed, this was the reasoning behind the decision to adopt the multiple ROC approach (DTI, 2007b).

4.1. The internal failures of the reformed RO

The same price and financial risks remain (one of the major internal failures of UK renewable energy policy) due to the overall design of the RO as a financial support mechanism: a central problem is the considerable uncertainty about the future value of ROCs and the electricity itself (Toke and Marsh, 2006). In addition, as the Carbon Trust and Consulting (2006, p. 2) report 'Policy Frameworks for Renewables' points out, the RO

> …by design passes regulatory risk to the private sector, which the private sector accordingly prices at a premium. This leads to a leakage of the subsidy away from developers, as suppliers take a margin to deal with this risk and funding from financiers is therefore available on less favourable terms than it would otherwise be.

technology banding has been proposed primarily to counter the failures of the non-reformed RO, which was designed to 'pull through' the lowest cost technologies sequentially but has only really supported the deployment of co-firing and onshore wind which have been seriously constrained primarily by supply chain under-development, land-use issues, planning permission and grid connection issues. It has also failed to close the funding gap for the less mature and more expensive RETs (e.g. offshore wind, wave, tidal stream and solar photovoltaic) and thus stimulate the necessary deployment levels required for the 2010 and 2015 renewable generation targets (Mendonça, 2007).

A comparison of the OXERA (2007) modelled projections for the non-reformed RO (part A) and reformed RO (part B) in Fig. 4.1 reveals quite clearly that the reformed RO is expected to significantly increase renewable energy output (in TWh) over the

Table 4.1
Summary of the main internal and external failures of the NFFO, non-reformed RO and the reformed RO.

Non-Fossil Fuel Obligation	The Renewables Obligation	The Reformed Renewables Obligation
Internal failures		
• Originally set to run for only 8 years limiting time projects could expect to get financial help increasing risk • Excessive competition to reduce average price/kWh of each bidding round led to contracted projects not being built as many accepted bids too low (unrealistic) • Bidding structure meant most of those offered contracts applied for planning permission/started plant construction at the same time – compounded by the first two failures and leading to a perceived 'wind rush' and resultant backlash, thus exacerbating planning problems • Uncertainty of when bidding rounds would occur (and irregular intervals between when they did) and for which technologies/capacity amounts • As NFFO bundled with nuclear power (until 1994), most of the subsidy (FFL) went to nuclear • No penalty mechanism to penalise failure to take up contract • Excessive fiscal constraints led to UK manufacturers unable to meet equipment demand and developers going abroad • Complex mechanism – supported big business	• Price/financial risks: typically short-term contracts (no NFFO priority access contracts) with generators not knowing what they will be paid for each contract; difficult to obtain financing (2 of 4 revenue streams depend on supply and demand) • Volume risk: ROC value and buy-out premium decrease the closer to meeting the Obligation targets; in-built incentive to not achieve set targets • Left technology choice to the market, thus promoted the cheapest technologies (onshore wind and landfill gas) and priced other RETs out of the mechanism) thus exacerbating planning problems • Highly complex mechanism that strongly supported large, vertically re-integrated companies (that could take on the RO risks themselves) over smaller independent and community based projects that have been proven to improve public acceptance/reduce planning failures • Excessive focus on low costs exacerbated problems for UK renewable industry sector that developed under the NFFO	• Price/financial risks from non-reformed RO still exist • Banding expected to significantly increase deployment of offshore wind and co-firing but could see leakage from onshore wind; banding but likely insufficient to significantly increase deployment levels of less mature technologies until at least by 2020 (the Emerging/Enhanced Band technologies, e.g. PV, wave. tidal stream) • Funding change for RO administration costs (from the buyout fund/government making up any shortfall) likely to increase investor/developer uncertainty • Review criteria too wide/vague – increasing uncertainty; 2 early reviews already; if co-firing cap breached will provoke another review • Increased complexity of the mechanism overall, due in part to banding and leading to lack of transparency and supports larger companies over smaller independent and community based projects with resultant same problems as non-reformed RO • Uncertain whether increased subsidy levels (for certain technologies) will be enough to build up industry growth and resultant employment. This would be compounded by the emphasis on low costs and the scale of proposed deployment means developers likely to go abroad for equipment
External failures		
• Local planning authorities not given guidance for renewable projects – thus exacerbating planning rejection • Policy Uncertainty: NFFO changed significantly in 1993 (extended contracts to 15 years); mechanism replaced after just 8 years; originally bundled with nuclear power • Transmission/grid connection issues same as for the RO but less of a problem due partly to far lower RES generating plant in operation than under RO and constraint issues problem of the grid company	• Planning permission problems still not resolved • Transmission/grid connection issues still not resolved • Policy Uncertainty/Excessive Changes: Setting carbon trading as the key policy tool and notifying intention to review RO in 2003 (one year after RO started; Obligation targets set late/non-binding; RO to be significantly altered (reformed) in 2009 • NETA/BETTA increased balancing risks and forcing additional costs to renewable generators	• New Planning Act expected to streamline/speed up process for renewables but potential top-down imposition of renewables on local communities and differentiation of projects by capacity/location could affect expected benefits • Transmission/Grid issues: Significant changes but potential for escalating costs under socialised connect & manage; grid not anticipatory to new renewables; must be developed in time; offshore grid still in development • Policy Uncertainty: Increased significantly by number of proposed changes to combat revenue risk/investor uncertainty • BETTA problems still exist

Note: See Section 2 (NFFO and non-reformed RO) and Section 3 (reformed RO) for an in-depth examination of the internal and external failures.

period 2002/03 to 2026/27 over the non-reformed RO. The major trend observed is that this growth is predominantly due to offshore wind power and to a lesser extent, co-firing, whilst onshore wind shows a slowing in the rate of increase. Fig. 4.1 also reveals that overall the other RETs (excluding wave, tidal, onshore and offshore wind, landfill and co-firing) only increase slightly under the reformed RO in comparison to the non-reformed RO, in terms of output. Of interest, total wind power and co-firing is estimated to contribute to around 70% of total RES-E generation by 2015/16. In contrast, wave and tidal power exhibit negligible growth under the reformed RO (and non-existent under the non-reformed RO).

Co-firing growth is maintained at a stable level under the reformed RO but undergoes a significant decrease under the non-reformed RO. When co-firing (regular) and co-firing (energy crops) are examined separately, both categories show a marked increase under the reformed than the non-reformed RO. Indeed, co-firing of energy crops actually shows no deployment at all under the non-reformed RO although the increase under the reformed RO is insignificant (see OXERA, 2007, p. 85 and p. 91 for a detailed breakdown). Landfill gas also declines further under the reformed than the non-reformed RO. Fig. 4.1 also shows that all other renewables do not change significantly for both the non-reformed and reformed RO mechanisms. A more detailed examination of this category reveals that solar photovoltaic and certain microgeneration technologies (micro CHP and Anaerobic Digestion CHP) do not deploy at all, biomass CHP exhibits insignificant deployment, whilst small hydro shows insignificant growth in deployment levels (see OXERA, 2007, p. 85 and p. 91). Therefore, banding appears to offer the highest support to the more mature or near market and lowest cost RETs – offshore wind and co-firing (primarily with non-energy crops). In contrast, banding does not appear sufficient to significantly increase deployment levels of the other RETs (including onshore wind). It could also be argued that onshore wind growth could be constrained by the shift to offshore wind and its higher level of support under the reformed RO (in addition to other barriers). In particular, those technologies in the Emerging Band show decreases (landfill gas), insignificant increases (wave, tidal, biomass with energy crops) or no growth at all (solar PV, micro CHP).

There have been a number of changes that have occurred that will affect the OXERA modelling outcomes for a number of RETs.

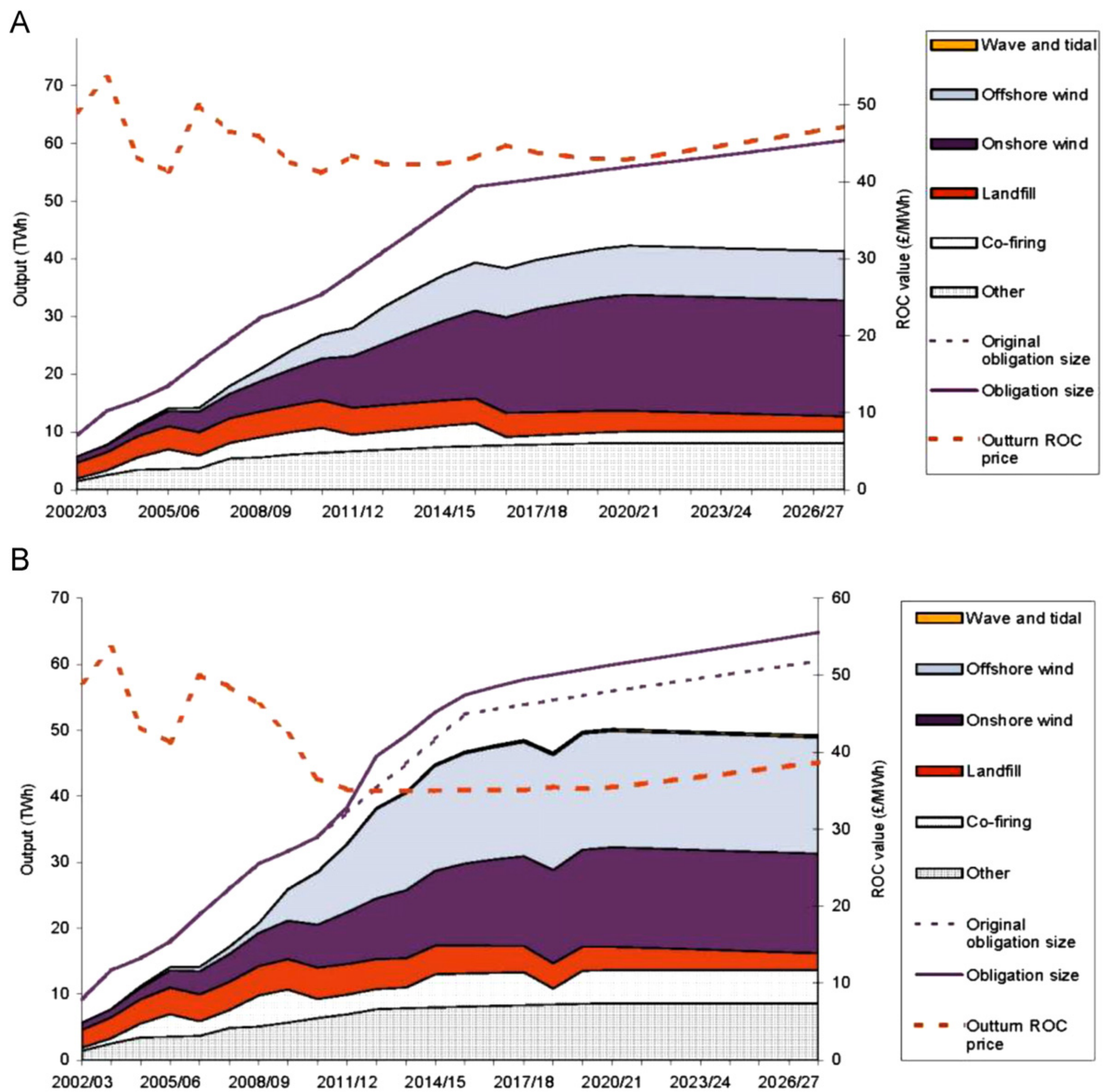

Fig. 4.1. Oxera modelled projections of renewable energy deployment volumes (in TWh) for the non-reformed RO (A) and the reformed RO (B) for the period 2002/03–2026/27 (OXERA, 2007: 12, 31). *Note*: Both figures incorporate the 2027 end date for the RO mechanism.

Offshore wind has been effectively albeit temporarily banded-up to 2 ROCs/MWh from 1.5 ROCs/MWh (see Table 3.3). However, the aim of banding-up is not to increase deployment more than previously expected, rather it is to help offshore wind deploy as previously expected in order to overcome what are perceived as short-term costs (including supply chain and market issues). Given the time-frame for banding-up eligibility (accreditation between 1 April 2010 and 31 March 2014), it is unclear how much of an impact this will have on the 32 GW of offshore wind proposed for the UK by 2020. Obviously it will be dependent on how quickly new projects can be accredited, of significance given the current delays in planning, grid connection and difficulties obtaining finance (Wood, 2010). Marine renewables could be expected to deploy more than expected under modelling. Primarily such an increase would occur in Scotland with the increased ROS subsidy and the strong signal from the Scottish Government including support out-with the RO mechanism. However, it is unlikely that deployment will reach the 1.2 GW currently anticipated in the Pentland Firth/Orkney Waters leasing programme due to high technology/financial risk, and project attribution to the (in contrast) lower-risk offshore wind leasing round projects in addition to other barriers such as grid and planning (Wood, 2010). The situation for microgeneration has changed the most with the implementation of the feed-in tariff mechanism on 1 April 2010. Although microgeneration could play a role in meeting the 2020 target, according to the UK Renewable Energy Action Plan (June 2010) the contribution from small-scale sources to the RES-E target is currently set at 2% (DECC, 2010b). An analysis of the impact of the microgeneration is important; however, this topic is out-with the scope of this article, focused as it is on large-scale RES-E generation.

With regard to net neutrality, it appears unlikely that the redistribution of support between the various RETs (from the most mature and cost-effective technologies to newer, developing technologies including offshore wind) could be achieved in a way that is net neutral in terms of costs and amount of renewable generation. Yet one of the four criteria for setting the bands (during the reviews) is that net neutrality should be taken into account (DTI, 2007b). This could lead to either the desired volume being delivered at a higher cost or a lower volume delivered at the same cost. This would particularly be the case for offshore wind, which would require additional funding support in order to deliver an equivalent amount of renewable energy by 2015/16 (UK Business Council for Sustainable Energy, 2007).

The review criteria established to enable the government to trigger an early review (out with the proposed banding review timetable) is both very broad and very vague. This could act as an internal failure by increasing investor/developer uncertainty with regard to future income (if a technology is banded down, for example). The reformed RO, by design, removes long-term security for individual RETs due to the lack of certainty of knowing the future allocation of the number of ROCs per MWh. This could be a particular problem for offshore wind: if a future review banded down offshore wind as it became more cost competitive, this could leave companies facing potential stranding risk (due to the large expected level of deployment and the huge capital costs involved). However, it is important to note that the review process itself can be beneficial as in the case for offshore wind. The government can learn from early mistakes or gained experience and it injects an increased level of flexibility into the reformed RO over the non-reformed RO. Such flexibility was one of the successful characteristics of the NFFO (Mitchell, 2000). One particular danger is that because the reformed RO is a very complex mechanism, this makes it increasingly more vulnerable to lobbying with the resultant problems for future band adjustment (McIlveen, 2010).

The proposed change in the way the administration of the reformed RO is funded is also considered an internal failure. The new system involves the administration costs (set to increase under the added complexity due to banding, thus increasing the overall cost to consumers) to be taken from the buy-out fund, with Government making up the difference in the event of a shortfall: however, there is no absolute guarantee that the government will make up the shortfall from the buy-out fund, especially in the event of unforeseen additional expenses under the reformed RO. This could add uncertainty for developers with regard to future revenue streams.

The issue of mechanism complexity still remains, and if anything, the reformed RO is more complex due to the introduction of banding. Although there are a number of benefits to the proposed reformed RO, including removing the 20% Obligation level in April 2010 which had placed an upper limit on the RO, providing 20 year support for new projects, allowing the targeting of support to different technologies and providing a review mechanism for tapering support, it is by design more complex and the resulting impact of the reform on ROC prices will be difficult to predict. This leads to problems with regard to transparency and is also likely to be administratively burdensome. This added complexity, by itself, could act as a barrier to investment, especially to the entry of smaller independent and community-based companies – a problem that has plagued UK renewable energy policy since the introduction of the NFFO in 1990. However, it should be pointed out that investor confidence is not dependent on one single factor.

4.2. *The external failures of the reformed RO*

Four main external failures are examined with regard to the reform of the ROS (see Table 4.1). These failures are planning, grid issues, policy uncertainty and the British Electricity Trading and Transmission Arrangement (BETTA). BETTA – the extension of NETA to include Scotland as well as England and Wales in 2005 – was designed to correct perceived imperfections in the wholesale electricity market and lower prices. BETTA was not designed to promote the use of electricity from renewable sources: it has an in-built preference for flexible and predictable sources of generation, leaving intermittent sources at a relative cost disadvantage (Smith and Watson, 2002). It is a complex mechanism that imposes high costs on small generators (in terms of membership, personnel and information transfer) and places a high premium on flexibility and penalises intermittent and unreliable generation. As a result, many small generators avoid it and sell via a supplier. However, most grid distribution zones (where generators sell into to avoid losing the distributed benefits of RES-E) only have one supplier thus constraining selling options. These risks are compounded by the fact that renewable energy is generally more expensive than conventional thermal generation (coal, gas and nuclear), does not taken into account external costs (apart from the Climate Change Levy component) with its focus on the marginal cost of green technology (Lauber, 2004) and is typically very capital intensive and needs this capital upfront.

The remaining three external failures – planning, grid issues and policy uncertainty – have all acted as considerable barriers to Scottish and overall UK renewable energy policy for almost two decades. Planning has undergone significant reform with the new Planning Act (2008) which aimed to fundamentally change the operation of the planning process in the UK by streamlining and speeding up the decision-making process and avoiding lengthy public inquiries (UK Parliament Online, 2008). However, the recently elected coalition government has introduced new and fundamental changes with regard to planning. Primarily, this involves the removal of the centre-piece of the legislation – the Infrastructure Planning Commission (IPC) – and the proposal to move from a single centralised planning structure to a localised system (also by abolishing regional planning bodies). This would enable local people/stakeholders within a national planning priorities framework to have more local power over the decision-making process.

There are a number of major relevant points regarding this for renewable energy. Firstly, experience has already shown that greater inclusivity often comes at the expense of quick decisions on planning, one of the major problems of the previous planning system. Although removal of the unelected and unaccountable IPC could make the process more democratic and potentially remove the danger of a top-down imposition of renewable projects on local communities that could dent public optimism and approval for renewables overall (Harwood, 2008), such a move could also have significant implications for projects that are necessary but locally unpopular such as renewables (in particular onshore wind, currently the main driver for renewable deployment growth in the UK). The danger is that there will be a return to lengthy planning delays, not only on renewable generation plant but also transmission/distribution work that is critical to the connection and expansion of renewable projects necessary to meet the legally-binding 2020 target in addition to replacing existing generation plant and infrastructure. This will be increasingly significant if the Coalition Government increases the target for renewables as proposed. In addition, the uncertainty over whether or not the new coalition government will introduce a third party right of appeal adds to increasing uncertainty with the real danger that such a proposal will lead to the planning system grinding to a halt (Planning Portal, 2010).

Secondly, the 2008 Planning Act establishes a cut-off point (in terms of plant capacity size and differentiated on whether a project is located onshore or offshore) (Office of Public Sector Information, 2008). Onshore projects greater than 50 MW and offshore projects greater than 100 MW will therefore fall under the remit of the new body replacing the IPC. The Major Infrastructure Planning Unit established within the Planning Inspectorate will now consider major infrastructure proposals with Ministers making the decisions. However, an Act of Parliament is required to abolish the IPC – it is unlikely that the IPC will be abolished until spring 2012 due to the legislative requirements. This uncertainty and lack of clarity regarding the planning system will act as a major disincentive for private investors/developers with the majority of those involved waiting to see what will happen, particularly with regard to nationally significant projects. This is exacerbated with the

National Policy Statements being sent back for review with no time-frame currently for resolution of this issue. Regarding the question of whether or not such changes are promoting development, since the election 95,000 new homes have been removed from the planning system in England alone (Panning Portal, 2010, personal communication). In addition, the result of this is that relatively immature high-cost technologies that are located onshore (for example, solar PV and microgeneration) and offshore (wave and tidal power) that are not yet ready for large-scale deployment will remain under planning conditions similar to the former (pre-2008 Planning Act) regime. This will have a particularly negative impact on the future contribution of wave and tidal power to renewable energy deployment, as developers continue to face costly and lengthy planning proposals at a time when they should be encouraged. This is difficult to reconcile with the new government's specific aim to increase deployment from marine RETs (DECC, 2010c). In other words, small-scale renewable energy projects will remain unaffected and thus not benefit from the new Planning Act. Another effect is that those onshore wind farms larger than 50 MW (capacity) could face already powerful local opposition with strong statutory backing through the emphasis on local planning control and power. Alternatively Ministers could end up imposing such larger projects upon local communities, a scenario that could end up occurring in Scotland as well and thus reinforcing the backlash against onshore wind in the UK.

In contrast, the majority of offshore wind projects look likely to potentially benefit from the new Act (by avoiding lengthy, complex and costly public inquiries and the associated difficulties in successfully obtaining planning permission) as it is deemed uneconomical to build offshore wind farms less than 100 MW (British Wind and Energy Association, personal communication). There is also the potential for conflict between the Planning Act and the new Climate Change Act (November 2008). The duty to mitigate and adapt to climate change, inserted at the last minute into an existing duty on sustainable development in the Planning Act has been argued as vague as it does not directly mention renewables (Friends of the Earth, 2008).

As with the UK's planning regime, there have been a number of changes for the transmission and distribution networks, partly in response to the Government's 2006 Energy Review (OFGEM (Office of the Gas and Electricity Markets), 2008a). The ability for renewable generators to be able to connect to the transmission and distribution networks in a timely and cost-effective way will be critical if the EU target of 15% of Britain's energy from renewable energy sources by 2020 is to be achieved. Government scenarios indicate that more than 37 GW of renewable generation will need to be connected to the electricity network – Britain's total installed capacity is currently 80 GW – in order to achieve this target (BERR, 2008e).

One of the major problems is that demand for network capacity currently exceeds supply, and existing rules favour thermal over renewable generation (the reason for this is that thermal generation forms the majority of capacity in the UK, are the cheaper generation option (in comparison to renewable generation) and the system is basically a market). There is too little transmission capacity, especially in Scotland where it is already heavily constrained. This is significant given that Scotland will play a vital role in the UK meeting the 2020 target (Electricity Networks Strategy Group, 2009). For the onshore transmission network, there are two primary solutions to resolving these issues: building more transmission capacity (and faster) in order to overcome a heavily constrained electricity transmission network. The other solution is to allocate available transmission capacity more efficiently. With regard to the first solution, this can be delayed due to other failures such as planning. The Beauly–Denny upgrade received planning permission after 5 years. It is also estimated to take at least 4 years to complete, dependent on growing opposition to the scheme (Scottish and Southern Energy, 2010). This problem might be relieved by the new Planning Act, which has the objective of streamlining the decision-making process and avoiding long drawn out public inquiries. With the proposed removal of the IPC, however, this will depend on how quickly the new system is put in place (at least 2 years) and how effective the transitional regime is, in addition to over-coming investor/developer uncertainty. Either way, increasing overall network capacity will still take time.

This leads to the second solution. As with increasing capacity, this solution also has its own challenges and problems: a regime for transmission access should ensure speed (quick connection), certainty (in terms of what the charges are going to be) and a total low cost. Such requirements will involve trade-offs, resulting in the difficulty to deliver all three objectives (Lawton, 2009). The Transmission Access Review introduced the interim connect and manage approach to allow faster connection of some renewable generation from May 2009 (OGEM, 2008b). This worked by removing the previous 'first come, first served' approach in order to create a level playing field for all generation (however, existing rules benefiting thermal generation would have to be changed for this to benefit renewables) and temporarily relaxing connection rules to and use of the network without the need for generators to wait until wider system reinforcements are complete. Since its introduction, around 12 GW of projects for advancement of connection dates have been received, with around 2 GW of renewable generation expected in Scotland by 2012 actually connecting earlier (National Grid, 2009). These figures have however to be set in context against the 71 GW 'queue' of proposed new generation capacity seeking connection to the GB Transmission Network, including 19 GW capacity from renewables (DECC, 2010b). Again, the new coalition government will retain the new enduring connect and manage model and bring the regime forward to August 2010 (previously this date was 2011) which differs from the ICM by socialising the costs (constraint costs, advanced connection costs) equally among all generators and suppliers on a per-MWh basis (DECC, 2010b). Of concern, however, is the cost aspect: if transmission investment fails to keep pace with the growth in generation (and it is important to remember that the socialised connect and manage approach will deliver accelerated connections at the cost of increased congestion and constraint costs – particularly in Scotland which already suffers heavy congestion and lack of capacity), this could lead to significant costs. If too high, this could lead to additional problems (unsustainable extra costs to consumers, costs to running the system).

A major change also involves offshore transmission access, of potentially critical importance given that the Government aims to install up to 34 GW of offshore wind capacity by 2020, mainly under the Crown Estates leasing programme (The Crown Estate, 2008). The main feature of the new regime is the allocation of offshore transmission licenses via a competitive tender process. Between June 2009 and June 2010 (the 'Go-Active' stage), OFGEM ran transitional tenders to identify offshore transmission operators (OFTOs) for offshore generation with National Grid's role as system operator for Great Britain also includes the offshore areas (the Renewable Energy Zone). The coalition government will continue consulting with OFGEM with regard to developing an enduring offshore regime. However, there are also additional challenges for offshore renewable connection: construction of the offshore transmission network (and its success in terms of time and costs) will depend heavily on the timely and successful transmission network reinforcement on the mainland which will itself depend on how the new (onshore) Planning Act actually works (see above). Also, there needs to be significant supply chain investment in required equipment, e.g. investment will be required by existing suppliers in expanding manufacturing facilities for HV cables, and particularly subsea cables – the HVDC and SVC market is still at an embryonic stage (The Crown Estate, 2009). This results in a technology risk and a cost premium to be borne by the 'first comer' offshore transmission owner to specify this technology. This impact is increased due to the coincidence of not only Round 3 projects for the entire UK, but for other countries offshore renewable projects occurring more or less during the same time period, namely up to 2020.

The fourth external failure considered here is policy uncertainty. UK renewable energy policy is still characterised by uncertainty, constant adjustments and change. Carbon trading remains as they key environmental policy tool for dealing with the issue of climate change, thus undermining confidence in the renewable-specific RO. Indeed the core strategy supported by the government to overcome the market failures to successfully tackle climate change and ensure security of supply involves putting a price on carbon emissions through the EU ETS (HM Treasury, 2010). However, the failure of carbon pricing alone to reduce emissions at the scale and pace required and incentivise the growth of renewables in conjunction with the internal and external failures of the mechanism itself have driven the successive waves of regulatory and policy change to the RO and renewables in general in the UK. It could also be argued that this was also at least in part the reason behind reforming the RO in 2009.

These proposals can be categorised into three (non-mutually exclusive) 'waves' of change that if adopted could fundamentally re-orientate the RO to become more like a feed-in tariff, albeit a system that will remain an RO mechanism but with the added complexity of feed-in tariff like 'bolt-ons' as opposed to actually being a feed-in tariff. Firstly, the Price Stabilisation Mechanism (this also occurs in the second 'wave' of proposals) and accepting renewable electricity generation from out-with the UK. Secondly, there is the UK electricity market framework reform process, started by the previous government but continued by the coalition government (although exact details will not be known until autumn 2010). However, the options being consulted on include: introducing new statutory regulations, creating new markets (a separate low-carbon market), supporting low-carbon in the current market (through establishing a low-carbon obligation,[1] a system of premium feed-in tariffs or through a Price Stabilisation Mechanism), using price intervention (establishing a minimum carbon price), changing the balance of delivery between private and public sectors and using the public balance sheet to support the financing of investment alongside wider measures to reduce barriers to entry in wholesesale and retail markets and ensuring security of supply (HM Treasury, 2010; HM Treasury and the Department of Energy and Climate Change, 2010; Directgov, 2010). The third 'wave' of proposals include the proposals to introduce some form of large-scale feed-in tariff for RES-E and the proposal to reform the Climate Change Levy (CCL) into a carbon tax, acting as a floor price for carbon. These are changes specifically proposed by the Conservative–Liberal Democrat coalition government and are examined in more detail in Section 4.1) (DECC, 2010c).

It becomes clear, however, that the failure of UK Government to address the main internal failures of the RO up to now, primarily price/financial risk and the resultant impact this has on developers/investors and thus deployment levels is driving the successive waves of change in renewable energy policy. In other words, subsidies are being used to compensate for the investment risks caused by deficiencies in the mechanism and thus renewable energy policy itself. This is significant given the level of investment required for the UK to successfully meet the 2020 renewable energy targets – around £18–19 billion annually up to 2020 (Project Discovery, Office of the Gas and Electricity Markets, 2010). What is important is that the UK appears to be currently introducing a feed-in tariff style system 'through the backdoor', via the successive waves of reform and adjustment. This leads to the question over whether or not it would have been (and perhaps still is, given the coalition government proposal for a large-scale RES-E feed-in tariff) better to switch to a FIT mechanism overall. By the end of 2009, under a stable feed-in tariff mechanism, Germany had over 25 GW of wind installed in comparison to just over 4 GW in the UK, and around 16% share of electricity in comparison to 6.6% in the UK. In addition, feed-in tariffs have had more success in installing non-wind renewable technologies (Bundesministerium für Umwelt and Naturschutz und Reaktorsicherheit, 2010). However, the problem of such mechanism changes, whether partial or complete, in addition to the first two 'waves' of change, bring a whole new host of problems and one growing area of concern that is possibly not being acknowledged properly is the impact that this will have on the renewables sector. Inevitably the point will come when the increased changes to the mechanism will out-weigh the benefits of any improvements – possibly this point has already been reached with regard to the impact on the renewable industry sector (although it should be noted that the RO favours large-scale companies and as such they will seek to maintain the status quo). What is apparent, though, is that the sheer number of changes mentioned here has the additional effect to increase policy uncertainty as an external failure. Indeed, it has the potential to become of critical importance in the near future.

However, the extension of the RO mechanism up to 2037 in conjunction with the introduction of a headroom mechanism (from 2015/16) which removes volume uncertainty is a significant adjustment, and a beneficial one. As Fig. 4.2 shows, under the previous duration of the RO (up to 2027), there is no expected new RO-eligible generation after 2020/21 with an overall decrease in new generation from approximately 2015/16 onwards. This is a direct consequence of the finite duration of the RO impacting on investment decisions (there is no expectation of future ROC revenues after 2027/28) and the predicted remaining revenues (e.g. from the sale of electricity) would not be sufficient by themselves to bring forward new development despite the subsequent upturn in ROC values (OXERA, 2007). As OXERA (2007, p. 36) point out, the cut-off dates for investments

> … suggests that the time frame for ROC revenue collection is a more dominant factor in investment decisions than the effect of banding.

The extension of the RO has significant implications for renewable deployment levels in the UK. Modelling carried out by OXERA showed that the reformed RO would increase deployment over the non-reformed RO: 9% as opposed to 7.9% (2010), 13.4% as opposed to 11.4% (2015) and 14% as opposed to 12% (2020). New generation levels would certainly not decline in the manner shown in Fig. 4.2 for both the reformed and previous mechanism, and the chance of the headroom mechanism being triggered increases. This is significant given that non-RO eligible renewable generation (large-scale hydro) could add between 1 to 1.5% onto the modelled levels of RO-eligible generation (DTI, 2007b). Although this implies that both the 2010 and 2015 targets could be achieved, the 2010 target is basically unachievable (requiring a serious step-change in deployment of 3.4% in one year; see also Wood and Dow, 2010) and the 2015 target will be heavily dependent on the impact of the external failures examined in this article.

With regard to stated policy objectives, the retention of high price/financial risk and arguably increased uncertainty looks set to remain a substantial barrier to UK renewable industry sector

[1] Although as yet undefined, a low-carbon obligation could include renewables and nuclear power. This could renew fears of nuclear taking precedence (in terms of R&D funding and priority) that occurred during the NFFO.

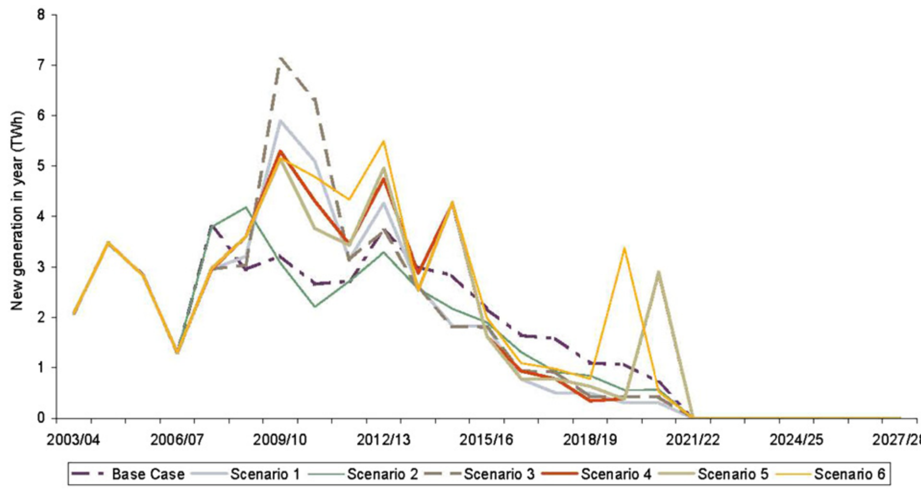

Fig. 4.2. Year-on-year levels of new generation 2003/04–2027/28 (OXERA, 2007: 36). *Note*: The data utilised in this analysis is based on the RO mechanism ending in 2027/28. The base case represents the non-reformed RO and scenario 6 represents the reformed RO.

growth (domestic and export) and resultant employment uptake. Much of renewable energy generating plant will continue to be imported from other countries, notably Germany and Denmark. Therefore, there is a very real risk that UK renewable policy will continue to subsidise other countries manufacturing, despite the concept that a move to a low-carbon economy will not just be costly but a substantial opportunity for the UK economy. At this early stage, it is difficult to determine whether the other goals of increasing renewable deployment, reducing carbon dioxide emissions and providing secure, diverse, sustainable and competitive energy supplies will be better achieved with the reformed RO. What can be said with confidence is that the lack of clear and precise policy goals, in addition to other failures, will work strongly against the meeting of these specific objectives.

5. New government, new renewable energy policy?

The recently elected Conservative–Liberal Democrat coalition government has put forward a significant number of proposals with regard to renewable energy policy. These include the Green Deal, the Green Investment Bank, a carbon tax, reviewing the electricity market, reforming the planning system and overcoming barriers to the grid, the implementation of a full system of feed-in tariffs to include large-scale RES-E generation, reviewing the role of OFGEM, increasing the RES-E target and EU greenhouse gas emission reduction targets and the preparation of a new Microgeneration Strategy. There are also technology-specific proposals focusing on marine renewables and anaerobic digestion, and the grandfathering of certain biomass, waste and advanced conversion technologies (DECC, 2010c). It is important to determine whether these new proposals constitute a positive direction for UK renewable energy policy. In other words, will they have a positive impact on renewable energy deployment particularly with regard to the legally-binding 2020 target?

It is too early to actually determine the direction in which UK renewable energy policy is going, or how it will work and how well it will perform (the coalition government has only been in power since May 2010). However, a number of valid points can be made at this early stage. With the exception of the Green Deal to help participating householders to save money by insulating their home and pay back the costs over time on their energy bills through the resulting savings, the proposal to introduce a full system of feed in tariffs for large-scale RES-E generation and the reform of the climate change levy in-order to provide more certainty and support to the carbon price, the vast majority of the proposals are not different from that proposed by the previous government. This should not detract from the potential merit of such policies nor those areas where the new government's immediate efforts should prove beneficial, particularly with regard to deciding to extend grandfathering to dedicated biomass, energy from waste, anaerobic digestion and advanced conversion technologies. This is anticipated to help remove the barriers to around 5 GW of such projects already proposed (DECC, 2010b). The government has also commenced a timely review of OFGEM's role, brought forward the enduring connect and manage regime and published a prospectus for the roll-out of smart meters.

Although a number of the proposals require legislative change which requires time, or will go through consultation or depend on the conclusion of related but different processes (such as the spending review), this leads to delaying commitments and there has also been a lack of actual detail concerning a wide range of proposals, including the key strategies put forward by the government. Despite stating in the June 2010 Budget that "*Climate change is one of the most serious threats that the world faces. The Prime Minister has pledged to make this the greenest government ever*" (HM Government, 2010, p. 28), the actual text of the Budget was lacking in environmental policies. It mentioned the need to introduce a carbon price through reforming the climate change levy alongside wider market reforms, the Green Investment Bank and the Green Deal for households, but provided no details. Also, the proposed 2010 Energy (Energy Security and the Green Economy) Bill likewise focused on the Green Deal whilst stating that the Bill 'may also contain measures' including regulating coal-fired power stations carbon emissions, energy market reform, smart grid frameworks and the green investment Bank (DECC, 2010d). Again there was little elaboration concerning these policies. Interestingly, two of the government's most controversial policies – the carbon price and reform of renewable energy incentives by extending the feed-in tariff to include large-scale RES-E were absent from the list of measures to be included in the final bill. In addition, although the first annual energy statement has been published, and provided a list of actions that the government will take, there was also a lack of detail concerning the policies.

These issues are of concern for a number of reasons: the renewable energy sector is at a critical stage, requiring clarity and direction from government over these proposals particularly due to the fact that the 2020 targets are less than a decade away. With the average development timeframe for onshore wind deployment (from pre-development to operation) taking on average between 4 to 7 years

(Pöyry, 2009) and delays due to planning, grid, financial and supply chain constraints only exacerbating this, any delay over the implementation (or even just deciding not to implement) these proposals could lead to a slowing or reduction in UK renewable energy deployment when uptake of renewables urgently needs to be increased. However, as stated above, clarity is unlikely to be prompt for a number of even the key proposals: details on the green investment bank will not be published until after the spending review scheduled for October 2010; the detailed implementation plan for reforming the planning system is not due until late summer, with the consultation of the revised national policy statements not due to begin until sometime in autumn 2010; further consultation with OFGEM is required (time not specified) with regard to an enduring offshore transmission regime; and the energy market reform proposals, which can only be described as an overhaul of the complete system, are not going to be consulted on until autumn 2010. Yet the impact of such proposals are highly significant, for example the implementation of a low-carbon obligation (one of the energy market reform proposals) could potentially result in the re-bundling of renewables with nuclear – thus re-introducing an external failure that was previously removed in 1998. In addition, the UK economy is only just beginning to tentatively come out of the worst recession in decades and the budget deficit and the resultant impact this will have on the ability of the public and private sector to finance these policies has to be taken into account.

There is little doubt that UK renewable energy policy has been under-performing and the sectoral target for RES-E is highly ambitious (and could be increased yet further in conjunction with an increase in GHG reductions, see above) within a very strict timetable. Therefore, this leads to the issue of whether or not the new coalition government should have pursued its earlier policy of mechanism change from the RO to a full system of feed-in tariffs for large-scale RES-E generation. Such a move would not only potentially deal with the major internal failures (primarily high price/financial risk and mechanism complexity) but also negate the need for the electricity market reforms and other policy 'bolt-ons' to compensate for the investment risks caused by deficiencies in the mechanism and thus renewable energy policy itself. However, it is of course important to recognise the extent to which electricity market reform is being driven by policy in relation to other technologies such as carbon capture and storage and new nuclear power as well as renewables, as part of additional interventions that could play a role in delivering a low carbon affordable electricity mix for the 2020s and beyond. The previous argument that it is too late for such a mechanism change is weakened by the fact that those proposals put forward by the coalition government will take time anyway to implement, over two years in some cases anyway. This is approximately the same time it would require to change to (or introduce to some extent) a large-scale FIT, as it would require a change in primary legislation and the proposal is not in the proposed energy bill.

However, there is also ambiguity over what the UK Government is actually proposing to do regarding the FIT scheme[2]: a full mechanism change from the RO to a FIT with those projects currently under the RO retaining the current levels of subsidy and support, or a partial change which could mean either both mechanisms dealing with different technologies or same technologies/different projects (e.g. the Crown Estates offshore leasing programme – rounds 1 and 2 under the RO and FITs for round 3 projects). At the moment, it seems likely that a partial change whereby the UK operates both mechanisms is being considered. However, there are a number of points of concern with this approach (and indeed, if there is a complete mechanism change). A feed-in tariff mechanism, by design, should address the main internal failure of the RO (high price/financial risk) but this will be critically dependent on the appropriate setting of tariffs, and any future changes to the tariffs. In addition, the main external failures will still need to be resolved (for both mechanisms). Importantly, there are also different variants of feed-in tariffs: those that work in one country might not 'fit' another.

There is also likely to be conflict between the two mechanisms. Without addressing the internal failures of the RO, this will lead to under-performance of the RO and leakage to the FIT if both mechanisms deal with the same technologies/different projects. If both mechanisms deal with different technologies, the under-performance of the RO could lead to reduced deployment for those technologies. This leads to the question: if the main internal failure of the RO is addressed, is there any need to introduce a large-scale RES-E FIT alongside (or even to replace) the mechanism given the considerable impact such a change will have on renewable deployment in the UK? In addition, the primary concern is that the introduction of a FIT would increase policy uncertainty/complexity and lead to a hiatus in development similar to the Non-Fossil Fuel Obligation/RO transition that lasted 5 years as developers/investors wait for information and/or the implementation of the new mechanism. Although it is unlikely that the hiatus would last as long as the last time, the new government would have to get the mechanism up and running in the next few years – without any real problems and still address the external failures – or run the risk of increasing investor/developer uncertainty and retarding growth in renewables, the very same problems the mechanism change has been proposed to counter. This is very important with the UK poised to commence an unprecedented deployment of renewables required to successful attain the legally-binding and highly demanding 2020 renewable energy target. Overall, the introduction of a large-scale FIT at this stage will likely negatively impact renewable deployment levels at least in the short term and thus the attainment of the 2020 target. Further research not just of a theoretical nature would be required depending on whether or not the government goes ahead with such a proposal and in what way.

6. Discussion

An examination of the internal and external failures of the NFFO and the RO reveal that despite the differences between the two support mechanisms, both share a number of internal and external failures (see Table 4.1). In particular, they created high levels of risk and uncertainty for investors/developers, due to an excessive emphasis on cost reduction, the unknown price of electricity and ROC values (for the RO), leading to the preferential uptake of the more mature least-cost technologies (e.g. primarily onshore wind) at the expense of increasing the deployment of other more expensive technologies that, although not fully mature in market terms, could have been developed with additional support. In addition, external failures were either not sufficiently addressed (planning, grid issues: both exacerbated by the focus on onshore wind), introduced (BETTA) or continued (policy uncertainty). These failures increased the risks, costs and uncertainty to renewable generators/investors and seriously limited the level of deployment that could have otherwise been attained, resulting in the added failure to meet stated UK renewable energy policy goals, including consistently under-performing with regard to renewable energy targets, developing the renewables sector (for domestic and export markets) with resultant

[2] It should be pointed out here that this article does not state that the new Coalition Government will or will not introduce some form of large-scale feed-in tariff for renewable electricity generation. However, Chris Huhne has repeatedly mentioned the possibility of such a FIT particularly for offshore wind or marine renewables since the election and as such it is worth investigating here at least at the theoretical level.

employment growth, reducing carbon dioxide emissions and increasing diversity/security of energy supplies (see Table 2.2).

The implementation of the reformed RO is at too early a stage to determine whether or not it will be successful in achieving its goals (although cf. Wood and Dow (2010), for an evaluation of the likely impact of the RO reform on deployment levels). Analysing the internal and external failures of the reformed RO, however, can reveal the ways in which the reformed RO addresses these failures and what likely impacts it will have on RES-E (see Table 4.1). Although the reformed RO will increase subsidy levels and has attempted to address the main external failures (planning, grid), by not addressing the issue of high price/financial risk and increasing overall mechanism complexity, it can be seen that the major internal failures have still not been fully addressed. This is where reforming the mechanism could have made the most impact on improving deployment levels, but has ended up being another missed opportunity. In addition, the success of the mechanism will again be heavily dependent on a select few technologies (primarily offshore wind, onshore wind and co-firing), and whether or not the measures to combat external failures are successful. It is the extension of the RO to 2037, in conjunction with the removal of the Obligation level for a headroom mechanism and thus removing volume risk, which is likely to be the single most important factor behind the increase in renewable deployment levels, particularly for the 2020 target. As Fig. 6.1 shows, these are the two (internal) failures that reforming the RO has successfully addressed.

With regard to offshore, onshore wind and co-firing, there are a number of issues that could affect the likely deployment ability of those RETs that are expected to contribute around 70% of total renewable generation under the reformed RO by 2015/16. For offshore wind, these include build rate constraints, the requirement of dedicated dock facilities, ships and barges and installation plant and supply chain constraints. In addition, offshore wind faces a number of technical challenges and future costs remain uncertain due to limited market experience. Also, the new offshore transmission regime remains in consultation and therefore untested. Given that offshore wind alone is expected to reach 34 GW of installed capacity by 2020 (under the reformed RO), if UK RES-E targets are to be met, this increases concern due to the extent both such external failures held up onshore and offshore wind deployment for the previous mechanisms. Also, there is the possibility of a time delay in investors accumulating the financial benefits of the increased ROC allocation for offshore wind, leading to investment in new capacity coming later rather than earlier. Co-firing is constrained by a cap on the *proportion of* a supplier's obligation that can be met by co-fired ROCs (12.5%).

Overall, it can be seen from this analysis of internal and external failures and the ways in which the reformed RO has addressed them that the government (past and present) appears to have learned from some failures of previous renewable energy policy but not others, with the result that some failures are still contiguous despite two major mechanism changes (NFFO/RO, RO/reformed RO). However, Fig. 6.1 also shows that the RO reform has provided a 'renewables policy package' in the sense that it has attempted to address the barriers and challenges to both internal and external failures. It is notable that this has been a comprehensive approach in comparison to previous adjustments to single instances of failure. Although it does not address all of the failures, this is definitely a positive step in the right direction for UK renewable energy policy. Yet this will still leave the renewable energy targets dependent on a select few technologies and the external failures having been addressed sufficiently. However, the lack of clarity and increased uncertainty surrounding the new coalition government's planning system reforms can only increase planning as an external failure whilst the sheer scale and diversity of changes proposed even in the last year or so (since the RO was reformed in April 2009) have resulted in policy uncertainty increasingly becoming a major external failure, one that is likely to continue to do so for a number of years to come. Debate over introducing a carbon price and the possibility of a low-carbon obligation (with the strong possibility of including nuclear power) also increases concern over renewables being re-bundled with nuclear power. Government needs to prioritise renewables policy urgently, yet there is little evidence of this happening and many questions still remain. For example, can new projects move ahead in confidence that revenue streams will not be undermined by a move to feed-in tariffs?

Once again, renewable energy policy is in a state of flux. Although the reformed RO is expected, under modelling, to significantly increase deployment levels, this was the situation anticipated at the time of the introduction of the RO in 2002. Currently the UK still lags behind other European countries despite strong policy commitments to move to a low-carbon economy, and only seven years on, the RO itself has been reformed and continues to be reformed via successive waves of re-adjustments and potentially significant changes in policy direction (e.g. carbon price, market reform and large-scale FITs). It is also not unreasonable to argue that the officially stated (long-term) policy objectives (see Table 2.2) appear unlikely to be met

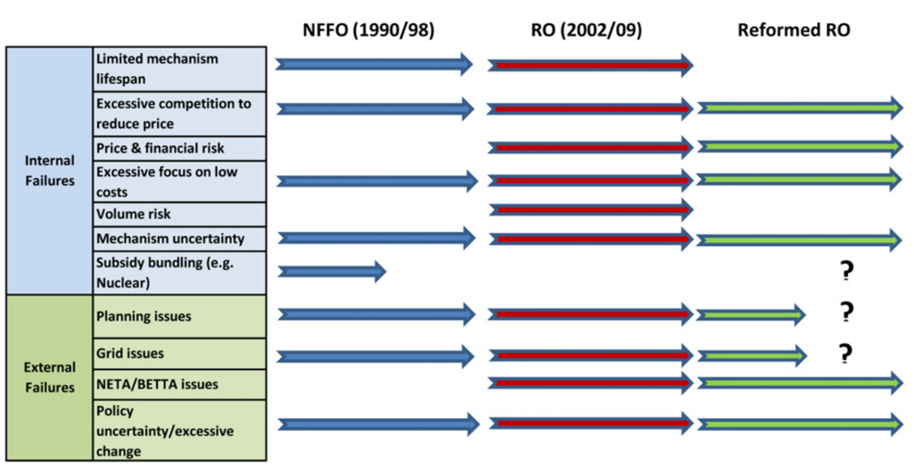

Fig. 6.1. The internal and external failures of the NFFO, RO and the reformed RO.

either at all or as successfully under the reformed RO as hoped. The next couple of years are critical, given the highly ambitious 2020 targets and the strict timetable in which to achieve them. Decisions made by the recently elected coalition government not only need to be made quickly and decisively, but also need to agree in which way they want UK renewable energy to progress. To FIT or not to FIT, that is the question. And ultimately, there is a limit to how long the renewable energy sector can hold its breath.

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