

“A well-functioning internal market in electricity should provide producers with the appropriate incentives for investing in new power generation, including in electricity in renewable sources, paying special attention to the most isolated countries and regions in the Community’s energy market.”

Preamble (at point 6) to Directive 2009/72/EC of 13 July 2009.

“The present integrated system, encompassing the single market and the shared regulatory regime and approach to investment in networks, brings benefits to both Scotland and the whole UK. It strengthens energy security and resilience, provides a larger, more attractive market for investors, increases competition, and underpins the shared approach to investing in low carbon generation.”

Scotland Analysis: Energy, DECC, 2014.

“Any indicator of fuel poverty that has consistently reported figures of millions of consumers being affected clearly demonstrates the failure of our efforts to alleviate fuel poverty in the UK to date and underlines the requirement for a more drastic course of action.”

Derek Lickorish MBE, Fuel Poverty Advisory Group Chair, Department of Energy and Climate Change, May, 2014.

EXPERT COMMISSION ON ENERGY REGULATION MAIN REPORT

Energy Regulation in an Independent Scotland



EXPERT COMMISSION ON ENERGY REGULATION
MAIN REPORT

Energy Regulation in an Independent Scotland

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CHAIRMAN'S INTRODUCTION

Energy is an essential part of our modern world. Its ready availability underpins most aspects of our daily lives at home, at work and in our leisure time. Providing the heat and power we need on tap comes at an economic and environmental cost, and its efficient supply depends on a complex infrastructure that creates natural monopolies.

As a result, all Governments face the challenge – the energy trilemma – of providing their citizens with secure, affordable, and low carbon power. To deliver that, the electricity and gas industries require regulation to drive competition, safeguard the environment, protect consumers and the public and create the predictable market conditions that encourage necessary investment.

Historically, the UK's power industry has delivered reliable and competitive supplies. In recent years, the challenge of decarbonising the sector, incentivising innovation and new investment and addressing affordability has required new approaches.

The major political parties all support the proposals for Electricity Market Reform (EMR) being introduced to encourage investment. Where the parties differ tends to be in the areas of consumer protection and price regulation, the generation mix required to meet environmental and economic objectives and the level of intervention required to optimise market outcomes.

Those differences matter because they create uncertainty in a sector that requires circa £200 billion of investment across the UK in the coming decade to 'keep the lights on'¹. Worryingly, against a background of UK capacity margins declining to the lowest levels for decades, markets are failing to offer price signals that will justify new investment, while consumer trust in the industry and its regulators to deliver just and affordable outcomes is at an all-time low².

At the same time, the impact of the recent recession and climbing consumer prices has heightened the need to tackle energy efficiency and address fuel poverty effectively. The Commission has spent much of its time on this area, recognising the current imperative of affordability. However, concerns on security of supply both internationally and in terms of tightening capacity margins – and the need to mitigate climate change – are also clear priorities.

The Commission has primarily focused on the electricity sector given the complexity of the issues faced there. However, the question of the regulation and operation of gas networks and markets is important and raises a number of points – some are specific to gas, whilst others are germane to both electricity and gas markets.

Gas is a globally traded and storable commodity. Scotland's access to gas supplies, some of which lands at St Fergus, should not be unduly affected in the event of independence. Continued regulation of the high pressure gas transmission network, currently owned and operated across the whole of the UK by National Grid, will come under scrutiny and may require some restructuring. However, in principle, this should be relatively straightforward if there is sensible cooperation between the Scottish Regulators and their counterparts. Northern Ireland's gas originates from a supply point in Scotland. Other areas, such as regulation of low pressure distribution network costs, storage and safety should be capable of being dealt with at a national level, albeit that cooperation amongst regulators to set common standards and arrangements would be beneficial.

Oversight of gas quality and composition is also important for consumer protection. Retail market arrangements for gas in Scotland, like the electricity retail market, is an area that would need to be governed by the combined economic regulator along with oversight from the proposed Scottish competition authority to ensure retail competition and fair pricing.

Our Interim Report issued in October 2013 set out key assumptions which we took as givens in addressing the questions posed. These assumptions included Scottish independence, the implementation of EMR, a multi-utility approach to regulation and continuing integrated transmission networks and wholesale markets for gas and electricity. We also assumed that Scotland and the rest of the UK remain in the EU, bringing with it the current economic, social, environmental and structural requirements the EU places on independent regulators or Member States as it drives greater market integration across Europe.

The EU provides a framework and indeed some protection for smaller Member States, but it is not a straightjacket. The current devolved arrangements in the UK already allow for different energy related policies, principally in the areas of energy efficiency, fuel poverty and renewables. Each jurisdiction will inevitably have different policy priorities, and over time they may change.

¹ <https://www.ofgem.gov.uk/ofgem-publications/76390/ofgem-discovery-pr8-2.pdf>

² <http://consumerinsight.which.co.uk/tracker>

A multi-utility regulatory model makes sense for smaller nations. An independent regulator that is credible and able to respond to periods of stress while providing a consistent regulatory approach to underpin a stable investment climate is important for any nation and particularly so given the prominence of energy in the Scottish economy.

Any regulatory system has to be designed to remain robust and effective through changes of administration and policy. In Scotland's case the administration in 20 years' time may have a quite different outlook on energy than that we see today. The power system it oversees will have radically changed as we move to decentralised generation and empowered consumers in a low carbon world.

In addressing the questions we took a longer-term view, beyond the necessary period of grandfathering existing arrangements through a managed transition, to consider the needs of a Scottish Government facing a markedly different energy system in the 2020s and beyond.

The issues we are considering will be important whatever the outcome of the referendum. Under any political scenario, markets, regulation and policy will change over time.

That means setting our sights above the current political debate. The Scottish Government set out one vision of a new world in *Scotland's Future* in November 2013. The UK Government published its *Scotland Analysis: Energy* in April 2014. Both positions can be expected to adjust in the negotiation that would follow from a vote for independence. We have tried to address the questions posed to us rationally and without bias on the basis of sensible cooperation and mutual interest between the administrations that share our common island. This has been assisted by the cosmopolitan composition of the Commission, drawn from across the UK.

I would like to record my thanks to the members of the Commission who have voluntarily, diligently and generously committed their time and talents to the task we were set. Similarly, I would also like to thank Rebecca Whyte, Neal Rafferty and particularly Chris Bronsdon, our secretary, for their support, forbearance and insight over the last nine months.

Robert Armour, Chair

Expert Commission on Energy Regulation
June 2014

EXECUTIVE SUMMARY

Energy assets tend to require extensive planning and significant investment and are built for long-term use. Any changes to the regulatory system underpinning that investment will require an adequate period of transition. Significant regulatory and market change tends to take a number of years to implement³, while changes to physical systems take longer. We have looked beyond the transition period to the longer-term, based on our assumptions of reasonable cooperation and joint intent and assisted by discussions with industry and regulatory bodies across the EU.

Regulation

Collaboration between Scotland and the rest of Great Britain on joint regulatory and system operation

- » There is a strong technical and regulatory case for Scotland and the rest of Great Britain (rGB) to retain a single-GB electricity and gas market, at least at the wholesale level, and to collaborate on a joint regulatory and system operators approach. There are international models of jointly regulated energy markets which show that this can be done.
- » The Commission, and industry stakeholders, agree that maintaining a single wholesale electricity and gas market with rUK provides the most rational economic outcome. Proposals to divide the single system physically into two separate operating systems would incur significant cost, but deliver no material benefit to the consumers supplied by either system.
- » We found no support in the industry, regulators or consumer bodies for such a division and we are heartened by the recognition by the Scottish and UK Governments of the continuing benefits of a single system.
- » A multi-utility regulator covering electricity, gas and water is an approach adopted by many smaller nations. We think it makes sense in Scotland. The Commission has not addressed regulatory issues beyond the energy sector.
- » The multi-utility model of regulation can offer a greater consistency of approach and achieve synergies where sectors have much in common, for example networks. The governance model should be designed to account for the differing demands of the sectors covered, both in terms of differences and synergies.

- » Any extension of the scope of the proposed Scottish Regulator beyond electricity, gas and water requires thoughtful design due to the potential for competing demands on the expertise and capacity of the Regulator and its governing board, especially at a time of energy system investment and change.
- » There are working European models for combined regulation of single electricity and gas markets across EU member state boundaries. Experience from these regulators demonstrate ways in which to meet the challenges and complexities of multi-utility regulation.
- » Best practice can be drawn from these in establishing a combined economic regulatory model. Brussels sets a mandatory minimum requirement for duties and competencies of the NRA. There is also a strong and supportive EU framework on regulatory cooperation through CEER⁴, ACER⁵ and the ECRB⁶.

Functions of new institutions to meet the requirements of EU law

- » Joint regulation of the single markets for electricity and gas will require new institutions to meet the requirements of EU law. A single market, with good communication and cooperation between the regulatory bodies operating in Scotland and the rest of the UK (rUK) can be implemented. Regulatory decisions must respect all jurisdictions.
- » An independent Scotland would want to put in place an independent National Regulatory Authority (NRA), to designate a System Operator, and to put in place appropriate governance and operational agreements.
- » The Regulator's duties and functions should be clear. It will, as a minimum, have the core duties required under EU law. Increasingly, regulatory requirements encompass social and environmental aspects as well as purely economic regulation.
- » These duties should be reviewed periodically and settled for a fixed period to give regulatory certainty to industry and investors, and to maintain its independence.
- » The non-core and delivery functions of the Regulator should be reviewed – these can diffuse the focus of the Regulator which should be on its regulatory role. Currently Ofgem has a number of non-regulatory functions, not all of which fit easily with its regulatory remit.

³ Examples include the development of Ireland's Single Energy Market, and reforms to the UK electricity market, which began in 2010 and are only now nearing completion.

⁴ Council of European Energy Regulators.

⁵ Agency for the Cooperation of Energy Regulators.

⁶ Energy Community Regulators Body.

- » The electricity sector is facing a period of investment and innovation, which will require asset renewal, low carbon generation and demand management technologies. The Regulator can proactively enable the development of the sector while these changes take place.
- » It is important to encourage competition, not least for consumers. Joint jurisdictional arrangements should deliver a proportionate regulatory backdrop against which this competition can take place.
- » GB currently operates a single AC synchronous power grid that is closely managed to ensure underlying system security; the provision of critical system interdependencies for supply, demand, and grid services will have to form part of any new arrangements.
- » The current wholesale gas market involves the buying and selling of natural gas after it has arrived from offshore production sites and has one price for gas across the UK system irrespective of where the gas comes from. Gas supplies for Northern Ireland are provided from a supply point in the Scottish network. Regulation of the market and operation of the system will therefore also require appropriate arrangements with counterparties in rUK and Northern Ireland.
- » The new regulatory arrangements should be flexible and capable of adaptation. This will be to the benefit of all Scottish consumers and the Scottish economy.
- » There may be differences in the policy approach or regulatory implementation between the two countries. These can be resolved through effective consultation and joint agreement to minimise market distortions and other unintended consequences. There could also be agreement that one jurisdiction can lead on specific aspects.
- » Cost socialisation and apportionment are issues that should be settled by both Governments. Grandfathering the treatment of existing investment is a fundamental principle of good governance; it protects the investment framework and maintains investor confidence.
- » As part of a single market, neither Scotland nor rGB will have unilateral control of arrangements within their geographical borders, but this is a reasonable trade-off to ensure that there are clear market signals for efficient investment across the GB system.
- » The main role of joint governance of a single market will be to provide the right climate for necessary investment; however individual governments may need to consider whether different locational signals are needed to help attract investment and maintain secure supplies.
- » Agreement and implementation of robust arrangements and processes, will give confidence to investors and governments that the settlement will endure, and that processes are in place to accommodate periodic change.

Making a Single Market Work Effectively

Establishing and maintaining an enduring single market:

- » Amongst consultees, there is overwhelming consensus that the current integrated wholesale markets for electricity and gas should be maintained. They provide benefits for consumers in Scotland and the rest of the UK. Long-term continuation of a single GB wholesale market will require political and regulatory commitment from both jurisdictions to support and maintain existing market and operational arrangements.
- » The European Commission is driving greater integration of wholesale markets and regulatory cooperation. We can learn from the single markets operating across borders in Ireland, Scandinavia and the Iberian peninsula, how best to create an effective structure for cooperation and governance.
- » A strong relationship with the Regulator for the rest of Great Britain (rGB) will be important from the outset along with a constructive and meaningful political partnership working to make the single market operate effectively.

The current single market relies on established frameworks and systems to ensure it runs smoothly

- » The current single GB wholesale market and business infrastructure will continue to be needed e.g. the BETTA and System Operator frameworks and a common settlement system. Elexon currently provides an important role in this system balancing services for the wholesale market. In future they will also provide services to the counterparty body for CfDs, capacity payments under EMR, and, implement any changes required under the EU Capacity Allocation and Congestion Management framework Guidelines (CACM FG)⁷.

⁷ The CACM Framework Guidance (section 2.2) makes it clear that overall market efficiency includes consideration of 'socio-economic welfare, liquidity, competition, network structure and topology, planned network reinforcement and re-dispatch costs'. Section 1.1 also notes that in evaluating the proposed CACM Network Code, ACER will take account of the need to fulfill security of supply objectives and the Union's targets for penetration of renewable generation.

- » The role of Elexon (for electricity), and Xoserve (for gas) is designated by Ofgem. Given the highly specific role that they play, the Commission recommends that the Scottish Government undertake further work to establish how these roles would be supported and governed for Scotland.
- » Under EU law, the Regulator has to consider security of supply and diversity of generation to ensure continuity of supply. The development of interconnection is often an efficient route to secure additional capacity, although this may not always be the most optimal solution, when taking account of security of supply.

» In the UK, the 'big 6' electricity and gas supply companies have a domestic market share of around 95%. It is particularly important to maintain the attractiveness of the market to new entrants and other existing participants in Scotland, where this position is concentrated within the 'big 3' (Scottish Gas, SSE and Scottish Power).

» Retail market arrangements could, if so wished, develop differently in Scotland taking into account the wider single market business structure. Any change could affect the attractiveness of the market to existing and new entrants and hence the levels of competition. Where changes are mandatory and unilateral across a large single market, then the business impacts are uniform. Where they are borne only within a smaller part of that market, there will be differential impacts on market participants. The Regulator in Scotland will need to consider this in its approach to fostering competition.

» Any impact of intervention in the market either at the retail level, or through infrastructure support, to provide differential signals in Scotland to the rest of the GB-market will need to be assessed.

» Changes to apportion transmission charges differently in Scotland would need to consider any effects on the proportionate sharing of costs with consumers across the system.

Developing regulatory functions beyond those of the combined economic regulator:

» In the event of a vote for independence, the task of establishing new regulatory arrangements while maintaining a single market will extend beyond the creation of an energy regulator and an independent system operator (ISO). They will also entail the establishment of authorities to oversee the financial and competition law applicable to energy markets, and the operational, health and safety regimes essential to good practice and maintaining public confidence.

» Scotland will need new regulators and institutions to licence the continuing operation of existing nuclear stations and coal mining, and new operations in fracking and unconventional gas. Arrangements will be needed to regulate the safe decommissioning of nuclear, coal and other energy related facilities on and offshore, and the funding arrangements to secure adequate provision for these and similar liabilities. It will also encompass appropriate health and safety regulation. These are significant projects and planning for these should commence soon, if not already underway.

Addressing technical challenges as the system evolves:

» At the outset, the new arrangements should be constructed to accommodate system change, and avoid the hidden risks of incremental change. These include impacts on voltage support, frequency management, system inertia and intermittency behaviours arising as a result of distributed generation, loss of thermal generation capacity and changing network demands.

» The Commission supports a proposal by the Institution of Engineering and Technology (IET) for the role of a 'system architect' that would have a technical role in ensuring continued operability of the current system, but also the technical oversight of the more complex and integrated system that we are rapidly moving toward.

» The joint interests of the Scottish and rUK Governments to ensure supply security and resilience make it sensible to jointly address critical operational independencies. Scotland provides and receives system support functions via the transmission system from the actions of the GB system operator. An early priority for the Scottish system operator will be to establish unambiguous agreements and governance with the rGB system operator (e.g. management of constraints, response, reserve, and black start) and clear lines of command for emergency operational decisions and responses (e.g. emergency load-shedding, and black start co-ordination).

» In the event that these ancillary services could not be fully met from resources in Scotland, contracts should be in place for provision via the rGB system operator. Alternatively, Scotland could develop its own ancillary services market, or explore provision through interconnection. The chosen solution should take account of the costs to Scottish consumers.

Providing clear market signals for investment in flexible plant, as Scotland's thermal stations retire:

- » A key issue in Scotland is the continuity of thermal generation capacity in the future where currently the prospect of a structural deficiency exists. Existing locational signals within transmission pricing are currently unlikely to deliver new thermal generating capacity in Scotland.
- » The Commission recommends that the Scottish Government explores how the development of new thermal power stations in Scotland, either to maintain the technical operability of the overall GB system or to ensure security of supply, can be encouraged.
- » A stronger CHP network in the industrial and commercial sectors can provide technical solutions for security of supply, but would need to be implemented on a significant scale.

Encouraging Renewables

Continuing Scotland's success in attracting renewable investment:

- » Scotland is an economically attractive place within the single GB-market to locate wind, wave, and tidal generation due to its natural resources. This has driven a rapid growth in renewables capacity, and is coupled with a strong and enduring policy commitment to encourage renewables. That has been an important factor in Scotland's success in attracting investment in green energy.
- » Future renewable development requires an increase in grid access and capacity as well as interconnection to provide a route to market.
- » The Commission assumes that Scotland will remain with rGB within the EMR framework. A post-independent Scottish Government could, over time, tailor new and additional mechanisms to promote renewable expansion. These could prioritise areas which present a strategic opportunity, or a natural or competitive advantage for Scotland.
- » The Commission supports the joint efforts being undertaken by the Scottish and UK Governments to encourage wind and marine energy in the Scottish islands, and sees this as an area of real potential for both energy generation and social impact.

Fuel Poverty and Energy Efficiency

Addressing issues that are most acute in Scotland

- » Scotland has a real opportunity to make a difference to fuel poverty and in continuing to drive energy efficiency. Historically, the issue of fuel poverty has been more acute in Scotland, and the focus on it greater. Under devolved arrangements the Scottish Government has given greater priority to fuel poverty and energy efficiency and introduced its own arrangements to make greater progress towards a just and affordable system. Scotland has set more ambitious targets for alleviating fuel poverty but in the difficult economic climate since 2008, and within the constraints of the existing system, eradicating fuel poverty remains a huge challenge.
- » While different criteria are used between Scotland and the rest of the UK to calculate the number of people in fuel poverty, any measure which consistently results in high numbers of consumers (2.39 million households were fuel poor in England in 2011), or a high percentage (with more than 27.1% of households in Scotland in fuel poverty in 2012) demonstrates that a more radical approach to tackling fuel poverty is required.
- » Scotland has different market conditions to the rUK as a result of climate, housing stock condition, high rural component and low gas penetration in remote areas, all of which lead to higher cost heating solutions.
- » The Scottish Government launched its own HEEPS programme in April 2013 to provide targeted funding support to help eradicate fuel poverty. This funding support was heavily predicated on funding contributions being available via the Energy Company Obligation (ECO). The changes announced in the Chancellor's autumn statement have put this at serious risk.
- » Removing the social obligations on electricity supply companies and transferring the burden into general taxation can place the funding obligation on those most able to pay. It decouples the funding from electricity charges enabling more direct control from Government. The Commission supports the proposals in this area by both the Scottish and UK Governments – provided that the revenues raised are allocated to the same degree for fuel poverty alleviation and targeted energy efficiency programmes.

- » At present, a disconnect exists between the availability and access to data on socially disadvantaged and vulnerable customers and those with the funds and delivery network to effect change. This is inefficient, and undermines efforts to target assistance on those in society with the greatest need.
- » Creating a Fuel Poverty Agency in Scotland could help drive a targeted and cost-effective means of delivering positive outcomes.
- » Faster deployment of smart meters might help realise their benefits to consumers sooner. The division of responsibilities and rights between supply and distribution businesses deserves to be revisited.
- » The roll out of the smart meter programme in the UK is taking considerable time to implement. While the meters will provide remote reading and more accurate billing, since the roll out programme commenced, there have been advances in smart meter functionality that could enable access to time of day tariffs and additional demand response services.
- » The GB Smart Metering programme should signal the beginning of a major new consumer interface and range of opportunities. The Scottish Government should consider:
 - Revisiting the concept of smart metering ‘supplier hubs’
 - The potential to transfer ownership and operation of the smart meters to Distribution Network Operators, which could bring a lower cost of capital as part of a regulated asset base that has a permanent physical connection to the consumer
 - Linking smart meters more closely with Network Operators as this could enable the move to smarter grids, improve the response to storms and outages and the use of smart meter data to support vulnerable customers
 - Whether the commercial and governance arrangements for the centralised GB Data and Communications Company (DCC) are appropriate for the long term in Scotland.

BACKGROUND

In July 2013, the Scottish Government established an expert commission of industry and consumer experts and academics, and asked them to offer independent advice on the operation and regulation of the energy market in Scotland and Great Britain in the event of independence. The Commission was also asked for its advice on policies to encourage renewables, improve energy efficiency and address fuel poverty in Scotland.

The Commission is independent and non-partisan, and has conducted its work and reached its conclusions in an unbiased manner. Commission members were chosen for their experience and depth of industry knowledge, ranging across power systems and market regulation to infrastructure and consumer issues. All Commissioners were unpaid and undertook this work voluntarily.

MEMBERS OF THE COMMISSION

- » **Robert Armour**, Chairman, Smarter Grid Solutions; Senior Counsel, Gowlings; Director, Albion Community Power; Nuclear Liabilities Fund; Former Chair SCDI – *Chair of the Expert Commission*.
- » **Simon Bucknall**, Retired, Formerly Director of Regulation, Scottish Power.
- » **Tom Delay**, Chief Executive, The Carbon Trust.
- » **Audrey Gallacher**, Director of Energy, Consumer Futures.
- » **Dr Robert Gross**, Director, Centre for Energy Policy and Technology, Imperial College, Co-Director, UK Energy Research Centre.
- » **Gordon MacDougall**, Managing Director, Western Europe, Renewable Energy Systems.
- » **Dr Fiona Riddoch**, Managing Director, Cogen Europe.
- » **John Scott**, Director, Chiltern Power, Formerly Director of Engineering National Grid and Technical Director, Ofgem.
- » **David Sigsworth**, Chairman, SEPA, Chairman of the Scottish Fuel Poverty Forum, Former Board Director, SSE.
- » **Dr Graeme Sweeney**, Special Advisor on Co₂ to Royal Dutch Shell, Executive Chair of Chop-cloc; Chairman of the Advisory Council of the European Technology Platform on Zero Emission Fossil Fuel Power Plants (ETP-ZEP).

The Commission was asked to consider five specific issues:

1. The role of a Scottish Regulator in the optimal operation of the UK energy market to deliver affordability, security of supply and environmental sustainability.
2. The market mechanisms necessary to ensure an independent Scotland can participate efficiently in an integrated GB-market, addressing the unique requirements of energy generation, transmission and distribution in Scotland.
3. How a strategic energy partnership with the UK will operate – its span of competence and the processes for cooperation with the UK.
4. Options for an optimal policy and regulatory environment to encourage renewable generation, including incentives for innovative technologies and the supply chain.
5. Advice on ways in which an independent Scotland can promote fairer, more affordable energy prices, given the need to address fuel poverty and measures to improve energy efficiency.

The Commission has been asked to work with the following assumptions:

- » Scotland becomes an independent country during this decade
- » Scotland is required to designate an independent, National Regulatory Authority (NRA) meeting the requirements of the European Union
- » A multi-utility approach to regulation is adopted
- » Integrated transmission networks in electricity and gas with rUK continue to operate
- » An integrated GB wholesale market for electricity and gas continues to operate
- » Both Scotland and rUK remain part of the European Union
- » That transitional arrangements will have to apply to changes in the system including grandfathering of the renewables obligation (RO) and contracts for differences (CfD).

Responding to these issues requires a number of assumptions to be made. The Commission's role is not to consider the merits or demerits of any political aspiration but to work with these assumptions and to think through how the system might be made to work most effectively and beneficially under those given circumstances.

Analysis and Regulatory Impact Assessment

The Commission had limited capacity and resources, meaning that formal analysis and regulatory impact assessment has not

formed part of its work. The issues raised within this report will need to be taken forward following detailed analyses in order to fully inform stakeholders on the potential impacts.

HOW WE APPROACHED OUR TASK

The Commission examined the current regulatory landscape for electricity and gas in Scotland, i.e. as part of a single GB-market that has a single system operator (National Grid) and a single regulator for electricity and gas markets (Ofgem) whose high-level objectives, duties and powers are framed within European regulation. We have explored how the regulation and physical systems might change in the event of independence. We have also provided advice on a number of policy questions we were asked, and considered aspects of the transition.

Our recommendations recognise that regulatory systems need to evolve over time. We have looked at the direction of travel in the UK and the EU, as well as the Scottish Government’s proposals for multi-utility regulation under a combined economic regulator model.

The purpose of a regulatory system is to provide a stable and efficient framework to encourage necessary investment, which fairly balances the interests of consumers, producers and network operators and controls abuse of market power. In an industry characterised by long life assets, we have looked at frameworks that will meet the needs of successive Governments over coming decades. Whatever the outcome on the 18 September 2014, we hope our advice will be useful as regulatory regimes evolve, both in a Scottish and UK context.

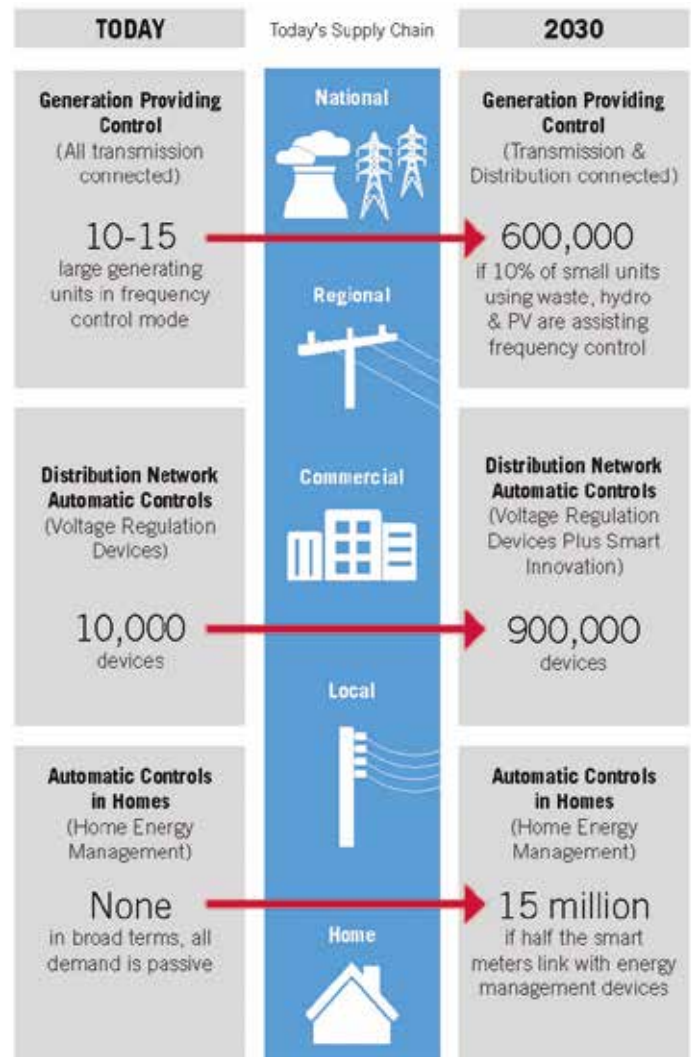
The following sections provide a high-level summary of some of the issues that provided context for the Commission’s work.

The Current System is Changing

The UK electricity sector is supported by a highly complex interconnected power system. The companies that operate the generation, transmission, distribution, and supply activities are all too aware of the significant challenge that the UK is facing to deliver a major cycle of reinvestment and development to replace aging power plants, provide GB-wide smart metering, upgrade the power grid, and respond to de-carbonisation challenges.

The electrical behaviour of the power system at national and local levels is already seeing potentially disruptive changes as we move from what is in effect a ‘passive’ power grid, reliant on centralised controllable generation and predictable demand. In future, we will see a ‘smarter’ system that integrates smaller distributed power sources and storage, virtual power plants, electric vehicle charging, and increasing volumes of intermittent generation.

If this is combined with growing numbers of intelligent consumers and home energy control systems, we can expect the sector to evolve from today’s model of ‘generating whatever is consumed’ to a new paradigm of ‘consume whatever is generated’⁸. Such a system will look very different from the one we see today, and is being explored actively internationally.



IET, 2013

8 <http://www.theiet.org/factfiles/energy/elec-shock-page.cfm>

Gas Transmission and Distribution

Electricity is generated and delivered to consumers instantaneously in order to match supply with demand, with a very limited amount of electricity storage available from the UK's pumped storage hydro stations – amounting to around 3% of installed capacity, according to the most recent Digest of UK Energy Statistics⁹. This system of supply and demand has to be precisely controlled and managed by the system operator in order to ensure that it remains in balance at all times. The GB gas network is also complex and carefully controlled, but it differs in its nature from the electricity system as it has a degree of inherent storage capacity either arising from gas compression in the pipeline or through dedicated gas storage facilities, which also provide some security and resilience of gas supplies.

All gas in GB passes through National Grid's National Transmission System (NTS), a high pressure gas network consisting of terminals, compressor stations, and a pipeline system some 6,300km in length, on its way to consumers. As the sole owner and operator of gas transmission infrastructure in GB, National Grid works with other companies to ensure that gas is available where and when it's needed.

The Gas National Control Centre (GNCC) keeps the NTS balanced between the gas demands of the consumers (both industrial and domestic) and supplies. The GNCC moves gas through the NTS by using over 25 compressor stations strategically sited around the country.

To perform its duties, the GNCC liaises with the Distribution Networks, shippers, traders and operators of gas terminals (around the UK coastline) and gas storage facilities and large gas consumers. Its systems are comprehensive and sophisticated – they receive hundreds of thousands of elements of data every day, which allow the GNCC to monitor flows, pressures and gas quality around the system and take any actions necessary to ensure that the NTS remains in balance across the diurnal cycle.

The gas transmission system in Scotland was historically built to transport gas North to South, commencing in Scotland. The gas processing facility operated by National Grid at St Fergus near Peterhead in Scotland is one of four in GB processing gas landed from the North Sea. The St Fergus site receives an estimated 20% of the GB total gas landings.

The UK's gas storage capacity is modest compared to many other markets and represents, on a space or volumetric basis, about 5% of national annual demand. Many other EU countries have 15% to 20% of national annual demand¹⁰. With less demand from England and Wales, Scotland's resilience is essentially the capacity of the pipe network as there are currently no gas storage facilities located in Scotland.

Gas leaves the transmission system and enters the distribution networks at high pressure. It is then transported through a number of reducing pressure tiers until it is finally delivered to consumers. The chemical composition of gas can vary, and a key role of National Grid is to ensure that gas quality is monitored to ensure both value to customers and the safe operation of gas-burning appliances.

System Adequacy and Security of Supply

The security of our energy supplies is always a high priority for Government – both the available electricity generation capacity that can be depended upon to meet demands at times of system stress, and the source of supply and ability of the GB system to store gas supplies via existing pipelines and interconnection¹¹.

The single, integrated GB-wide power system has evolved to provide what has been judged to be the most effective and economic arrangement for ensuring security of supplies across GB.

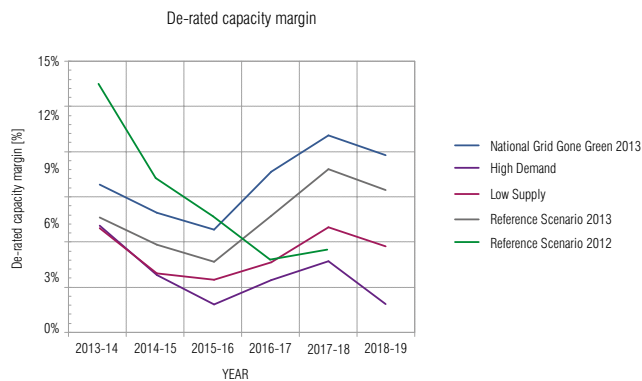
Long-term capacity requirements for new power stations have not been reflected in recent electricity market price signals. In addition, there have been many closures of fossil (predominantly older coal-fired) power plants, which cannot meet (on an economic basis) more stringent emissions requirements (through the Large Combustion Plant Directive and the Industrial Emissions Directive). This has already resulted in significantly fewer power stations available within the UK to meet peak electricity demand, exacerbating concerns in the period beyond 2015¹².

⁹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/279546/DUKES_2013_Chapter_5.pdf

¹⁰ British Geological Survey response Energy and Climate Change Committee inquiry into energy security, 2011.

¹¹ <https://www.ofgem.gov.uk/ofgem-publications/40204/gas-sos-report.pdf>

¹² <https://www.ofgem.gov.uk/ofgem-publications/75232/electricity-capacity-assessment-report-2013.pdf>



Reproduced courtesy of Ofgem

The gas Security of Supply Regulation No. 994/2010 'concerning measures to safeguard security of supply' aims to enhance security of supply by providing common assessment of Member States' energy security arrangements. The regulation is designed to ensure:

- » Member States provide gas to protected customers
- » a minimum standard of infrastructure resilience
- » Member States make adequate preparations for a gas supply emergency
- » improving coordination between Member States
- » the internal market for gas functions for as long as possible in the event of an emergency.

Security of electricity supplies is addressed as part of Directive 2005/89¹³, which contains measures designed 'to safeguard security of electricity supply and infrastructure investment'. The Directive requires Member States to take into account the need to:

- » ensure continuity of electricity supplies
- » study the internal market and the possibilities for cross-border cooperation in relation to security of electricity supply
- » reduce the long-term effects of growth of electricity demand
- » introduce a degree of diversity in electricity generation in order to ensure a reasonable balance between different primary fuels
- » promote energy efficiency and the use of new technologies
- » continuously renew transmission and distribution networks to maintain performance.

The Regulatory Landscape

Regulation is a necessary component of certain market structures. It provides a proxy for competition where markets are small, where there is market concentration, or where the asset base supports natural monopolies e.g. pipes or wires.

The key roles for effective regulation must be to:

- » protect the interests of consumers, today and in the future
- » ensure competition and competitive markets
- » encourage and support investment
- » incentivise innovation
- » regulate natural monopolies.

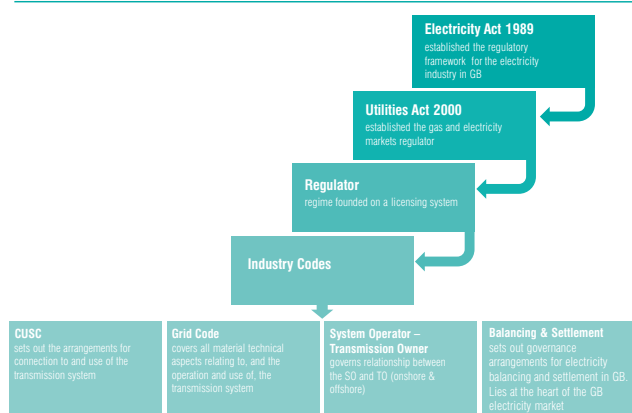
The Utilities Act 2000 established the GB gas and electricity markets Regulator, Ofgem, which is responsible for the economic regulation of the gas and electricity industries and is governed by the Gas and Electricity Markets Authority (GEMA). GEMA determines Ofgem's strategy, sets policy priorities and takes long-term decisions on a range of matters including price controls and enforcement. GEMA must have regard to guidance on social and environmental objectives issued by the UK Secretary of State for Energy and Climate Change. Ofgem also administers and regulates a number of environmental programmes devised for Government. Decisions by the Regulator must be independent of both Government and industry, as well as provide transparency for industry and consumers.

Ofgem's main priority is to protect the interests of consumers. For network activities, Ofgem has established price control mechanisms that restrict the amount of revenue that can be earned by the regulated businesses while incentivising customer service.

The Gas Act 1986 and Electricity Act 1989 (as amended) provide the fundamental legal framework for gas and electricity companies. The Acts establish the licences for electricity generation, transmission, distribution and supply, and for gas transmission, distribution, shipping and supply. The legislative requirements are then delivered by the designation of certain functions through a set of industry codes which govern market operations for both electricity and gas.

¹³ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32005L0089>

Regulatory & Commercial Environment



European Regulation

Liberalisation of the European electricity and gas markets has been implemented through legislative packages starting in the 1990s, designed to open up national electricity markets to greater competition, to regulate natural monopolies such as networks, and to increase competition within retail markets. The Third Package (2007) continues this process *“to ensure a real and effective choice of supplier and benefits to every single EU citizen. The [EU] Commission’s proposals put consumer choice, fairer prices, cleaner energy and security of supply at the centre of its approach”*. The Third Package also promotes a ‘Target Model’, where networks and markets will adopt common principles to facilitate cross border trade and reduce transaction costs to the benefit of business and consumers.

The UK is implementing the requirements of the Third Package in the electricity and gas systems. However, there is more prominence politically around the effects of current and forthcoming regulatory changes, asset investments and emissions reduction legislation on the UK electricity sector.

Ofgem has played an active role in Europe as the lead Regulator in the Electricity Regional Initiative Project. This was initially launched in 2006 as an interim step to speed up the integration of Europe’s national electricity markets by the designation of regions of operation that would work towards a more harmonised, or common, set of market regulation arrangements.

The UK is part of the France-UK-Ireland (FUI) regional electricity market (REM), which has an annual electricity consumption across France, Ireland and UK of 780 TWh or around 30% of the EU 25 electricity market.

A key priority for the region has been the implementation of the Capacity Allocation and Congestion Management (CACM) Target Model for electricity, which sets out the vision for intra-day, day-ahead and long-term trading, cross-border balancing and capacity calculation, with the aim of integrating the national markets in the three Member States.

A major step towards a single EU market for power was made on 4 February 2014 when power markets across 15 Member States were coupled for day ahead trading. The project is part of the EU’s Third Package of legislation. *“Market coupling favours price convergence, which fosters competition and therefore better services, and ultimately better prices for consumers.”* (Alberto Pototschnig, director of ACER).

The FUI electricity REM includes the two biggest national economies in the EU that are also very active in electricity markets. Integration will facilitate regional development and accelerate cooperation and coordination at the European level. Interconnectors and compliance with the CACM Guidelines, intra-day trading, reciprocal access to balancing markets and wholesale market transparency¹⁴ are the key priorities of the electricity REM¹⁵.

Without a coupled system for ‘balancing services’, Member States are still reliant on having adequate national capacity available at times of system stress as physical delivery of energy via interconnection may not always be possible.

In the event of independence for Scotland, the Commission believes that a single, synchronous physical system operating across Scotland and rUK, with technical agreements in place on how the system will operate, provides more effective and economic system security in comparison to alternatives such as provision of electricity or gas supplies via interconnection agreements.

The GB Wholesale Market Framework

The wholesale electricity market has operated since 2005 under the British Electricity Trading and Transmission Arrangements (BETTA). Under BETTA, wholesale trading has three components that operate for different time periods.

¹⁴ See: EU Regulation on wholesale Energy Market Integrity and Transparency (REMIT). <http://www.acer.europa.eu/remi/Pages/Background.aspx>

¹⁵ <https://www.ofgem.gov.uk/electricity/wholesale-market/european-market>

- i) Bilateral market – in which generators, suppliers and others trade a variety of contract types, either directly or via brokers or power exchanges. These markets and contracts function up to the point of ‘gate closure’, which in the GB wholesale market is one hour from the point of electricity delivery, and is via the spot or day ahead markets out to seasons or longer.
- ii) Balancing mechanism – run by the GB System Operator, in which generators with flexible generation and suppliers with flexible demand can be paid to vary their output or demand to help balance the system. This market operates at the point of ‘gate closure’ forward to the point of delivery and enables oversight and control of the whole GB system in real time by the System Operator.
- iii) Imbalance settlement process – which pays for the balancing actions taken by the GB system operator on a minute by minute basis.

Bilateral contracts are privately held between the contract parties. In the wholesale electricity market, trades are at a price set by the ‘market’ and have remained relatively low over the 2013–2014 winter quarter as demand has been suppressed by the mild weather. Power stations selling into that market have different generation and development costs relating to planning and site conditions. Once operational, power stations also have different operation and maintenance costs which they must pay, including the cost of transmission from the site of generation to the point of consumption.

Large scale renewable energy generation is sited where it is most economically efficient to do so and is driven predominantly although not solely by the quality (intensity) of the natural resource availability. This has resulted in a significant capacity of onshore wind generation in Scotland, subject to the parameters of locational pricing signals within the GB transmission system.

Electricity Market Reform (EMR)

Proposals for the introduction of EMR were announced in the UK Government White Paper *Planning our electric future* in July 2011, with the Energy Bill receiving Royal Assent in December 2013. To undertake the most fundamental redesign of the UK electricity market structure since privatisation has been a significant task; the consultation and design process is not yet concluded almost three years later, with additional detailed work being undertaken on a range of issues, as well as the development of secondary legislation.

EMR will operate under a Levy Control Framework¹⁶ (LCF) which limits the total market support that can be offered across all forms of generation for the years up to 2020. By then the LCF will have a maximum annual cost of £7.6 billion that will cover the existing installed capacity currently subsidised through the Renewables Obligation (RO), the renewable heat incentive¹⁷ and small scale feed-in tariff mechanisms. The LCF will also cover new projects established under the EMR framework. EMR will introduce a very different market, which has three main elements:

- » An emissions performance standard (EPS), which will restrict the level of permissible emissions from new fossil fired generation. This will result in the construction of either new unabated gas plant which can meet this emission level without emissions capture technology, or new coal-fired generation fitted with carbon capture and storage (CCS) technology
- » A Contract for Difference (CfD) mechanism that replaces the RO (although it retains the RO’s differentiated support for different technology types) and extends to cover support for all low carbon generation – including Carbon Capture and Storage (CCS) and new nuclear power stations
- » A Capacity Market, designed to encourage the operational availability of existing and new generation capacity to ensure generation adequacy of the system at times of peak demand.

Investors display a range of responses to changes in the status quo. The changes created by EMR have been designed to encourage future investment in low carbon generation, yet still bring new and unknown risks compared to existing mechanisms.

The original concept for the RO was technology agnostic, supporting the lowest cost, and most scalable, renewable technologies available at any point in time. Technology banding introduced an element of political discretion between technologies and an element of political risk that has been carried forward to EMR.

Combined with political intervention in the retail markets to address affordability of energy, this has seen an increase in perceived regulatory risk. Some investors are comfortable with the proposed changes under EMR; however, investment projects compete on risk and return with other opportunities open to the large, multi-national companies that dominate the sector. With

¹⁶ <http://www.nao.org.uk/wp-content/uploads/2013/11/10303-001-Levy-Control-Framework.pdf>

¹⁷ Heat networks may have a more prominent role in the future as they provide economic and technical options that can assist with integration of electricity and gas in a high renewables environment.

EMR details still not complete and transparent at all levels, and the outcomes of sector investigations unclear, certainty on investment returns for projects is reduced leading to deferrals in the construction of capacity.

Consumer interests will play a key role in the development of our future power system. The recent behaviour of some electricity supply companies with respect to consumer billing and tariffs has been very poor, resulting in heavy fines from the Regulator. This has led to problems with consumer trust and an accompanying critical, political and media focus upon energy suppliers.

As noted by Ofgem in their 2013 State of the Market Assessment report¹⁸, “there is declining consumer confidence with 43 per cent distrusting energy companies to be open and transparent. This may deter consumers from engaging in the market and prevent them from getting a better deal for their energy.

- » There is continuing uncertainty over whether the vertical integration of the large energy companies is in consumers’ interests,
- » retail profits increasing from £233 million in 2009 to £1.1 billion in 2012, with no clear evidence of suppliers becoming more efficient in reducing their own costs, although further evidence would be required to determine whether firms have had the opportunity to earn excess profits, and
- » suppliers consistently setting higher prices for consumers who have not switched.”

The decision taken by Ofgem in March 2014 to refer the electricity supply companies for a full investigation by the Competition and Markets Authority may improve the outcomes for consumers. However, the inquiry is likely to take 18 months to complete.

The Political Landscape

As part of the political focus on the energy sector in Scotland, the Scottish and UK Governments have both published information and analyses for consideration.

The Scottish Government published *Scotland’s Future* which highlighted:

- » the lack of a coherent approach to energy
- » failure of the current energy market arrangements and the consequent underinvestment in capacity
- » the major risks presented by proposed reform of the market

- » that the current single GB-wide market for electricity and gas should continue, helping rUK provide secure supplies and meet its binding renewable targets.

The Department of Energy and Climate Change (DECC) published *Scotland Analysis: Energy* which put forward a number of points, including the view that:

- » An independent Scotland and rGB would have different policy objectives, making it difficult to agree a common approach which would be required to maintain a fully integrated system
- » Without a fully integrated system, the costs of supporting Scottish energy network investments, small-scale renewables and programmes to support remote consumers would fall solely on Scottish bill payers
- » The integrated market maintains energy security and market access for renewable energy; the continuing UK could choose to buy its energy supplies from other Member States in the event of Scotland becoming an independent State.

There is a strong degree of commonality between the views:

- » A single GB-wide market is in the interests of Scotland and rUK
- » The transparency of energy costs for consumers must be improved in order to deliver choice and value for money
- » Subsidies for renewable energy schemes and energy efficiency programmes should not be placed on consumer bills for the poorest in our society

And equally a range of points on which they differ:

- » Whether a single GB-market could operate under joint regulators in the event of Scotland becoming an independent state
- » The case for new nuclear power as part of the energy mix
- » Continuing the socialisation of Scottish transmission and distribution network costs across all GB consumers

It is the people of Scotland who will decide the outcome of the referendum in September 2014. Points of agreement and difference will then be discussed or negotiated with respect to future arrangements under any outcome.

¹⁸ <https://www.ofgem.gov.uk/news/state-competition-energy-market>

SCOTLAND'S ENERGY SUPPLY NETWORK

The majority of Scotland's population lives in cities. However, Scotland's geography means that it also has a diverse and distributed rural base with many consumers living in rural areas, including Islands. As a result, whilst some areas are still poorly served for electricity and in particular gas, there are more miles of transmission wire (and gas pipeline) per head of population in Scotland than the rest of the UK. The additional costs for electricity and gas transmission and distribution assets are currently socialised across the whole of the UK, as outlined below.

Transmission Costs and Investment

Ofgem estimated in 2010 that the cost of the investment needed to secure energy supplies and meet Britain's climate change targets could be as much as £200 billion in the period up to 2020¹⁹, with £38 billion required for investment in gas and electricity transmission assets²⁰.

Investments in the transmission infrastructure in GB have been made on an economic basis to enable the upgrade of aging electricity transmission assets, and to provide improved and new connections for existing and new electricity generators.

Ofgem's transmission price control review process (RIIO-T1) confirmed the fast-track price control decisions on SP Transmission Ltd and Scottish Hydro Electric Transmission Ltd, which own the transmission networks in Scotland. This resulted in Ofgem agreeing price controls providing for investment of £7.6 billion, which could be brought forward during the period in question (2013-2021)²¹. This announcement demonstrated the investment requirement and the value of the existing and new generation on the network.

In addition, recent forecasts and modeling from National Grid²² suggest that planned transmission capacity upgrades in Scotland during 2014-2015 will amount to around 12% of total UK capacity.

However, the higher transmission use of system (TnUOS) charges which apply in Scotland mean that this 12% of capacity will account for around 21% of total GB TnUOS charges during the same period. Meanwhile, Ofgem has recently confirmed²³ that

there will be a further delay to the outcome of Project TransmiT, its review of GB transmission charging arrangements.

Distribution Costs

Hydro Benefits Replacement Scheme and Common Tariff Obligation²⁴

The Hydro Benefit Replacement Scheme is designed to protect consumers from the higher costs of distributing electricity in the North of Scotland. It is funded by charges on all licensed suppliers across Great Britain.

- » The North of Scotland has the highest system length per 1,000 customers of any distribution network. At 63.2km this is more than double the GB average of 27.2km per 1,000 customers
- » Distribution costs for consumers in the North of Scotland remain higher than elsewhere, even after the reduction from the scheme has been applied. The assistance provided an average bill reduction of £36 a year to each domestic consumer in the North of Scotland
- » In 2013-2014 the energy consumption tariff which was levied on GB consumers (via charges on all electricity suppliers) was 0.018972 p/kWh²⁵ and provided a total capital support of £54.45 million

The Common Tariff Obligation ensures that electricity suppliers in the North of Scotland are not able to charge comparable domestic customers different prices solely on the basis of their location within the area. This is designed to protect customers in remote rural areas from the relatively high costs of supplying electricity in these areas.

There is a statutory requirement to review the scheme and obligation every three years. Following the latest review (2012), DECC has decided to retain these schemes as they continue to meet their policy objectives of protecting electricity consumers in the North of Scotland.

¹⁹ <https://www.ofgem.gov.uk/ofgem-publications/76124/discoveryfs.pdf>

²⁰ <https://www.ofgem.gov.uk/ofgem-publications/76242/20121217-press-release-riio.pdf>

²¹ http://www.nao.org.uk/wp-content/uploads/2012/11/Departmental_Overview_Ofgem.pdf

²² <http://www2.nationalgrid.com/UK/Industry-information/System-charges/Electricity-transmission/Transmission-Network-Use-of-System-Charges/Tools-and-Data/>

²³ <https://www.ofgem.gov.uk/publications-and-updates/project-transmit-update-progress-and-way-forward>

²⁴ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/229469/hydro_benefit_replacement_scheme_response.pdf

²⁵ http://www2.nationalgrid.com/UK/Industry-information/System-charges/Electricity-transmission/Assistance-for-areas-with-high-distribution-costs/AAHEDCChargingStatement2013_14FINAL.pdf

Support for Lerwick Power Station, Shetland Islands²⁶

Shetland is not connected to the main electricity network in GB. This means that the islands rely entirely on local sources of generation, with supply and demand on the islands also balanced locally. At any given time there cannot be more generation than demand, or vice versa, meaning that a significant percentage of the generation must have a reliable and controllable output.

The network on Shetland is classified as a distribution network, since it does not have voltages greater than 33kV. It is owned and operated by Scottish Hydro Electric Power Distribution (SHEPD), a distribution network operator (DNO). It was agreed during the introduction of BETTA that SHEPD would also administer the electricity supply on the islands – meaning that they are responsible for balancing the islands’ demand and supply.

This agreement was designed so that prices for Shetland’s customers would remain in line with those on the mainland. As there are higher costs associated with electricity supply on Shetland, it was agreed at the time of the fourth distribution price control (DPCR4) for the period 2005-2010 that the cost differential should be recovered from all SHEPD customers.

The resulting cross subsidy fluctuates from year to year due to the variation in the cost of fuel for generation at Lerwick power station (LPS), the cost of the contracted third party generation (from the independent, Sullom Voe Terminal Power Station) and the price of electricity on the mainland. The difference between the GB-market price and the cost of electricity produced on Shetland sets the level of the cross subsidy met by SHEPD customers. The amount that SHEPD can re-charge for operating and maintaining LPS is set at a fixed allowance in the current price control period (DPCR5).

The arrangements to supply electricity on Shetland cost around £29 million in 2010-2011. The majority of the costs are from the fuel and operating cost of running Lerwick power station (£16 million) and the rest from third party contracts (£13 million). A third of this £29 million was recovered directly from Shetland’s customers through their electricity supply bills. The remainder was recovered from customers connected across SHEPD’s distribution network. SHEPD calculates that, in 2010-2011, the additional cost of providing a supply on Shetland resulted in an average cost across all their customers of £27.

Ofgem has recently reviewed the proposals from SHEPD for replacing Lerwick power station and has made a Determination on the company’s submission²⁷.

Gas Supply – Statutory Independent Undertakings

Scotland has five Statutory Independent Undertakings (SIUs) for gas supplies that are operating gas networks not connected by pipeline to the rest of the network. Four use Liquefied Natural Gas (LNG) and one uses Liquefied Petroleum Gas (LPG). Campbeltown, Oban, Wick and Thurso have SIUs supplied with LNG by road tanker from a depot at Avonmouth, near Bristol. The fifth SIU, Stornoway, uses LPG.

There are around 7,500 gas customers in the four affected SIUs, mainly domestic. The Gas Act 1986 obliges Scotia Gas Networks (SGN) to continue to provide a gas supply, ‘where required’, to all customers already connected to the network. There is no gas storage facility in Scotland and a limited amount in England, which is provided via the Avonmouth LNG site.

The supply to the SIUs has relied on commercially available sources of LPG that are delivered by ship and road tanker along with LNG whose supply was sourced from National Grid’s facility in Glenmavis, North Lanarkshire. In 2012 this facility was closed by National Grid when it reached the end of its operational life and the only available source of LNG in the right specification is from National Grid’s facility in Avonmouth, Bristol.

SGN has invested in additional storage capacity and transport fleet to provide assurance that this change would not have an impact on the supply to the SIUs which rely on LNG. However, in 2013 National Grid notified SGN of its intention to close the Avonmouth LNG site in April 2018. As a consequence of this and requirements set by Ofgem as part of the RIIO GD1 price control, SGN are investigating the best long-term options for the supply of energy to the SIUs including non-gas solutions.

²⁶ <https://www.ofgem.gov.uk/ofgem-publications/43538/shepdninesconsultation.pdf>

²⁷ <https://www.ofgem.gov.uk/ofgem-publications/87381/ofgemdeterminationofshepdsundercr18a.pdf>

The cost of delivery for gas supplies from the point of entry to the system through to end consumers is becoming increasingly important. Gas currently forms approximately 60%²⁸ of the household bill in the domestic sector in Scotland where gas is available, and in future, there may be greater diversity in supply sources to Scotland and requirements for an increasing flow from the South to the North. Events in Ukraine during 2013 and 2014²⁹ highlight wider concerns in Europe over the security and price of gas supplies.

Thermal Capacity

The reduction in thermal generation capacity in GB has raised significant concerns for security of supply. A key issue in Scotland is the continuity of thermal generation capacity in the future where currently a structural deficiency exists. Existing locational signals within transmission pricing are currently unlikely to deliver new thermal generating capacity in Scotland. While this goes beyond the Commission's remit, the Commission recommends that Scottish Government explores how the development of new thermal power stations in Scotland can be encouraged, either to maintain the technical operability of the overall GB system or to ensure security of supply.

Consumer Issues

While the single GB-market has helped increase the number of players in wholesale electricity, the retail market in Scotland has not experienced significant increases in competition. The incumbent utilities – Scottish Power, Scottish and Southern Energy, and Scottish Gas – have retained a high market share, and the loyalty of customers to their 'brand'.

In the UK, the 'big 6' electricity and gas supply companies have a market share of around 95%. In Scotland, there is particular concentration in the 'big 3'. It is particularly important to maintain the attractiveness of the market to new entrants and other existing participants in Scotland in order to drive consumer competition.

This is an important issue, as retail market arrangements could, if so wished, develop differently in Scotland, taking into account the wider single market business structure. Any change could affect the attractiveness of the market to existing and new entrants and hence the levels of competition. Where changes are mandatory and unilateral across the market, then the business impacts are uniform. Encouraging market entry for new participants in the electricity and gas retail markets is more challenging in Scotland as there is a smaller pool of potential customers who could be persuaded to switch to a new supplier. This is even more of an issue where populations are rural and dispersed. Where any changes are introduced only within a smaller market such as Scotland, there may be differential impacts (e.g. system issues) for market participants to consider and address.

²⁸ <https://www.ofgem.gov.uk/ofgem-publications/64006/householdenergybillsexplainedjuly2013web.pdf>

²⁹ <http://marketrealist.com/2014/04/effect-ukraine-crisis-natural-gas-markets/>

THE ROLE OF A SCOTTISH REGULATOR IN THE OPTIMAL OPERATION OF THE UK ENERGY MARKET TO DELIVER AFFORDABILITY, SECURITY OF SUPPLY AND ENVIRONMENTAL SUSTAINABILITY

- » Scotland will need an independent National Regulatory Authority (NRA)
- » Scotland's Regulator for electricity and gas should be established with a clear mission, duties and responsibilities. At a minimum these should include:
 - » ensuring that consumer interests are protected
 - » delivering a regulatory framework which ensures system operability and security. This is an enabler for 'just, transparent and affordable' energy costs for current and future consumers
 - » evaluating and advising on current and future system risks while providing advice and reports on Security of Supply, gas storage and Environmental Sustainability
 - » certifying a Scottish Transmission System Operator (TSO) and assessing its investment plans
 - » overseeing access to the transmission and distribution networks
 - » encouraging innovation in the sector to promote cost-effective solutions to the challenges ahead, such as the integration at scale of low carbon technologies
- » These roles can fit within a multi-utility regulatory structure
- » The tendency to load non-regulatory and delivery functions on the Regulator should be resisted
- » Scotland's Regulator should establish a comprehensive and constructive relationship and set of working agreements with its counterpart in the rest of Great Britain (rGB), including periodic review
- » Scotland's Regulator should recognise underlying socio-economic, climatic and geographic differences in Scotland to the GB-market and help deliver local solutions – including, for example, the regulation of heat networks and off-grid supplies
- » There should be a settled set of principles for an agreed period governing the Scottish Regulator's duties, its reporting and accountability to the Scottish Parliament.

A multi-utility regulator covering electricity, gas and water is an approach adopted by many smaller nations. We think it makes sense in Scotland.

The Scottish Government's proposed combined economic regulatory (CER) model has a very wide scope and will require thoughtful design due to the potential for competing demands on the expertise and capacity of the Regulator and its governing board, especially at a time of energy system investment and change. The Commission has not addressed regulatory issues beyond the energy sector.

Scotland's energy regulator must have a clear mission statement and set of duties, plus sufficient resources (within the multi-regulatory model envisaged by the Scottish Government) to ensure that it can deliver. It must be properly independent of Government, but operating with a clearly defined framework and working relationship.

Work should begin as a priority to explore the nature and content of the joint agreements and working practices that will need to be in place from the outset between the Scottish Energy Regulator and its rGB counterpart. This will be based upon trust and a high degree of technical understanding and competence.

This process should also recognise and establish from the outset, areas (the retail market, for example) where Scotland's specific circumstances and the needs of Scottish consumers might require a different approach to be taken.

The agreements and working practices developed with other jurisdictions should be robust and encourage cooperative and shared working. A strong framework will ensure that arrangements function well and prevent delays to the important energy industry changes that are already underway.

An effective response to the industry changes ahead will be facilitated by promoting innovation in the sector. As these changes form part of an international agenda, it is likely that high-quality jobs and exports could be a further beneficial outcome.

The Commission encourages both Governments to tackle the resolution of complex issues as the regulatory arrangements are established. Experience in other countries shows that this is the best approach, rather than making changes once operations and market systems ‘go live’.

The core focus of the Scottish Regulator should be on the economic regulation of electricity and gas networks and markets, with an appropriate level of resources to deal with the associated complexities. The tendency to load non-regulatory and delivery functions on the Regulator should be resisted and delivery functions which are not part of this core focus will need to be reviewed and potentially reallocated elsewhere.

Environmental objectives and ambitions will remain key issues for Scotland and could present opportunities for new approaches to be taken. In time, for example, regulation could potentially extend to include heat networks and off-grid supplies.

The Role of the Regulator

It is a legal requirement of article 35 of the EU Electricity³⁰ Directive and article 39 of the EU Gas³¹ Directive to establish a National Regulatory Authority (NRA) that is independent of both Government and Industry. Whilst Member States may designate additional powers to the Regulator, as a minimum set of competences the core duties (in summary here) of the Regulator include:

1. Tariffs for access to transmission and distribution networks: fixing or approving, in accordance with transparent criteria, transmission or distribution tariffs or their methodologies
2. Unbundling: ensuring that there are no cross-subsidies between generation, transmission, distribution, storage, supply activities and liquefied natural gas
3. General oversight of energy companies: ensuring compliance on the part of transmission and distribution system operators, system owners (where relevant) and electricity or gas undertakings with their obligations under the Directive and other European Union legislation, including as regards cross-border issues

30 Directive 2009/72/EC Concerning common rules for the internal market in electricity and repealing directive 2003.54/EC.

31 Directive 2009/73/EC Concerning common rules for the internal market in electricity and repealing directive 2003.55/EC.

4. Consumer protection: helping to ensure, together with other relevant authorities, that consumer protection measures are effective and enforced; publishing recommendations, at least annually, in relation to compliance of supply prices with Article 3; ensuring access to customer consumption data.

In addition to these minimum competences, the Regulator will also need to ensure that it cooperates with neighbouring NRAs and with ACER with respect to cross-border issues.

The Regulatory Philosophy

The Scottish Government’s Regulatory Reform (Scotland) Act 2014, will require a Scottish Regulator to take account of the requirements for sustainable economic development. The Act supports the Scottish communities’ economic purpose (to focus Government and public services on creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth) and all the related elements of the National Performance Framework.

The Scottish Government’s policy is to eliminate obsolete and inefficient regulation, tackle inconsistencies in regulatory systems and enhance Scotland’s competitiveness by:

- » Promoting the five principles of Better Regulation – Proportionate, Consistent, Accountable, Transparent and Targeted
- » Carefully assessing the impact of any new regulations
- » Working closely with key delivery partners, including Local Authorities and other regulators and the independent business-led Regulatory Review Group.

The Commission commends this approach on regulation generally.

Establishing a Scottish Regulator

The Commission has engaged with regulators and experts³² in the UK, EU and beyond in order to:

- » discuss and focus on the key areas and issues which are critical to an effectively functioning regulator
- » benefit from their extensive practical experience in the oversight, design, or joint regulation of single wholesale markets, renewable energy support schemes, and network codes.

32 Including, but not limited to: Utility Regulator – Northern Ireland & Commission for Energy Regulation – Ireland, European Commission – DG Energy, Agency for the Cooperation of Energy Regulators (ACER), Council of European Energy Regulators (CEER), European Network for Transmission System Operators – Electricity (ENTSO-E), NVE – Norwegian Water Resources and Energy Directorate, Ei – Swedish Energy Markets Inspectorate, ERSE – Entidade Reguladora Dos Servicos Energeticos, Portugal, Minnesota Public Utility Regulator, USA.

The Scottish Government will want to consider the following points with respect to the establishment of a Scottish Regulator.

1. There is a direction of travel within the European Union and other jurisdictions towards a multi-utility regulator or combined economic regulatory model – i.e. a regulator that has responsibility for a number of sectors e.g. electricity, gas, and water. Indeed, it may be both desirable and highly prized in a small country driven by a resource efficiency approach to seek to exploit potential synergies between regulatory disciplines that can be applied to more than one sector
2. The desire for a CER covering a large scope of sectors and interests should be balanced with the requirements for a focused role on the sectors in question, especially as part of a joint regulatory role with its rUK counterparts for electricity and gas
3. The stated ‘mission’ of the Regulator is a critical element. The mission should be clear, within the ambit of the Regulator to deliver, and focused – the Regulator should not be set too many priorities which it has to deliver
4. The primary duties of the Regulator will focus on economic regulation, and should include the evaluation of the economic, social or environmental benefit that would be delivered from different regulatory approaches
5. Secondary duties may be raised under guidance or could be delivered through other designated bodies. For example, Ofgem E-serve acts on behalf of the UK Government to support the delivery of government consumer and environmental schemes and programmes
6. The capacity and depth of expertise of the Regulator’s staff are key to effective delivery. If there are too many competing demands e.g. competition commission referrals and crises in other sectors addressed by the CER, this can significantly affect its capacity to deliver on all sectors and maintain its credibility
7. The operability of the system should feature within the Regulator’s priorities. By understanding the challenges facing existing system operation it may be possible to alter operational limits or market data timings and to justify the provision of greater flexibility in advance, before entering into large scale investments that may impact consumers
8. This is relevant in the context of the changing landscape of the sector within the UK– smart grids, increasing renewables, CCS, demand response as raised by the IET³³. The recent consultation undertaken by Ofgem on moving to half-hourly settlement periods for consumers³⁴, draws from international examples, such as the agreement between the Electricity Reliability Council of Texas (ERCOT) and the Public Utilities Commission of Texas (PUCT) to reduce the time period from gate closure to delivery of power to 30 minutes. This has significantly increased the forecasting accuracy for wind generation, provided greater certainty for demands on conventional thermal generation and enabled one of the highest penetrations of wind generation onto any electricity grid
9. Issues relating to regulation and system operability could be jointly addressed through the Scottish system operator (SO), working with the Regulator and rGB SO within the limits of an agreed system Security, Quality and Standard of Supply (SQSS) standard or common framework
10. The Regulator’s governance processes and structure will benefit from careful planning. The design of the regulatory organisation to address the skills and disciplines required for each sector will be complemented by the monitoring and evaluation processes overseen by the Board of the Regulator
11. Clear outputs and outcomes on the part of the Regulator will be important, as will their delivery within set timescales
12. The existing arrangements suffer from lack of clarity of long-term objectives and the perception of continual legislative and regulatory change. There should be a settled set of principles for an agreed period governing the Scottish Regulator’s duties, its reporting and accountability to the Scottish Parliament. The Energy Act 2013 placed a requirement for a Strategy and Policy Statement to be agreed between the UK Government and Ofgem. A Scottish Regulator will need to establish a comparable process in order to operate independently of Government, but with a clear process and set of policy outcomes and principles in respect of which material changes to the regulation of the electricity and gas sectors must have regard. The energy sector is entering a time of on-going change and it will be important that governance arrangements facilitate progress and efficient outcomes.

³³ <http://www.theiet.org/factfiles/energy/elec-shock-page.cfm?origin=myc-pnjv>

³⁴ <https://www.ofgem.gov.uk/electricity/retail-market/market-review-and-reform/smarter-markets-programme/electricity-settlement>

These are some of the key issues involved in the establishment and role of a competent, effective and credible Scottish Regulator for electricity and gas markets. To be effective and credible from the outset the Regulator will need to be adequately resourced and will need to clearly demonstrate its competencies and capacity to deliver. There will be a limited period of time in which to deliver the functional set-up of the Regulator, and to attract suitable staff with the appropriate experience and track record.

Gas Regulation

As indigenous supplies have declined, and import capacity has increased, the sources of GB gas supplies have changed. As recently as 2000, GB gas was sourced, almost wholly, from the North Sea. The situation today is different, and much of the gas consumed within the UK is sourced through major pipelines from Norway and the Continent, as well as through LNG imports. Nevertheless, the main flow of gas within the network is North to South.

The expectation is that supply of gas from the UK continental shelf will decrease over coming decades, while supply by pipeline from the continent will increase³⁵. This will change the direction of the flow of gas so that the dominant flow is South to North, necessitating approval for, and investment in the network for upgrades to accommodate changes in flow direction. A Scottish Regulator will need to have strength of competence in specific areas of expertise, both in gas and electricity regulation.

Innovation and Flexibility

Scotland's Regulator would have a greater ability to take account of underlying socio-economic, climatic and geographic differences in Scotland to rGB and help deliver local solutions – including, for example, the regulation of heat networks and off-grid supplies and support for the development of smart grids.

Whilst not a major component of the system at present, the development of heat networks – particularly using renewable fuels – is likely to become a larger part of our energy supply. Oversight of the sector will be needed prior to the potential regulation of the sector given its network and monopolistic attributes.

Innovation-based regulation and output metrics provide the greatest flexibility for market actors and will assist in the delivery of system improvements and appropriate aspects of social and environmental aims via tools e.g. smart cities, quality of supplies, storms response, treatment of DG connections, and risk mitigation.

In looking at regulatory regimes abroad, the Commission was attracted by the approach taken in Minnesota, USA. The Regulator there is tasked with delivering 'just, transparent and affordable' energy costs for current and future consumers. The recognition of trade-offs between the short and long term, and of the need for transparency to create trust in the system are important albeit that security and environmental drivers must also be addressed.

A change in the 2007 Next Generation Energy Act of Minnesota³⁶ altered what had previously been a spend target of 1.5% into a 1.5% annual savings goal as an output metric for all utilities.

The utilities in Minnesota were not evaluated on their level of spending on conservation programmes, but on the level of energy savings actually achieved. This was significant because it put the emphasis of the programme on the results that they brought about in order to achieve 1.5% savings of their total retail sales. This is a very significant saving in the context of energy conservation programmes.

The state of Michigan recently passed legislation that requires its utilities to achieve energy savings of 1% over a three-year period. This was the first time the state had mandated a utility conservation program. In Minnesota these programs have been in place since the early 80s, and the goals represent nearly a doubling of the level of achievements that had previously been attained³⁷.

These examples from the US highlight a shift towards incentivised regulation – i.e. based on outputs rather than inputs, and the Commission believes that a similar approach and focus should be considered for energy regulation in an independent Scotland.

Provision of Regulatory Advice to the Scottish Parliament

Regulatory accountability for specific duties enables action to be taken where the Regulator possesses the levers of control and influence. With respect to the security of supply of the electricity and gas system, the Regulator is only one part of the system. While the Regulator may have specific powers, or may request action on the part of others to address security of supply issues, it cannot be accountable for the action, or inaction, of others within a market. **The Commission considers this is formally a Government accountability.**

36 Laws of Minnesota, 2007, Ch. 136. (Art. 1, Sec. 2, Subd. 2) Energy Policy Goals. It is the energy policy of the state of Minnesota that: 1. The per capita use of fossil fuel as an energy input be reduced by 15 percent by the year 2015, through increased reliance on energy efficiency and renewable energy alternatives; and 2.5 percent of the total energy used in the state be derived from renewable energy resources by the year 2025.

37 Presentation on Energy efficiency in the State of Minnesota, courtesy of the Minnesota Public Utility.

With access to increasing volumes of market information and intelligence, particularly when smart metering becomes prevalent, the Regulator will be well placed to provide regular advice and formally report to the Scottish Parliament on issues such as current and future system risks, Security of Supply, gas and electricity storage capacity and environmental sustainability. **The Commission recommends that the Regulator is accountable for advising the Scottish Parliament on these matters.**

The System Operator (SO)

A key requirement under the EU Directives is that the NRA designates the system operator (SO) in order to a) ensure that it has the competence and capacity to undertake the SO duties and b) ensure that (for certification in relation to third countries) by notification of the EU Commission, the granting of certification to the SO will not put at risk the Member State's security of energy supply.

This raises some interesting questions relating to the role and current structuring of the National Grid Company, and changes that may be required in the event of an independent Scotland. Structurally, the SO will need to show that in legal form and organisational structure it meets the unbundling requirements of the EU Directives, and demonstrate business separation and accountability from other activities.

National Grid is the SO for electricity transmission in GB (and Transmission Owner (TO) in England & Wales), and is the SO and TO for gas transmission across the whole of GB. In addition to its regulated interests, National Grid is a commercial entity; it is also currently providing technical support to the UK Government on EMR, specifically on the CfD and Capacity Mechanisms.

As part owner of the UK electricity transmission network that is undergoing a series of investment upgrades, and to which new projects will connect, as well as acting as the GB SO, there are inherent conflicts between these duties that have been managed to date through the separation of business activities. In the event of independence, there would be an increased focus on how best to operate across two jurisdictions.

The SO role in Scotland could remain with National Grid as a service arrangement, be undertaken by one of the Scottish network companies, or be provided by a newly created body in Scotland. There are some important details to be resolved with each of these options: for example, would National Grid be required to operate the Scottish system in a ring-fenced manner, particularly if policy divergence arises between the jurisdictions over time; would it be acceptable for the Scottish network companies to hold this role as they are vertically integrated companies owning generation interests; and if a new body was created would the investment needed in staff, physical assets and IT facilities be cost-effective?

Further considerations include:

- » It would be important to have clarity on National Grid's role in relation to Scottish transmission investment decisions, if it remained the Scottish TO and at the same time, rGB TO. There is clearly potential efficiency in a TO role covering the whole of the GB system, but the TO will owe duties to each jurisdiction which may give rise to differential obligations. The EC requirement to have a separate Scottish TO implies some requirement for ring-fencing.
- » Currently, the Electricity Networks Strategy Group (ENSG) brings together key stakeholders in electricity networks that work together to support UK Government in meeting the long-term energy challenges of tackling climate change and ensuring secure, clean and affordable energy. Stakeholders include network companies, generators, trade associations and devolved administrations. The ENSG is jointly hosted by DECC and Ofgem.
- » The SO has a key role in ensuring compliance with the EU Target Market (network codes and guidance) and the Regulator will need to have technical capacity to oversee implementation. The Scottish SO will be required to demonstrate compliance with the Directive in order to be independent and this may require the splitting out of vertically integrated companies. The Commission is unconvinced that the role of SO could be undertaken by a current Scottish TO company without some unbundling.
- » The framework of design and operational standards that would apply to the 'networks' in Scotland and what governance structure would operate.

In discussion with stakeholders, there was strong agreement that these issues need to be addressed through a formal change management process.

This provides certainty to the industry and investors that the technical and regulatory changes are known and the risks quantified, and that the technical operability and security of the system will be retained. In the unlikely event that agreement cannot be reached then the system must be able to default to a position that maintains supply security and safety.

Relationship with the rGB Regulator

A priority for Scotland's Regulator and its rGB counterpart should be the establishment of a comprehensive and constructive relationship and set of working agreements, including periodic review and practical arrangements for on-going evolutionary change.

A collaborative relationship between Scotland's Regulator and its counterparts elsewhere should be in place from the outset. This will require a coalition of the willing built on trust, goodwill, technical understanding and competence.

It is clear from discussions with ACER and CEER, that while some of the discussions and arrangements are technically demanding, the starting position amongst regulators is collaborative. In the event of a lack of progress in resolving cross-border or internal disagreements, ACER will act to deliver a binding solution for the parties. This framework prevents dysfunctional arrangements and undue delay to the important industry changes that are already underway.

These issues are considered further within the section of this report which responds on the question of 'how the strategic energy partnership with the Government of the UK will operate'.

CONSIDERATION OF MARKET MECHANISMS TO ENSURE AN INDEPENDENT SCOTLAND CAN PARTICIPATE EFFICIENTLY IN AN INTEGRATED GB-MARKET, ADDRESSING THE UNIQUE REQUIREMENTS OF ENERGY GENERATION, TRANSMISSION AND DISTRIBUTION IN SCOTLAND

- » Continuation of the single GB electricity wholesale market, transmission and distribution arrangements post-independence will be the most rational outcome for consumers and investors
- » Experience shows that single energy markets can withstand degrees of difference in energy policies adopted by the respective national governments
- » Generation operating, or projects committed across the GB system at the point of independence, and supported by existing market mechanisms should be grandfathered – current commercial arrangements should be honoured, with the historic costs spread across all GB consumers as at present
- » For new generation post-independence, the eligibility of Scottish generators for support under UK-wide market mechanisms should be agreed by an independent Scottish Government and its rGB counterpart as an early priority
- » An independent Scottish Government will have trade-offs to consider within the single market structure between support for new Scottish generating capacity and greater interconnections with rGB and continental Europe, in the context of market signals which presently discourage new thermal capacity in Scotland
- » An independent Scottish Government should evaluate the scope for (and effect on interconnections and system operability arising from) diverging approaches to network access, system capacity and investment, and transmission charging
- » Clarity will be needed on the future of schemes designed to protect consumers from high energy infrastructure costs in parts of Scotland (such as the Hydro Benefit replacement scheme and cross subsidy arrangements for the Statutory Independent Undertakings in gas) and where these costs are allocated.

On 4 February 2014, the electricity markets of the North West region of Europe (covering 75% of the European power market and 15 Member States including GB) were coupled for the purposes of day ahead trading. *“This move will significantly enhance the development of the single EU energy market by favouring price convergence, which fosters competition and therefore leads to a greater choice of services and tangible benefits for European electricity consumers.”*³⁸

Electricity wholesale markets regulated by multiple jurisdictions operate in Europe. These have been implemented in recognition of the benefits to all parties of doing so, and are backed by a strong drive within Europe arising from EU Directives implementing moves toward a single, integrated electricity (and gas) market.

Within Great Britain, a single wholesale market has operated since the introduction of BETTA in 2005, when the New Electricity Trading Arrangements (NETA) were extended to Scotland. By maintaining the established GB wholesale electricity market, and a single synchronous electricity system operating across GB, the larger economies of scale minimise the costs to all parties of any transition in the event of a vote for independence.

The advantages of a single market are wide ranging. The use of existing business infrastructure (for example, balancing and settlement services) maintains operability and reduces potential delays in implementation.

This Commission believes that it is sensible and cost-effective for consumers in Scotland and the rest of GB and for investors for the single GB wholesale electricity and gas markets to continue in a fully effective form, and that all parties should work hard to deliver such an outcome in the event of a vote for independence.

Operating under the current UK policy framework and the embodied renewable energy targets, energy supply companies have established a significant level of long-term supply contracts for renewable energy from Scotland. The Commission agrees with the proposal that generating capacity and contracts for all operating or committed projects at the point of independence should be grandfathered. This should apply reciprocally for both jurisdictions.

Scotland and rGB may choose to pursue differing policies within the retail market, where there is merit in doing so in terms of providing greater choice and improved services to consumers. Evidence from other jointly regulated markets in Europe demonstrates that different policy approaches can be applied in the retail sector for different jurisdictions, although the introduction of new mechanisms in one retail market that are not adopted by the counterpart retail market may lead to some additional costs and system issues for supply businesses which ultimately could be borne by the consumer. These are factors that can be assessed at the time of any policy change.

³⁸ Alberto Pototschnig, Director of the Agency for the Cooperation of Energy Regulators (ACER), 4/02/14.

Industrial, technological and social policy are not core to the role of the Regulator and could be delivered through other agencies – although oversight of the balance between incentives and investment requirements would be beneficial. The incidence and priority of social interests in Scotland often differs from rUK – such as in social support, fuel poverty etc. where differing policy priorities could be accommodated.

Continuation of the Single Market, Transmission and Distribution Arrangements

A jointly regulated single wholesale market that operates across two jurisdictions is a realistic option. There are working examples across Europe of separate countries operating joint wholesale electricity and gas markets, overseen by separate regulatory bodies working in partnership. They also demonstrate that single energy markets can withstand degrees of difference in the energy policies adopted by the respective national Governments. This happens where it is mutually beneficial for the participating countries and their consumers, and is fully consistent with European energy policy and its drive towards a single, integrated energy market.

The power (transmission and distribution) network, meanwhile, is operated as a single synchronous electricity system that carries high voltage electricity from the generators on the transmission system (and increasingly collects distributed generation at the distribution level) to substations where the voltage is reduced ready for distribution. This network underpins the efficient, safe and reliable supply of electricity to consumers. It has also recently seen investment plans approved which will enable large scale investment in grid infrastructure and capacity across Scotland in order to help meet the UK's legally binding renewable energy targets.

While alternative structures could be developed, they would introduce additional costs and risks into the system with no resultant benefit delivered. In the event of negotiations between an independent Scotland and the Government of rUK not reaching an agreement, then ACER, an EU Institution, has a duty to intervene to make binding individual decisions on terms and conditions for access and operational security for cross border infrastructure, based on regulatory and economic analysis of the situation³⁹.

New interconnector agreements and holding companies may need to be established for the ownership and operation of gas and electricity interconnectors between Scotland, England and Northern Ireland, and for users of the interconnectors to contract with the Scottish System Operator.

In the event of independence for Scotland, the continued operation of these arrangements will be subject to agreement between the respective governments. The need for, and scope of, a strategic energy partnership is addressed later in this report.

The Commission believes that there could be greater scope for Scotland and rGB to adopt different approaches within the energy retail markets, taking their markedly distinct geographies and circumstances – and thus customer needs and political priorities – into account.

Evidence from other jointly regulated markets in Europe suggests that such differences could be more easily accommodated in retail than wholesale markets, although there may be issues arising from the need to change existing systems which could give rise to complexity and some limited additional costs to supplier businesses.

This Report addresses the potential for retail market differences more fully in its consideration of fuel poverty and energy efficiency issues.

Operational and Committed Projects

The electricity sector is going through a period of transformation with new forms and scales of electricity generation, active demand response and new control methodologies. However, the sector remains characterised by assets with lifetimes that are typically measured in decades. These assets require significant levels of capital expenditure to establish, with project development and pre-construction periods covering a number of years.

In order to approve an investment decision, prospective developers require as much forward certainty as possible on the commercial viability of their project. For the vast majority of renewable energy generation projects, the cost of construction and the requirement for a reasonable return on capital mean that additional support and a positive regulatory framework remain vital elements if such investments are to move ahead with confidence.

A post-independent Scottish Government may wish to consider new mechanisms beyond EMR. However, Scotland should, initially at least, continue with the framework which EMR is putting into place. This means that the forms of market support currently available or being proposed for low carbon generation – whether through the Renewables Obligation (RO), feed-in tariff for small-scale generators (FIT) or forthcoming Contract for Difference mechanism – should remain available to generators in Scotland in the manner that is currently proposed.

³⁹ http://www.ceer.eu/portal/page/portal/EER_HOME/EER_ABOUT/Tab

Grandfathering existing investment is a fundamental principle of good governance; this applies not only to renewables, but across the energy sector and beyond. Failure to grandfather, and generally to legislate in a way that demonstrates that the state will retroactively undermine investment affects sovereign credit ratings.

The Commission shares the view expressed by the vast majority of witnesses that generation currently operating, or projects which are financially committed at the point of independence in either jurisdictions, and which either is or would be supported by the market mechanisms referred to above should be grandfathered. Current commercial arrangements should be honoured, with the historic costs spread across all GB consumers as at present.

These costs – to pay for new and sufficient renewable generation regardless of location – arise from an obligation placed on electricity suppliers by Governments across the UK, and are in respect of contracts and a market mechanism which have been in place for a number of years. The Commission believes that, unless the UK Government states unequivocally that the current arrangements will not be honoured – i.e. that it will take steps to materially change the eligibility of Scottish generation to help meet targets imposed on electricity suppliers in England, Wales and Northern Ireland – its assumption regarding grandfathering and the current sharing of costs will hold true.

Shared Market Experiences

The collective experience of England and Wales, Northern Ireland and Scotland in the operation of the Renewables Obligation Orders (RO), since their introduction in GB during 2002 and Northern Ireland a few years later, demonstrates that Scotland and the rest of the UK can agree and operate a single market mechanism which accommodates minor differences across jurisdictions.

Autonomy over the review and setting of technology support levels under the RO (Scotland) has required the Scottish Government to evaluate, and be accountable for, the need, justification and cost impacts on consumers through an EU State Aid approval process of its proposals to introduce higher levels of support in Scotland relative to the rest of the UK.

The RO has clearly been successful in delivering a significant level of renewable generation capacity, as the following table (focusing on Scotland) demonstrates⁴⁰:

Figure 4.4: Cumulative installed capacity of sites generating electricity from renewable sources in Scotland (MW), 2000-2013p



(Includes a small amount of wave/tidal/solar)
Source: DECC, Energy Trends, March 2014
<https://www.gov.uk/collections/energy-trends>

This steady growth has been achieved within the framework of a single energy market and has been able to accommodate minor differences in the energy policies and approaches of the respective countries involved.

Many commentators, when considering these issues, focus their attention on the levels of subsidy. This argument overlooks the incentive under the RO to exploit the most cost-effective sites – many of which, taking into account the quality of resource as well as other factors, are located in Scotland.

Generation in Scotland accounts for 28% of the subsidy value under the RO mechanism and provides a greater proportion (commonly between 30 – 40%) of the UK's total renewable generation output. These numbers underline the cost-effective contribution that Scottish generation is making towards the UK target, thus reinforcing the mutual benefits which underpin the current market arrangements.

A Scandinavian Example

The ability of an independent Scotland and rUK to operate a single market mechanism can also be considered in the light of wider European experience. **The common Swedish and Norwegian certificate market for renewable electricity⁴¹ provides an example of a shared market support mechanism for renewable electricity.** The certificate scheme was introduced in Sweden in 2003 and became a common certificate scheme with its adoption by Norway from January 2012.

40 <http://www.scotland.gov.uk/Resource/0044/00444530.pdf>

41 http://ec.europa.eu/competition/state_aid/modernisation/centeno-lopez_en.pdf

The operation of a joint support scheme is intended to provide improved market functioning e.g. higher liquidity, better price formation and also a bigger market more attractive for investors. This should bring increased cost-efficiency, access to larger production base and increased long-term predictability for investors through a politically stable system.

The key underlying factor in the success of the common certificate market is that the Swedish and Norwegian Governments (and Regulators) agreed at the outset that the market should not be bound to physically deliver equal levels of capacity in each country. The purpose of the scheme was to bring forward the most economically efficient renewable generation capacity to the joint market, to the benefit of all consumers.

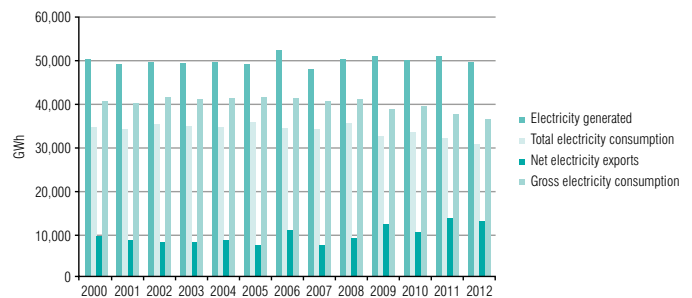
The process has been described as politically challenging; it poses questions about burden sharing, system operability and governance, and the ability and role of the market in determining the location of new generation. But the participants clearly believe that the common ground and targets underpinning the arrangement are worthwhile, and provide the impetus necessary to deliver support for a joint system.

Support for New Capacity in Scotland

In establishing the operation of joint market arrangements, including support mechanisms, their design and application, there will be choices for an independent Scotland in how it chooses to create a robust system. Different elements combine to meet the structural needs of the system: the capacity of operating thermal plant, renewable and intermittent plant, the availability of storage, the effectiveness of demand side management (DSM), system reliability, the capacity of transmission connections to rUK, and the development of new interconnectors to Europe. For example, transmission connection to rUK or new interconnection to Europe provides access to capacity, but also to export markets for renewable generation output.

Scotland currently exports around 25% of the electricity that it generates and this helps meet consumer demand in rUK.

Figure 4.3: Electricity generated, consumed and transferred (GWh), Scotland, 2000-2012



Source: DECC, Energy Trends, December 2013
<https://www.gov.uk/government/organisations/department-of-energy-climate-change/series/energy-trends>

With an increasing level of renewable generation, there will be a greater need for system balancing services to cover the variability of output. Interconnection provides economically efficient access to capacity in other markets, but is not as physically secure as capacity that can be controlled and dispatched as part of the single GB-market.

The four operational thermal power stations in Scotland (Hunterston B, Longannet, Peterhead and Torness), totalling around 5 GW of installed capacity, are expected to have shut down by the end of the next decade, although some may close sooner, depending on plant operability and market conditions.

The reform of the GB electricity market is currently seeking to create market price signals to invest in new low carbon, long-term capacity. With the closure of aging power plants as they reach the end of their operational life, and fossil fuelled power plants closing early as a result of limits on operating hours under the LCPD (Large Combustion Plant Directive) and IED (Industrial Emissions Directive), we are seeing significantly fewer power stations available within the UK to meet peak electricity demand, exacerbating security of supply concerns in the period beyond 2015⁴².

New thermal plant in Scotland could provide valuable services to the power network in terms of voltage and/or frequency support and additional ancillary services, all of which help maintain system operability. The capacity market (as currently proposed under EMR) will award contracts following a competitive bidding process in order to meet the required level of capacity for the lowest overall cost, but has no technical weighting for the geographical location of that capacity, and the associated system support that could be provided.

42 <https://www.ofgem.gov.uk/ofgem-publications/75232/electricity-capacity-assessment-report-2013.pdf>

Where potential capacity projects are transmission constrained or subject to higher transmission charges, such as in Scotland, they will receive a lower ranking in the bidding process. The projects to increase transmission connection to rUK already underway, provide a strong link for export, but are likely to reduce the market signals for new thermal capacity in Scotland. This imbalance in costs, charges and incentives needs to be considered and resolved, as the current arrangements could leave Scotland with a potential structural deficit for thermal generation in the medium term, which would be to the detriment not only of Scotland, but to the operation of a single synchronous system across GB.

The Commission believes that design elements, which recognise the grid control and stability benefits for rGB as a whole related to large scale generation located in Scotland, should form an important part of the development of the capacity mechanism being taken forward at present.

The development and operation of a separate Scottish mechanism would remain a possibility if support tailored to specific approaches on generation, transmission and distribution network access in Scotland could not be delivered through the joint regulation of the single market.

Transmission Charging

Under the current GB transmission charging arrangements, the impact of Transmission Network Use of System (TNUoS) charges on the competitiveness of both renewable and conventional (thermal) power stations in Scotland has been raised as a barrier to new developments. These issues were the subject of the investigation launched in September 2010 by Ofgem under Project TransmiT⁴³, an open review of electricity charging and associated connection arrangements including the launch of a Significant Code Review (SCR) in July 2011. Ofgem published its final policy decision on the Significant Code Review in May 2014⁴⁴, and recently announced that the outcome of Project TransmiT will be subject to further delay⁴⁵.

⁴³ <https://www.ofgem.gov.uk/electricity/transmission-networks/charging/project-transmit>

⁴⁴ <https://www.ofgem.gov.uk/ofgem-publications/87782/electricitybalancingsignificantcodereview-finalpolicydecision.pdf>

⁴⁵ <https://www.ofgem.gov.uk/publications-and-updates/project-transmit-update-progress-and-way-forward>

Transmission charges form a key part of the investment decisions and long-term plans to be taken by developers. The lack of clarity arising from the current review of those charges clearly acts as a barrier to those investment decisions. While the changes proposed by TransmiT would mean a slight reduction in the charges faced by Scottish generators, they would still be higher than elsewhere in the UK. This leads to questions about the extent to which an independent Scotland might wish to pursue further changes to this mechanism, and the issues that this would raise.

Working in a constructive partnership with rGB counterparts, it should be possible, within agreed limits which retain a single wholesale market with joint regulatory oversight, to explore different approaches to grid charging, access and investment.

Historically, the need for solutions that address specific Scottish circumstances has been recognised. One example is through a recent consultation on competitive allocation of CfDs for wind projects on the Scottish islands⁴⁶.

In the event that an independent Scotland wished to pursue changes beyond this, it should evaluate the impacts that could result from 'Scotland only' approaches in these areas in order to appraise the level of economic, social or environmental benefit that would be delivered. Any such proposals would require regulatory approval from the Scottish NRA and close cooperation with the rGB TSO and regulator.

Hydro Benefits Replacement Scheme and Common Tariff Obligation⁴⁷

The Hydro Benefit Replacement Scheme, Common Tariff Obligation and arrangements for the Statutory Independent Undertakings in gas, are covered in detail earlier in this report. Clarity will be needed on the future of such schemes (that are designed to protect consumers from high energy infrastructure costs in parts of Scotland) and where these costs are allocated.

⁴⁶ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/310283/competitive_allocation_consultation_document.pdf

⁴⁷ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/229469/hydro_benefit_replacement_scheme_response.pdf

TO CONSIDER HOW A STRATEGIC ENERGY PARTNERSHIP WITH THE GOVERNMENT OF THE UK WILL OPERATE – ITS SPAN OF COMPETENCE AND THE PROCESSES FOR COOPERATION WITH THE UK

- » The benefits of single markets for electricity and gas to all parties are generally acknowledged
- » An effective energy partnership is important to ensure the best operation of market arrangements and security of supplies to all parties
- » The negotiation and settlement of the strategic energy partnership needs to be kept separate from the arrangements for its on-going governance and operation – ‘settle as counterparties, govern as equals’
- » A clear governance framework, and institutional relationships that tackle the difficult issues will help ensure robust and enduring arrangements
- » Mechanisms and processes need to be designed to accommodate change in an efficient way
- » Safeguards protecting the rights and interests of all parties must be agreed
- » Any policy changes intended to influence behaviours within a geographic part of the market will take place in the context of an integrated GB electricity system that cannot escape the laws of physics.

The Scottish and UK Governments recognise the shared benefits that the single market provides. Post-independence, the retention and operation of single energy markets for electricity and gas will need a strategic relationship and agreement between Scotland and rUK, which will extend to structural and governance arrangements between the Scottish and rUK Governments and the relationships between the National Regulatory Authorities.

The agreement between Scotland and rUK will need to be governed effectively to ensure robust protection of majority and minority rights. Both jurisdictions need to be confident the arrangements agreed cannot be unilaterally altered or nullified by the other party.

The interface between Government and the Regulator in each jurisdiction should be clearly defined on a range of issues, including the role of Government in setting policy, the relationship of Government to the Regulator, and the role of the Regulator. It will also require an in-built capacity for review of the operation of the market and the effectiveness of the energy partnership after specified periods of time.

Scotland is presently a consistent net exporter of electricity to the rest of the UK and in 2012 exported 13TWh, or over a quarter of all the electricity generated in Scotland. Under current forecast scenarios of high renewable generation installation in Scotland and closure of current coal and nuclear generation, Scotland is likely, at times of low renewables availability, to import electricity from rUK in order to continue meeting demand and for necessary network ancillary services.

The integrated nature of the GB electricity system highlights the need for a collaborative relationship between governments, regulators and TSOs such that any changes which may affect its operation are developed by mutual agreement.

There is a variety of international comparators of joint regulatory models where two or more countries co-operate in the operation and regulation of a single market. Each of them has features tailored to their specific circumstances, and differs in scope.

These models could usefully be applied to a jointly regulated market for Scotland/rUK and demonstrate that a cross-border single market can be made to work effectively. Experience suggests that it is preferable to address the important issues and accountabilities including governance at the outset to avoid gaming or uncertainty later when joint arrangements are commercially operational.

An agreed change management process will be required to accommodate lessons from operation and changed circumstances.

If Scotland wished to operate the electricity system ‘more independently’, for example to achieve greater security of supply, this would be technically achievable and could be agreed within the limits of a jointly regulated system. However, any changes would require an evaluation of the costs and lead-time for implementation.

Setting up a Strategic Energy Partnership

The continued operation of a single GB energy market, based upon a strategic relationship and partnership between Scotland and rUK will require a series of governance and institutional arrangements to be established between the Scottish and rUK governments and energy regulators.

Certain fundamentals should underpin the Energy Partnership:

- » That both Governments recognise the mutual benefits and strengths presented by current system operability, regulatory and market arrangements, and that this common ground presents a solid foundation upon which to enter negotiations

- » That the current policy thrust and the resulting targets applicable in Scotland and rUK will remain consistent – with both Governments continuing to pursue binding renewable and low carbon energy targets, at fair and affordable prices for consumers as part of a wider focus to ensure sustainable and secure supplies of energy
- » That the models for the necessary governmental and regulatory partnerships, working arrangements and systems of governance which exist in other parts of the world can provide useful templates and guidance for the task facing both governments in working together
- » That the necessary arrangements to meet the EU obligations for a National Regulatory Authority (NRA) and System Operator (SO) are implemented in Scotland.

A clear governance framework, and institutional relationships that tackle the difficult issues, need to be established from the outset. This will then be developed in such a way as to ensure robust, lasting and balanced arrangements. A strategic energy partnership between the governments of Scotland and rUK should encompass:

- » The political will and commitment to deliver a mutually beneficial outcome – ideally in the form of a pragmatic memorandum of understanding (MoU), which sets out in full the overarching aims and intent of both parties
- » The commitment to provide the necessary resources required on both sides to ensure that the institutions are properly equipped to succeed
- » The duration and scope of the transitional arrangements that will need to apply while new structures and bodies – including a Scottish Regulator and System Operator – are established and resourced
- » A realistic and detailed process map and timetable, intended to guide the participants and stakeholders through the process and the steps necessary to jointly retain and operate the single energy market – including delivery of the necessary legislation and related consultations.

The negotiation and settlement of the terms of the strategic energy partnership need to be kept separate from the arrangements for its on-going governance and operation; the guiding principle should be ‘settle as counterparties, govern as equals’ although the UK Government has signalled that a partnership will be difficult to reach due to differences in objectives in a number of areas.

A well governed strategic partnership, with clear lines of communication at Ministerial and official level can both prevent, and speedily resolve the unintended consequences of policy changes implemented by one jurisdiction which has impacts in the other.

Case Study – The Single Energy Market (SEM) in Ireland

The introduction of a carbon price within the Republic of Ireland changed the merit order for electricity generators in the SEM, resulting in a more favourable economic position for fossil generation in Northern Ireland which was not subject to the carbon price. This led to the displacement of carbon emissions from the Republic of Ireland into Northern Ireland, and lower generation output (and revenue) for fossil plant in the Republic of Ireland. Once this position became apparent, Ministers intervened to remove the carbon price in the Republic of Ireland. Subsequently, when proposals for the Emissions Performance Standard (EPS) were made as part of the UK electricity market reforms, Northern Ireland was granted an exemption due to the distortive market impact.

Where there is intergovernmental commitment to retain the single market, the resultant arrangements will be robust. **Evidence shows that governance arrangements for a strategic energy partnership are most effective where they are established on an equal basis, with neither party in a majority position. Typically these have been detailed within a Memorandum of Understanding (MoU) agreed between Ministers.**

InterGovernmental Memorandum of Understanding

The exact detail of the intergovernmental MoU on a strategic energy partnership will be part of the negotiation and settlement process following the outcome of the referendum. The MoU should address the following areas for electricity and gas:

Scope of the Agreement

There needs to be agreement on the scope of the arrangements. The MoU should make clear where there is agreement on joint operations and regulations, such as transmission and interconnectors, and areas where a degree of national autonomy may be preferable such as policies for fuel poverty, energy efficiency or heat distribution networks.

For electricity, elements within this scope may extend from the wholesale market only, through to the full system as it is currently operated; however, due to the number of constituent parts of the electricity system it would be logical to set out the scope of the agreement by system functions such as interconnection agreements, operation, transmission systems, distribution systems, retail and supply, fuel poverty and energy efficiency (including demand side management and smart grids), renewables and incentives.

For gas, a similar functional structure within the scope of an agreement would cover supply contracts, landing points, network standards, storage, transmission and distribution, shipping and interconnection.

Transitional Arrangements

There will need to be a sensible period of transition prior to implementation of any new structures. Transparent arrangements will maintain confidence in the system until Government, Regulatory and operational changes are implemented. Transition arrangements should include establishing inter-Governmental and industry working groups that will address the technical, operational, legal and financial issues as well as the timescale over which they will report.

Governance of the Status Quo

During the transition period, an appropriate governance structure will be required to ensure that the current system is maintained operationally, as well as supporting the implementation of system changes already agreed, and apportioning their associated costs. This will need to be supported by both jurisdictions and will cover:

Operational control

Practical arrangements are required to run the electricity and gas systems to meet existing licence conditions, technical codes and standards. Functional responsibilities within jurisdictions on how the electricity and gas systems are run also need to be clear as it is a dynamic system with constantly changing levels of generation and demand.

The compliance with common standards to underpin reliability and security of supply will be important to both parties.

Emergency Response and Support

For the electricity and gas sectors this will detail:

- » The Role of Operators
- » The Role of Regulators
- » The Role of Governments

The system must be able to respond to natural events, strikes, system failures, or cascading faults in a consistent and coordinated fashion such that critical system interdependencies are safeguarded; roles and accountabilities including who leads in emergency response must be unambiguous.

Technical changes to system

During the transition period the technical and code change alterations designed to address developments and issues affecting the system will continue to be needed.

The industry codes also underpin the electricity and gas wholesale and retail markets. Licensees are required to develop, become party to, maintain, or comply with the industry codes in accordance with the conditions of their licence.

The codes define the terms under which industry participants can access the electricity and gas networks; it is a dynamic governance framework with rolling amendments and modifications.

Neither overarching EU legislation nor the dynamics of the system will stand still. Both issues will need to be catered for.

Change Management Process and Policy

If a strategic energy partnership can be established, then a longer-term change process will need to be in place. **Depending on the scope and subsidiarity agreed, there will need to be a change management process to provide a robust and proportionate structure** during the transitional and implementation phases arrangements for:

- » notification of changes agreed to be within each national jurisdiction's remit
- » consultation and controls on limited impact measures proposed by either partner
- » reserved matters requiring joint consent for more fundamental changes

For example, measures that are agreed to be minor – that is, considered to be straightforward and low impact in terms of any cross-border effect, and thus purely a matter for each separate Government – may be dealt with through a relatively simple process of notification. This might encompass new policies or initiatives to tackle fuel poverty, support community renewables, or to support supply chain development.

Where policy, technical or regulatory changes are considered to have greater potential to influence prices or supply across the respective borders, they would be subject to formal consultation prior to their introduction and include analysis that quantifies potential impacts.

The arrangements under the strategic energy partnership should also recognise that there will be some reserved matters – that is, areas of policy where any change within one country is considered likely to have a fundamental impact on the other, or on the single market as a whole (such as further significant reform to the wholesale market). Such changes would need to secure mutual consent prior to any implementation.

Periodic Review Mechanism

Periodic review of the strategic energy partnership will enable both jurisdictions to notify, establish and agree the direction of policy and regulatory development for a given period of time. This will build confidence in the intergovernmental process, and also certainty for industry in the policy and regulatory landscape. The periodic review mechanism would operate under certain basic principles. It could be used to respond to significant market events and would provide the opportunity to consider any major changes – such as what may, in time, replace EMR.

The process could incorporate a standard impact assessment in order to identify the thresholds, analysis, and consequent rights to proceed or block proposals that are put forward by each jurisdiction – through a dispute resolution process.

A Code Change Authority

The current legislative framework in the UK requires market participants to obtain a licence in order to generate, transmit, distribute, or supply electricity at scale; establishes processes for licensing; and uses licence conditions to require market participants to be party to different Codes and Agreements which establish the rules for the wholesale and retail markets, transmission and distribution access, and market settlement.

Scotland and rUK should pursue consistent legislation which establishes the requirement for licences, the standard terms for those licences and which obliges the licensees to be party to Codes and Agreements.

From discussions with a number of regulatory bodies and market experts in Europe, there is agreement that the governance structure of the joint regulatory model has an important influence on the effectiveness of the market regulation activity.

For a joint regulatory structure to be effective, the rules for operation and settlement of the wholesale market – including the capacity mechanism – would need to be identical in Scotland and rGB⁴⁸, although different incentives for different technologies can be envisaged.

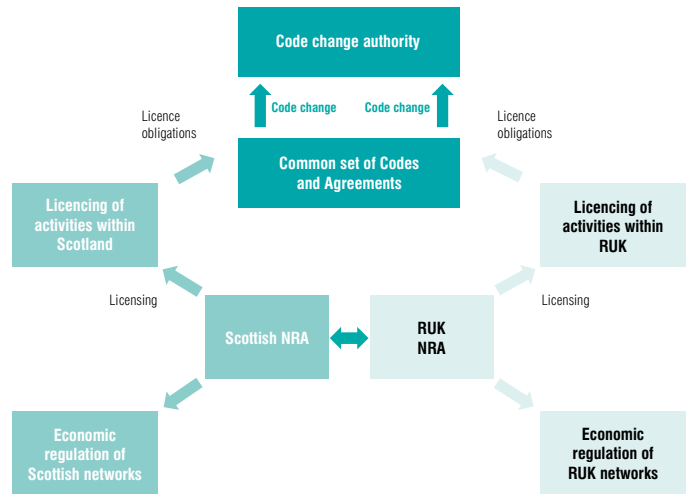
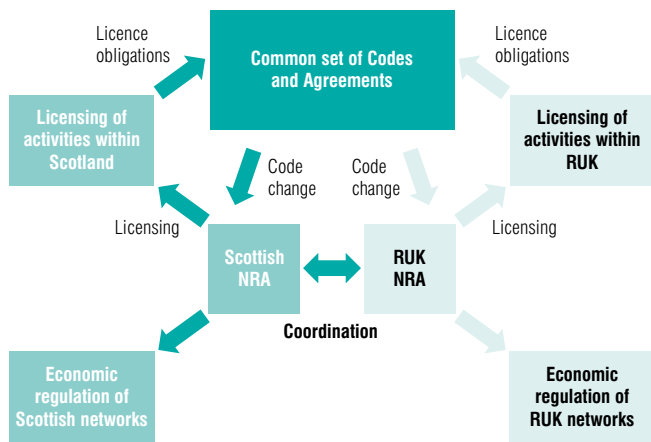
EMR will substantially increase Ministerial involvement in the market through decisions on the capacity mechanism. Following independence, these decisions will need joint Ministerial accountability. If a unified approach to supporting low carbon generation is maintained, joint oversight will also be required over the award of CfDs unless there is a settlement between Governments on a market allocation of the Levy Control Framework that an independent Scotland would control.

In other respects a single electricity market could incorporate diversity. Approaches to network regulation and charging could differ, provided third party access was retained. The market already accommodates different approaches to measuring consumption (interval meters and profiles) and with different transmission and distribution system charges for generation and demand customers across the UK, it will continue to do so. If one country moved to half hourly settlement for all consumers and the other did not, this should be perfectly manageable.

There are two high-level approaches that could be adopted to ensure consistent market rules following Independence. These are: i) a coordinated approach to rule change or ii) a code change authority.

i) Under a coordinated approach to rule change, the two NRAs would undertake the economic regulation of networks in Scotland and rGB respectively. The two NRAs would also licence relevant activities within Scotland and rGB.

⁴⁸ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/301772/2901910_ScotlandAnalysis_Energy_acc.pdf



Model 1 : A Coordinated Approach

The licences would require the parties to be subject to the relevant codes and agreements, on a consistent basis across the market. Market participants in each country would manage code change and seek approval from the relevant NRA. The NRAs would coordinate to ensure the codes and agreements remained fully consistent.

This approach has obvious problems of duplication – with two NRAs considering similar rule changes – and risks that the codes would diverge.

ii) An alternative arrangement would be to separate out code change from economic regulation. Economic regulation would remain with the NRA in each country. Code change would be managed by an agency or committee jointly established by the two countries.

Under the second approach, licencing and economic regulation would still be undertaken by a Scottish NRA and its rUK equivalent. The licences would carry an obligation to be subject to the relevant codes. Licences could also impose obligations specific to Scotland, such as participation in energy efficiency schemes or output metrics.

Model 2: A Code Change Authority

Consistency would be maintained through a single agency that approved code change. This agency would need to be given appropriate legislative power to approve code changes in Scotland and rUK, or delegation of the NRA’s powers with respect to Code change. The approach would also need to be consistent with the requirements of the EU’s Third Package.

A code change authority could be more effective in ensuring a single market over time. It might also be possible to consolidate other functions (such as licencing) to further promote market integration.

Industry stakeholders have confirmed that a transparent change management process and accompanying timescale to implement future changes would maintain confidence in a different regulatory structure.

Inter-Governmental Coordination

An effective and meaningful strategic energy partnership will need formal structures to administer, monitor and review the implementation of the partnership agreements once they have been reached.

Experience from the SEM, Nordic and the MIBEL markets has demonstrated that the most effective regulatory approach is delivered by a joint governance model where the respective regulatory authorities have an equal responsibility and accountability that engenders a rational discussion of the ‘market’ issues as opposed to national interests.

This could be delivered in the form of an inter-governmental agency. Meeting on a regular basis, its remit would focus on ensuring that the partnership as agreed was being duly and properly implemented. This would require procedures for raising and resolving unforeseen issues, and it would also provide a forum for the initial consideration of policy developments and issues as they arise.

There is a variety of different options for such an agency's constitution and operation (see Annexe A for summaries on the structure and role of international regulators). A relevant example is the Irish Single Electricity Market Committee which operates on the basis of equal representation from each jurisdiction in Ireland, but also includes independent membership. This latter element, if coupled with a system of binary decision-making and a binary choice mechanism, provides a stronger incentive to reach agreement in the event that any disputes arise.

The Spanish/Portuguese MIBEL model has many similarities, including equality of representation on the joint Board. That comes from recognition that both jurisdictions must have confidence in the implementation of the settlement reached and that a joint single market structure requires acceptance of constraints and safeguards.

An inter-governmental forum would also sit at the head of a pyramid of necessary institutions and structures – such as a joint regulatory committee or equivalent body, the respective TSOs and key industry technical groups. It would also form part of the interface with other relevant organisations, such as ACER.

Depending on the scope and the partnership body, policy issues would still fall back to the Governments, meaning that it would be prudent to have a liaison forum for the Energy Ministers of the two Governments. This could simply be a bilateral structure or something more permanent, possibly informed by relevant external bodies such as the Climate Change Committee, the Fuel Poverty Fora or in future, perhaps a Security of Supply Committee to inform on the Energy Trilemma.

The Commission considered that a partnership structure along the lines of the SEM or MIBEL, but possibly with wider scope such as seen in the Nordic model which encompasses trading in renewable energy certificates, could be a suitable model for the two Governments to consider. The independent member requirement, seen in the SEM, may also be worth considering though this could prove challenging given the relative shares of Scotland/rGB within the single markets.

Inevitably these arrangements are focused on electricity and gas and primarily on wholesale market coordination. As the regulatory model proposed by the Scottish Government also covers other utilities, the arrangements applying for coordination with rUK for these areas would also have to be considered. The Commission has not attempted to address these areas.

Establishing a Strategic Relationship

The insights gained from discussions with stakeholders have confirmed that the following elements would offer best practice in establishing a Scottish Regulator, and the strategic relationship with rUK:

- » Establish a mutually constructive relationship with Ofgem and the Regulator in Northern Ireland (NIAUR), with simple and clear mechanisms for decision-making
- » Map today's technical and commercial arrangements wherever possible as the starting point, but avoid leaving complex issues to be 'resolved later'
- » Implement structures and frameworks from the start that can be brought into alignment with longer-term aspirations when required: future-proof the designs now rather than try and change them later when processes are 'live'. Co-operative working between jurisdictions will encourage inward investment and should be a priority
- » Maximise adaptability, and minimise bureaucracy to accommodate the continual changes anticipated as the power sector develops, decarbonises, and integrates more closely with consumers, communities and other sectors⁴⁹
- » Innovation at all stages will help deliver cost-effective outcomes in the energy sector, particularly in the regulated network companies where normal competitive innovation pressures are absent and sub-optimal 'traditional solutions' remain available

⁴⁹ <https://www.gov.uk/government/publications/smart-grid-forums-smart-grid-vision-and-routemap>

Settle as Counterparties, Govern as Equals

The nature of the joint regulatory model and the strategic partnership between Scotland and rUK Regulators for electricity and gas will be established through a negotiated settlement in the event of Scotland becoming an independent state. The outcomes of this process cannot be known in advance, and will be subject to a counterparty discussion between respective Governments.

However, once this settlement is agreed it is important that on-going arrangements and operation are governed effectively to ensure robust protection of majority and minority rights. **Both jurisdictions need to be confident that arrangements agreed cannot be unilaterally altered or nullified by the other party, and equality of representation on the governing body is one means of addressing this.**

OPTIONS FOR AN OPTIMAL POLICY AND REGULATORY ENVIRONMENT TO ENCOURAGE RENEWABLE GENERATION, INCLUDING INCENTIVES FOR INNOVATIVE GENERATION AND NETWORK TECHNOLOGIES AND THE SUPPLY CHAIN

- » Scotland's longstanding commitment to renewable generation and emissions reduction targets have provided a consistent signal to encourage investors
- » The ability to trade and export Scottish renewable power across UK and European markets will be crucial to delivering Scotland's renewable aspirations
- » Continuity of existing support mechanisms will reassure investors
- » Any support will need to remain consistent with developing European targets and policy, including the role of competitive forces to reduce and determine technology costs
- » The Scottish Government could tailor existing or new mechanisms to better reflect priorities and circumstances, subject to addressing the costs and potential complexities involved for generation, networks and consumers
- » The Commission supports the joint efforts being undertaken by the Scottish and UK Governments to encourage the development of the energy resources of the Scottish Islands
- » The Scottish Government could develop a wider range of tools which could be used to provide financial and structural support for technology, infrastructure and supply chain development
- » Renewable generation requires connection and transmission capacity to reach its point of use
- » Continuing development of the transmission and distribution networks will be important, including smart grid innovation technologies

The renewables industry has made significant investments, both in Scotland and across the UK, in response to the incentives and obligations put in place by both Governments, and the need to deliver economically efficient generating capacity.

EU targets for 20% of energy supplies (heat, transport and electricity) to be provided from renewable sources by 2020 are binding on Member States and the UK still has much to do. Future proposals set out by the EU as part of their 2030 climate and energy package have not been finalised, but provide greater flexibility for Member States to contribute to an overall EU target likely to be 27% of energy supplies. Investment in renewable energy supplies will take place where it is economically efficient to do so.

The prolific growth of renewables across Scotland in particular over the past decade reflects the huge natural resource that exists and the consistent commitment shown by the Scottish Government to support ambitious renewable energy targets. It has also taken place against the backdrop of a UK market for renewable electricity with the Scottish Government autonomy to set the same, or different levels of support, where warranted⁵⁰.

Given existing policy commitments there will still be a strong demand for renewable power in the event of independence – both across the UK and potentially Europe, where the energy will be needed, subject to the required connections, network capacity and investments being equitably apportioned. Future renewable development requires an increase in grid access and capacity as well as interconnection to provide a route to market. The EU Commission's ambitious plans for expansion of trans-European networks to provide energy security within the union will be particularly relevant to Scotland. This demand will extend from onshore wind, which is proven, and on a path towards grid parity with non-renewable alternatives to offshore technologies, where Scotland has unique potential.

The Scottish Government should continue to prioritise the development of a supply chain and support for the development of offshore renewable technologies in deeper waters, where innovation and cost reduction could have real significance for global export markets. There is greater opportunity for Scotland to benefit from EU support for renewable expansion while aligning with guidance on minimising market distortion.

⁵⁰ <http://www.scotland.gov.uk/News/Releases/2008/09/19111827>
<http://www.scotland.gov.uk/Resource/0040/00401801.pdf>

Serious efforts to encourage the development of gas storage is necessary for security of supply. To achieve objectives in a reliable, robust low carbon electricity supply, energy storage and smarter network management must be introduced. Scotland can access international markets and meet growing domestic needs and demands by aligning itself with Energy and Climate initiatives at the European Union level. Technology and industrial policy will be crucial enablers in all of this.

The Commission considers that there is a need to look at the implications on system security of the shifting balance between renewable and thermal electricity generating capacity as Scotland's existing power stations are retired, taken in the context of whole system operability and environmental objectives.

Delivery of Scotland's Renewable Ambitions

Scotland's very ambitious renewable energy targets, and determination to support the development of emerging technologies and foster community renewable ownership and benefit, are well understood by the industry and investors. There is considerable scope for further community scale renewable development where the combination of manageable size of project, community involvement and benefit improve the local acceptability of schemes.

Continuity of Market Mechanisms

Successive Scottish Governments have strongly promoted the outstanding renewable resource which exists across Scotland's land and seas – amounting to around a quarter of Europe's wind and tidal potential, and a tenth of the Continent's wave energy resource – and the role that these resources could play in driving sustainable growth, enhancing the diversity and security of Scotland's energy supplies, and transforming and empowering the lives of those in rural and remote communities.

The key to achieving this through the years has been the Renewables Obligation (RO) mechanism. Scotland has had its own RO since 2002 when the legislation was first introduced, working alongside similar ROs applying in England & Wales, and – from 2005 – Northern Ireland.

The RO in Scotland is created using powers devolved from the 1989 Electricity Act. The three UK ROs are near identical, and combine to create a UK-wide market for the Renewable Obligation Certificates (ROCs) awarded to eligible renewable generators. However, Scottish ministers have, through the years – and subject to the approval of both the Scottish Parliament and the European Commission – taken a slightly different approach in order to provide appropriate levels of support for technologies seen as having particular strategic importance to Scotland.

The most notable example of this concerns wave and tidal power. An obligation upon suppliers to buy a specified amount of wave and tidal power at a higher rate than other renewable technologies was introduced in 2007. When the ability to award different multiples of ROC to different forms of renewable generation (known as technology 'bands') was introduced across the UK in 2009, the Scottish Government used its powers to set higher bands for wave and tidal generators in Scottish waters than were available at any other location across the UK.

This difference has now been removed following the raising of wave and tidal bands in Northern Ireland, England and Wales to the levels which applied in Scotland. However, the Scottish Government has recently held its hydro band at the same level following reductions to that band elsewhere in the UK, and has also introduced new bands for innovative offshore wind generation which are available in Scotland only.

It is also worth noting that the RO in Northern Ireland has taken different approaches to particular technologies (such as anaerobic digestion and solar PV) when considered necessary.

These examples are interesting in that they provide evidence of a joint market and system continuing to work efficiently despite variations in approach amongst its separate component parts. They demonstrate that a single market can and should be capable of weathering such differences in approach where those differences are held to be necessary – and where an agreement has been established as to their extent, cost and incorporation.

An independent Scotland's ability to maintain course toward the renewable targets and aspirations set by the current Scottish Government will hinge on clarity as early as possible regarding continuity of current and proposed market mechanisms, and access for Scottish generation to those mechanisms. Subject to State Aid approvals, the adoption of the Contract for Difference (CfD) structure in a jointly regulated single market could provide the required continuity and consistency for industry and investors.

This experience demonstrates that Scotland and the rest of the UK can operate a market mechanism which accommodates minor differences across jurisdictions. Having autonomy over the review and setting of technology support levels under the RO (Scotland) has required a consideration of, and accountability for the cost impacts on consumers. It has also provided a clearly defined process by which economically efficient generation can be developed in one jurisdiction in order to provide benefits to consumers in another. This holds true for technology subsidy where there are limited impacts, but cannot be considered as a remedy in all cases.

Similar experience can be found in the common Swedish and Norwegian certificate market for renewable electricity⁵¹. The certificate scheme was introduced in Sweden in 2003 and became a common certificate scheme with its adoption by Norway from January 2012. The rationale behind the operation of a joint support scheme was that it would provide improved market functioning e.g. higher liquidity, better price formation and also a bigger market more attractive for investors. This would also bring increased cost-efficiency, access to larger production base and increased long-term predictability for investors through a politically stable system. Underlying the success of the common certificate market was the understanding by Sweden and Norway that the market was not required physically to deliver equal levels of capacity in each country. The common certificate scheme brought forward the most economically efficient renewable generation capacity to the market.

The Commission believes that the ability to agree and operate such differences will remain an important element of Scotland's policy options post-independence. Experience suggests that degrees of difference are not impossible to achieve and administer.

The Commission assumes that Scotland will remain with rGB within the EMR framework. A post-independent Scottish Government could, over time, tailor new and additional mechanisms to promote renewable expansion. These could prioritise areas which present a strategic opportunity, or a natural or competitive advantage for Scotland.

However, there are likely to be natural limits to this, as well as questions regarding the costs of such differences and how those costs are to be met. These are questions which a robust agreement and strategic energy partnership between Scottish and rUK Governments will need to define.

There will also be separate avenues that an independent Scottish Government could explore, over and above the operation of a UK-wide market mechanism. New financial and borrowing powers conferred by independence could enable fresh approaches to be taken to promote innovation and help reduce the technology cost and risk of new renewable projects before they are scaled up in the market – subject to compatibility with EC guidelines and the acceptability of (and ability to meet) the costs involved.

An independent Scottish Government will be able to introduce, tailor and fund its own initiatives aimed at supporting activity in the renewable and low carbon space. These could encompass measures to promote renewable heat and power, across a range of scales and within communities, and extend out to storage technologies and applications, district heating and potentially carbon capture.

The Scottish Government should aim to conduct, as part of its transition planning, a thorough options analysis – identifying the choices and tools that would be available to it to support and promote the development of renewable and other low carbon technologies, as well as strength and activity within the related supply chains.

Investors need clarity and continuity of policy. Continuity can be addressed by an early confirmation regarding the status of projects already operating under the RO and commitments to the grandfathering of support over the contracted period. However, projects and businesses located in Scotland will also want clarity over their continued eligibility to apply for and receive support under the UK electricity market reform mechanisms currently being finalised, and the terms and conditions under which those schemes will operate.

Export and Trade of Renewable Energy

It is axiomatic that the aspects of renewable generation – namely, its dispersed nature, often remote from large demand centres – creates distinct and wide ranging challenges for the transmission and distribution of the energy generated. This also lends urgency to the pursuit of new solutions which would allow such generation to be stored – economically and at large scale – and used at times which correlate with demand.

⁵¹ http://ec.europa.eu/competition/state_aid/modernisation/centeno-lopez_en.pdf

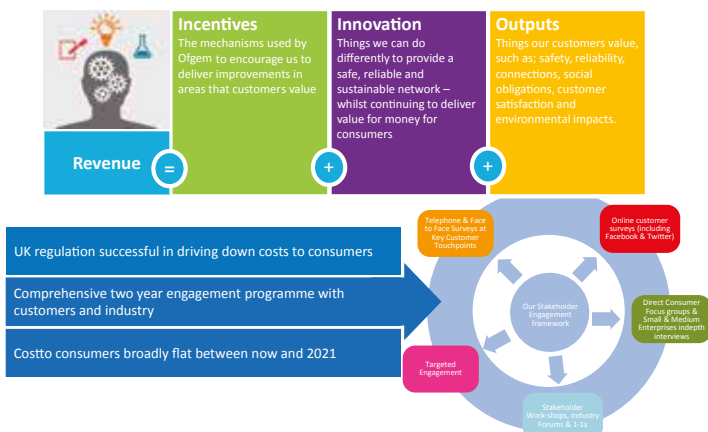
The management and operation of the electricity and gas networks – in a way which ensures the delivery of energy as securely, affordably and sustainably as possible – will be an important issue facing Government and Regulator in an independent Scotland. Energy policy and economic regulation must between them deliver the Government’s desired outcomes through a least-cost combination of instruments.

The electricity transmission network in Scotland is operated on behalf of owners Scottish and Southern Energy Power Distribution and Scottish Power Energy Networks by National Grid Transmission UK, who also operate the system in England and Wales.

While Scotland’s network differs slightly from the rest of the UK, in that 132 kV lines are classed as transmission rather than distribution, it operates under a common set of arrangements governing access and use of system charges. The methodology under which these charges are calculated and applied has been under review for some time. This issue is a contentious one – based on current forecasts, Scotland will have around 12% of total GB transmission connected capacity in 2014-2015, while the generators in question will pay around 35% of total GB use of system charges.

A great deal of investment in Scotland’s networks has already been approved by Ofgem under its RIIO model (Revenue = Incentives + Innovation + Outputs). The RIIO-T1 outcome, confirmed in April 2012⁵², set out final proposals for Scotland’s transmission owners to begin taking forward investments worth up to £7.6 billion after inflation, designed to assist with connections for renewable generators through the replacement of ageing infrastructure and the extension of new lines across the country.

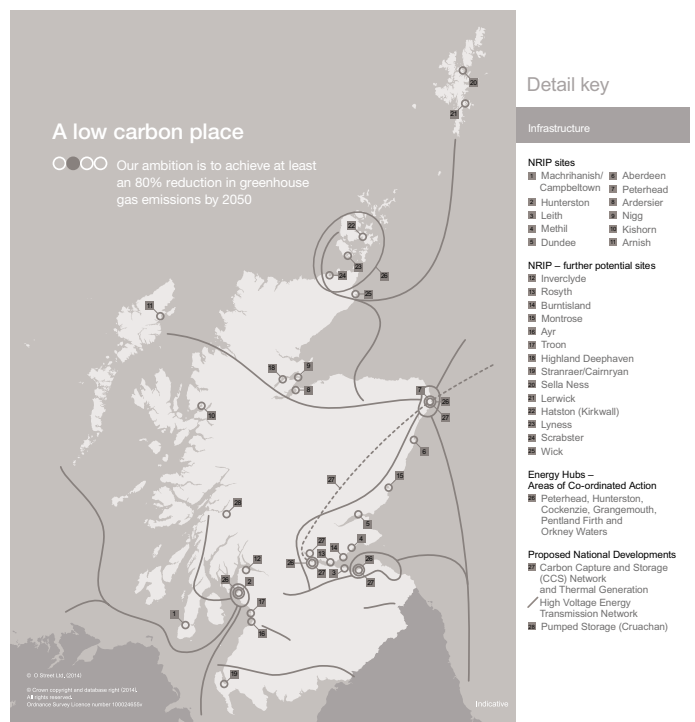
UK Regulatory Framework - RIIO



(Courtesy of National Grid)

52 <https://www.ofgem.gov.uk/ofgem-publications/53746/sptshetfltp.pdf>

These developments are already providing access to market for large amounts of new renewable generation across Scotland, and will continue to do so. These improvements to the system will take time to progress through the planning and construction phases; the upgraded line between Beaulay and Denny took five years from application until the award of consent in 2010 following a public inquiry, and construction of the line is ongoing. However, the Scottish Government has recently proposed the inclusion (as part of its third National Planning Policy Framework) of upgrades to the transmission network as proposed national developments⁵³.



These investments, as well as those which have been approved by Ofgem with regard to the transmission of electricity and gas across the UK⁵⁴ are taking place, in the context of the needs of the UK as a whole.

They have been designed to strengthen and support trade across the existing single energy market, and to enhance security of supply by ensuring that energy is capable of being transferred from where the resource exists to where it is needed. This ensures the renewable energy resources, which are most concentrated in remote parts of Scotland, are available to help meet demand and targets across the UK as a whole.

53 <http://www.scotland.gov.uk/Publications/2014/01/3724/5>

54 <https://www.ofgem.gov.uk/ofgem-publications/76242/20121217-press-release-riio.pdf>

The Commission believes that regardless of the outcome of the referendum on 18 September 2014, these needs will endure and that a strong argument consequently exists for the investment costs being shared across the UK.

The issue of connections is particularly acute in the context of the Scottish islands. Moves are underway to introduce a bespoke strike price for island generated wind under the proposed CfD mechanism. This recognises the huge potential resource on Scotland's islands, and the relative merits of the costs involved in tapping into that resource – relative to more expensive technologies such as offshore wind. The Commission supports the joint efforts being undertaken by the Scottish and UK Governments to encourage the development of the energy resources of the Scottish Islands in wind and marine energy and sees this as an area of real potential for both energy generation and social impact.

An independent Scotland would also need to consider the role of 'smart grids' as part of societal changes over the coming years which will fundamentally alter the way in which energy is generated, stored, distributed and consumed. There will be opportunities for Scottish businesses and universities in the research, development and marketing of the technologies which will underpin and emerge from the efforts required to deliver this shift.

EU 2030 Package (looking beyond current Targets)

Discussions are taking place through 2014 amongst EU Member States which will establish the policy framework and targets designed to continue moves towards an integrated and secure low carbon energy market across the Continent by 2030⁵⁵. The framework which the EU has proposed comprises amongst other measures:

- » a target to reduce EU domestic greenhouse gas emissions by 40% below the 1990 level by 2030
- » an objective of increasing the share of renewable energy to at least 27% of the EU's energy consumption by 2030
- » continued improvements in energy efficiency
- » reform of the EU emissions trading system.

This is a matter upon which the current Scottish Government has worked with its UK counterpart – with common ground regarding the intent if not always the precise detail and scope of the EU's chosen approaches.

An independent Scottish Government would of course be free to participate as a member state (subject to that status being achieved) and engage with the EU to pursue policies and outcomes going forward which it believes are in the common interest of Member States and which constitute the best possible means of achieving common goals.

The 2030 framework and policies will meanwhile provide a backdrop for investment in renewable and low carbon energy – and a set of principles governing state subsidies and support – which will have a meaningful influence on investment and development decisions, and with which future Scottish Government policies will need to remain consistent.

Whichever approach or option is taken will need to remain consistent with developing EU policy and priorities governing availability of state support and subsidies.

⁵⁵ http://ec.europa.eu/clima/policies/2030/index_en.htm

ADVICE ON WAYS IN WHICH AN INDEPENDENT SCOTLAND CAN PROMOTE FAIRER, MORE AFFORDABLE ENERGY PRICES, GIVEN THE NEED TO ADDRESS FUEL POVERTY AND MEASURES TO IMPROVE ENERGY EFFICIENCY

- » The Scottish Government must retain a concerted approach to tackling fuel poverty
- » The establishment of a Fuel Poverty Agency would help drive strategic and structural changes aimed at tackling fuel poverty issues across Scotland
- » The Scottish Regulator could review the structure and operation of the retail market across Scotland in view of Scotland's varied customer needs
- » Greater competition in energy supply, and a new set of responsibilities for gas and electricity distribution businesses, can deliver better deals for Scotland's homes and businesses
- » Certain 'social' and environmental policy costs should be removed from consumers' bills – as long as funding for those initiatives is maintained
- » Area based delivery and trusted local intermediaries can help ensure that vital energy efficiency efforts and funding are tailored to reach and benefit more difficult and costly households and businesses
- » There is scope for improvement in the roll-out of smart meters which will help realise their potential benefits to Scottish customers
- » The wider use and penetration of both district heating and CHP should continue to be widely and actively explored in Scotland.

Our ability, or inability, to pay for the energy we need has seldom had such a high profile. The rise in energy costs and bills over the last decade, allied with the poor condition of some housing stock, has had a significant impact on business competitiveness and household budgets, upon the number of homes and families living in fuel poverty, and on the importance and effectiveness of policies and programmes aimed at reducing demand for energy.

These issues are particularly acute in Scotland; where there is greater concentration in the retail market, higher average consumption due to the colder climate and nature of the building stock, fewer customers with access to a gas supply and a concentration of expensive all-electric heating in rural areas, away from the gas grid – all of these things lead to unacceptable levels of fuel poverty.

While different criteria are used between Scotland and the rest of the UK to calculate the number of people in fuel poverty, any measure which consistently results in high numbers of consumers (2.4 million households were fuel poor in England in 2011), or a high percentage (27.1% of households in Scotland were in fuel poverty in 2012) demonstrates the need for a more radical approach to tackle fuel poverty.

Policies dealing with fuel poverty and energy efficiency are only partially devolved at the moment. The Scottish Government has the power to set its own targets – these include a target to eradicate fuel poverty as far as is reasonably practicable by the end of November 2016, and to reduce total final energy demand by 12% by 2020 – it has also introduced new measures and programmes for Scotland. However, the devolved powers do not extend to measures requiring wider energy market regulation.

In the view of the Commission, it is apparent that under the current powers of the devolved Parliament in Scotland there has been a significant effort to address fuel poverty and delivery of energy efficiency as a priority. However, due to a combination of factors including the recession, increases in energy costs, and changes to the Energy Company Obligation (ECO) announced in the Chancellor's 2013 autumn statement, the Scottish Government's target to eradicate fuel poverty will not be met. It is important to acknowledge this, and to ensure that sufficient financial resources and strategic direction remain focused on tackling this issue.

Establishing a Fuel Poverty Agency with the correct legal structure and powers to deal with information and data discontinuities, and coupled with Local Authority partnership to integrate social security information and vulnerable consumers, would provide a significant step forward in dealing with fuel poverty.

The Commission agrees with the Scottish Government that a Scottish Regulator would be better placed to deliver Scottish solutions. A suite of changes to energy supply functions, coupled with a greatly enhanced role for electricity and gas distribution businesses, could result in a stronger focus on local needs and better outcomes, identify those most vulnerable and do much more to cut fuel poverty.

In April 2013, the Scottish Government launched its own Home Energy Efficiency Programmes for Scotland (HEEPS) to provide targeted funding support to help eradicate fuel poverty. This was heavily predicated on funding contributions being available via ECO, changes to which have put this at serious risk in Scotland.

The provision of funding for energy efficiency and fuel poverty through general taxation can be argued to be both fairer and less distortive of energy costs.

Of late, the major parties have generally supported a shift from collection through energy bills to wider taxation. Allocating a suitable level of resources from central government funds can eliminate the risk that fuel poverty initiatives might be diluted.

However, irrespective of how the money is raised, if the action programmes are embedded and locally relevant, then the outcomes will be more enduring and deliverable. This funding must be sufficient to support delivery across Scotland.

Energy efficiency is the main way in which energy affordability can be delivered and achieved on a long-term basis, for households and businesses alike. More efficient use of energy also directly reduces Co₂ emissions by avoiding burning fossil fuel, i.e. 'doing more with less'. The importance of energy efficiency links directly to the costs underlying much of our economy and to the productivity and competitiveness of our industry and services. A strong focus on energy efficiency should be a natural priority for Scotland, a country whose business balance is heavily weighted towards the energy sector and which recognises the value in its use, and whose northern climate makes domestic heating a necessity.

European heat networks benefit from very high efficiency Combined Heat & Power generation (CHP) from a range of fuel sources (fossil and renewable). District Heating (DH) with CHP has been shown to provide a very high efficiency solution for heating, and the Commission believes that its use in Scotland should be more widely explored.

The increasing integration of electricity and heat within networks, and the use of gas as a fuel source, highlights an increasing future role and responsibility for the regulator in the economic regulation of heat networks, as well as in the traditional electricity and gas markets as the cost and pricing of gas becomes of increasing importance.

The roll out of smart electricity and gas meters in the UK is taking considerable time to implement. Once completed, the meters will provide remote reading and more accurate billing, thus playing a potentially meaningful role in helping to tackle fuel poverty. However, there has been further progression in smart meter functionality since the roll out programme commenced. Further action in this area could produce a number of benefits, and deserves to be treated as a high priority.

Energy Affordability and Fuel Poverty

Energy affordability encompasses interrelated issues, including retail prices and tariff structures, household income, and household energy demand, and is in turn related to the energy efficiency of buildings. Responsibility for these elements under the current constitutional arrangement is split at present, with a degree of devolved power and responsibility balanced by the reservation of powers over energy market regulation.

The UK Government guides Ofgem with respect to regulation of the energy retail sector, and can influence the size and content of energy bills through the placement of obligations on energy supply companies to raise levies to support particular policy outcomes.

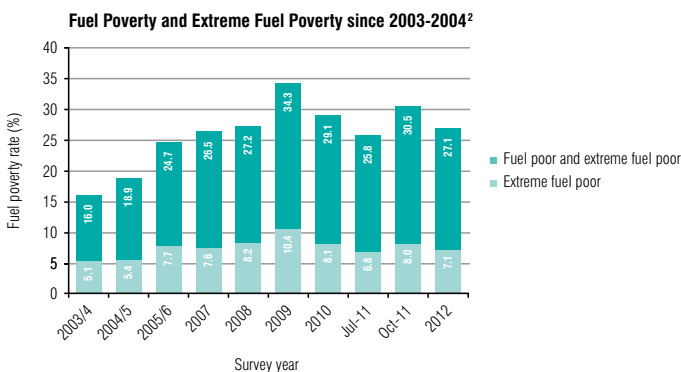
An example can be found in the UK Government's requirements for energy companies to achieve emission savings by installing domestic energy efficiency measures. The costs of these obligations are assumed to be passed onto consumers through their energy bills. Schemes such as the current Energy Company Obligation (ECO), and previously Carbon Emissions Reduction Target (CERT) and Community Energy Savings Programme (CESP), have been the main source of funding for retrofit energy efficiency measures for many years.

The Scottish Government, meanwhile, has the power to set its own targets, and has done so both with respect to fuel poverty (to be eradicated as far as is reasonably practicable by the end of November 2016) and energy efficiency (a reduction in total final energy demand of 12% by 2020 from a 2005-2007 baseline, covering all fuels and sectors). The Scottish Government invested £220 million towards measures tackling fuel poverty (and supporting energy efficiency) between 2009-2010 and 2012-2013, and has announced plans to spend around £250 million pounds between 2013-2014 and 2015-2016.

These and other measures, such as the setting of standards for the construction of new buildings as well as standards for energy efficiency of existing housing in the social rented sector, demonstrate the division of powers that exists and the suite of actions in place or proposed to help address fuel poverty and promote energy efficiency in Scotland.

Energy affordability could, in theory, be addressed by a mixture of reducing prices, increasing incomes, or improving energy efficiency and it is clear that Governments are sincere in their efforts to deal with these issues. **The Commission believes that additional powers would open up new possibilities, which could better address Scotland’s specific circumstances and more acute needs.**

The graph below, taken from the Scottish Fuel Poverty Forum Report published in March 2014⁵⁶, shows trends in fuel poverty and extreme fuel poverty in Scotland.



The affordability situation in Scotland is exacerbated by a number of factors, including the:

- » colder climate, requiring greater levels of heating over a longer period
- » number of off gas grid properties (about 10% according to the

2012 Scottish House Condition Survey⁵⁷), including many with electric heating – which could carry a disproportionate burden of social and environmental policy costs on their bills⁵⁸

- » high numbers of flats and tenements in the housing stock – which can be better in energy efficiency terms than some other types of dwellings, but are harder to improve.

Rising prices have also meant that concerns about energy affordability are no longer restricted to defined fuel poor groups.

Fuel Poverty Agency

The Commission believes that a bespoke body, set up with the sole focus of co-ordinating and targeting efforts to tackle fuel poverty, would be a significant step forward.

This could be within Government or established as a non-departmental public body – the manner of the body’s incorporation is less important than its remit.

A Fuel Poverty Agency should be capable of striking effective working and operational partnerships with a range of partner organisations across Scotland – such as local authorities, care services and energy distribution companies. It should be empowered to gather and maintain data regarding those most vulnerable to and most affected by fuel poverty, and capable of targeting the solutions (including improved energy efficiency) which work best in particular circumstances.

The roll-out of smart meters would also, with appropriate safeguards, enable a Fuel Poverty Agency to monitor those in vulnerable circumstances, and to identify for instance where financial pressure leads to customers failing to use heating systems to maintain their wellbeing.

Energy Costs

An independent Scottish Government would have greater autonomy and a range of new financial and regulatory powers, enabling it to introduce new measures aimed at tackling high energy costs and prices.

56 <http://www.scotland.gov.uk/Topics/Built-Environment/Housing/warmhomes/fuelpoverty/ScottishFuelPovertyForum/final-report>

57 <http://www.scotland.gov.uk/Topics/Statistics/SHCS>

58 <http://www.consumerfutures.org.uk/news/households-who-rely-on-electric-heating-may-pay-the-highest-price-for-government-energy-policy>

A report by the Office for National Statistics⁵⁹, published in March this year, showed that the average monthly spend on energy increased, despite a reduction in energy usage, from £69 to £106 between 2002-2012 – a 55% increase. This rise has occurred while household incomes have essentially remained flat following the financial crisis of 2008 – underlining that the impact is greater on those with lower incomes.

Real 2012 prices	Gas bill	Electricity bill	Energy bill
Wholesale energy cost	£383 (55%)	£215 (37%)	£597 (47%)
Network costs	£124 (18%)	£133 (23%)	£257 (20%)
Other supplier costs and margin	£119 (17%)	£121 (21%)	£240 (19%)
Energy and climate change policies	£33 (5%)	£80 (14%)	£112 (9%)
ECO ¹⁷	£25 (4%)	£22 (4%)	£47 (4%)
RO	–	£30 (5%)	£30 (2%)
EU ETS	–	£8 (1%)	£8 (1%)
CPF	–	£5 (1%)	£5 (0%)
Warm Home Discount	£6 (1%)	£6 (1%)	£11 (1%)
FITs	–	£7 (1%)	£7 (1%)
Smart Meters & Better Billing	£2 (0%)	£1 (0%)	£3 (0%)
VAT (5%)	£33 (5%)	£27 (5%)	£60 (5%)
Total (no Warm Home Discount rebate)	£691	£576	£1,267
Average rebate (inc VAT)	–	-£13	-£13
Total (with rebate)	£691	£563	£1,255

Source: DECC 2013. Figures may not add due to rounding.

Make-up of average household energy bill (DECC, 2013)

These are average costs for dual fuel users – actual costs for individual consumers vary considerably depending on:

- » Payment method – direct debit is cheapest, followed by pre-payment meter (PPM) and quarterly credit (payment on receipt of bill). Fewer options for switching supplier are available for some consumers, as many new entrants offer only direct debit tariffs. This situation is particularly acute for those using PPMs, where competition is very limited. Those who have never switched and are able to pay by direct debit are most likely to be able to make greatest savings. The introduction of smart meters should provide opportunities to address some of these issues

59 <http://www.ons.gov.uk/ons/rel/household-income/expenditure-on-household-fuels/2002---2012/full-report--household-energy-spending-in-the-uk--2002--2012.html>

- » Heating fuel and volume/pattern of energy use – those using electric storage heating are particularly exposed to levies on bills, as these are concentrated on electricity costs. In addition, those at home during the day, for example, are likely to have higher heating needs; Scotland has a harsher climate and lower gas penetration than other GB countries, so these issues are more prevalent
- » Availability of social tariffs – these are subsidies on bills, generally applied at source (i.e. a reduction on the bill sent to the consumer) for targeted groups at greatest risk of fuel poverty. As with all universal benefits, however, some people in need are excluded, while others whose need is relatively smaller are included within the scheme
- » Ability to pay, and the way in which consumers, especially those in fuel poverty, manage their costs.

Elements of energy bills which government energy policy should take account of, including a future Scottish Government in the event of greater devolution or independence⁶⁰ include:

- » Wholesale gas: The largest single influence on bills is the cost of wholesale gas, which has an indirect but significant effect upon electricity costs as well as upon gas bills for consumers. The Commission acknowledges that wholesale gas prices are determined internationally and by a range of factors, meaning that they are almost entirely outside the influence of any government in the short to medium term – a matter of relevance in the context of current proposals to place a regulatory freeze on consumers' energy bills. In the longer-term, however, the costs facing consumers might be influenced as a result of Government policy and efforts to change the fuels used to produce electricity or to heat buildings
- » Transmission and distribution costs, taken together, make up around 20% of consumers' bills. These costs are currently regulated by Ofgem, and indications are that this element will not rise significantly, in real terms, over the next few years. The Commission believes that there is a logical argument for the costs of upgrades to the transmission capability within Scotland, and the rest of the UK, to continue to be met by all UK consumers, on the grounds that these are designed to help deliver the legally binding carbon targets faced by the UK as a whole and to enhance system security in both jurisdictions. Electricity distribution costs are significantly higher in the

60 <http://www.consumerfutures.org.uk/files/2013/07/Energy-policy-constitutional-change-and-consumers-in-Scotland.pdf>

- » North of Scotland than in other GB distribution areas, due to the geography in this area and the widely dispersed population
- » The extension of the EU Emissions Trading Scheme will add to bills over the next few years. While the introduction of this charge is the consequence of an EU Directive, it is up to individual governments to decide how the money is spent. The Commission notes arguments on the part of Consumers Futures about the value of recycling EU ETS money towards energy efficiency measures, and the step change in funding that such a move could deliver. The Scottish Government should consider the changes to budgetary planning which would be needed to drive the implementation of such a change.

Regulation

A Scottish Energy Regulator, or the proposed Consumer and Competition Authority, would have the ability to consider and address specific Scottish circumstances. The Commission believes that this would provide an opportunity to streamline and optimise the landscape for energy customers in Scotland, and to promote wider competition in energy supply.

Levels of market engagement and switching in Scotland have historically been limited, with very high levels of consumers (compared to other GB nations and regions) remaining with their incumbent supplier. There remains a question about the competitiveness of the retail market in Scotland as a result, leading to concerns around the consolidation of a Scottish ‘Big 3’ – Scottish Gas, SSE, Scottish Power. There are several possible reasons for this:

- » the historical difficulties involved in face-to-face selling (and poor experience of this technique by consumers) as a result of geography and the widely dispersed population
- » brand loyalty to the ‘Scottish’ companies
- » the lack of mains gas, which inhibits suppliers from marketing their preferred dual fuel deals
- » dynamic teleswitching tariffs – these are used by many electric storage heating consumers in Scotland but are not supported by other suppliers, thus restricting the ability of such customers to move to a different supplier
- » lack of effective choice or competition for consumers using pre-payment meters – Scotland has a greater percentage of such consumers.

Better-off consumers with internet access are generally more likely to benefit from competition in the existing retail market than are those more at risk of fuel poverty. The combination of rising energy prices and flat incomes also means that increasing numbers of households are likely to remain fuel poor even after installing standard insulation measures. While the Scottish Government has taken action in this area, which has been welcomed by consumer and campaign groups, wider changes mean that overall action on fuel poverty has been running to stand still.

In October 2013, the Scottish Government proposed that if elected under independence, it would remove ECO and Warm Homes Discount costs from consumer bills and meet those costs from central Government resources. While this transfer would add to existing pressures on public expenditure, the Commission believes that the need for such support remains and welcomes the Scottish Government’s assertion that current funding levels will be maintained⁶¹.

The Commission believes that this would help level the playing field; smaller suppliers would be much better placed to compete without issues such as the Warm Homes Discount creating hard to understand points of difference.

This change could pave the way for a more detailed review of Scottish supply, charges and tariffs by the Scottish Regulator, designed to fit more coherently with the needs and circumstances of Scottish consumers. For example, the introduction of rising block tariff structures would provide lower cost energy for low users while encouraging greater consideration of energy efficiency measures among higher users. This would require legislation and a significant change in industry billing approaches.

This kind of review would be contextualised by certain factors, such as the single market wholesale cost and the additional business infrastructure costs that it might create for incumbent suppliers arising from changes in respect of their Scottish customers.

Evidence gathered by the Commission clearly indicates that utility programmes which attempt to find the most vulnerable in society are often unsuccessful, with customers ultimately paying the price. Scotland can redesign this process to improve value, improve the spectrum of measures and deliver more effectively, particularly in rural areas.

⁶¹ <http://www.scottish.parliament.uk/parliamentarybusiness/28877.aspx?SearchType=Advance&ReferenceNumbers=S4W-19828&ResultsPerPage=10>

The Commission believes that there is an argument to considerably enhance the role of the energy distribution companies. These companies, due to their provision of captive monopoly services, could pick up greater residual social responsibilities – for example, maintaining a priority register of vulnerable customers who need protection and special care during emergencies and outage. The source of data generation will depend on the reallocation of duties previously fragmented across many supply companies. This would sit well alongside wider measures to tackle fuel poverty and promote energy efficiency being driven forward by others.

The Commission believes that the distribution companies should also become responsible for all meter provision and operation in Scotland, including meter reading.

The roll out of the smart meter programme, which should signal the beginning of a major and beneficial new consumer interface in the UK, is taking considerable time to implement. Whilst the meters will provide remote reading and more accurate billing, there have been further advances in smart meter functionality since the roll out programme commenced that could enable access to time of day tariffs and additional demand response services.

By transferring responsibility to energy distribution businesses, the Scottish Regulator can mandate a statutory programme of smart meter installation that is homogeneous and co-ordinated. All electricity customers should have the benefit of a smart meter in a known timeframe.

The Commission has some concerns about the effect of such a move upon the existing distribution price control review (RIIO-ED1); if the risks attached to re-opening and delaying this review and its vital investment were considered too great, then an alternative option would be to transfer responsibility following contractual and operational delivery.

All of the steps outlined here could form part of a more concerted effort to give fuel poverty actions and policies a stronger 'local' emphasis and basis – such as, for example, the potential use of community initiatives designed to encourage better use of the schemes which are available.

The changes should also simplify the structure of supply business functions quite substantially, and could result in overall reductions in charges to customers. They would require a number of issues to be addressed, including access by wider parties to the data from smart meters; practical interpretation of cyber security and data privacy requirements; and access to data sufficiently close to real time, where needed.

Energy Efficiency

The Energy Efficiency Directive 2012/27/EU⁶² requires energy delivery companies to reduce their energy delivered (end use) by the equivalent of 1.5% each year to 2020. This can offer an opportunity for Scotland to completely rethink the delivery of end use energy efficiency. The Directive foresees a certificate scheme as being one of the most efficient ways of delivering this result; both France and Italy are currently using this approach.

Scotland should explore access to the 4% of European cohesion funds which the EU has allocated for the purpose of energy efficiency measures. Taking a longer view of the significant challenge of renovating all existing stock to a suitable level, the trade-off between deep renovation and renewal of the appliances, energy delivery system, controls and supply should be explored. A more integrated approach to energy use and delivery through higher efficiency appliances may be a route, for certain groups and types of buildings, to achieve a significant improvement in the near term.

The co-ordinated upgrading of groups of buildings is being taken forward across Europe and is seeing some success. There is a particularly interesting and impressive example in the Netherlands, with €60 million available under the Energiesprong programme designed to foster energy neutral buildings⁶³. With larger schemes, and the involvement of interested third parties, Energy Service Companies (ESCOs) can become involved providing access to additional funding and expertise.

62 [Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC](#)

63 <http://annex40.net/Netherlands.11586.0.html#c44898>

The energy efficiency of products developed in Europe is being gradually raised through the implementation of a basic efficiency requirement and an energy labelling system under ECO product design. The legislation also includes the requirement of energy labelling on energy consuming products, creating the opportunity for public organisations to set standards for energy efficiency of the products which they choose to procure. This can progressively cut their energy consumption and promote reduced energy use in the public building stock as a whole.

Energy audits are a necessary first step in identifying opportunities to reduce energy use in SMEs and industry. Encouraging Scottish companies involved in IT development to design effective, easy to use assessments for self-audit by SMEs and industry would be a useful investment for Scotland, and develop the knowledge base required to deliver wider energy efficiency in these areas. The Commission understands that Resource Efficient Scotland is currently taking forward work in this area on the Scottish Government's behalf.

The Scottish Government published *Conserve and Save: The Energy Efficiency Action Plan for Scotland* in October 2010. The plan introduced a headline target to reduce final energy (end-use) consumption by 12% by 2020 using a 2005–2007 baseline, and was formally reviewed in May 2013⁶⁴. The latest energy trends data, published in September 2013, indicates that, in 2011, Scotland's final energy consumption was 9.2% lower than the baseline averaged over the years 2005–2007, indicating that Scotland remains on course to meet its 2020 target.

The Scottish Government has implemented a range of initiatives and proposals using its own devolved powers. These include:

- » the introduction of a single Scottish Energy and Resource Efficiency Service (SERES), to provide greater cross-referral and more consistent and comprehensive advice, encouraging businesses to consider a holistic approach to their low carbon transition
- » the decision in 2013 to establish a new single integrated resource efficiency advice and support service for Scottish businesses, public and third sector organisations. Resource Efficient Scotland, launched in April 2013, integrates previous business and public sector services delivered through Carbon Trust, Energy Saving Trust and Zero Waste Scotland into one single service⁶⁵.

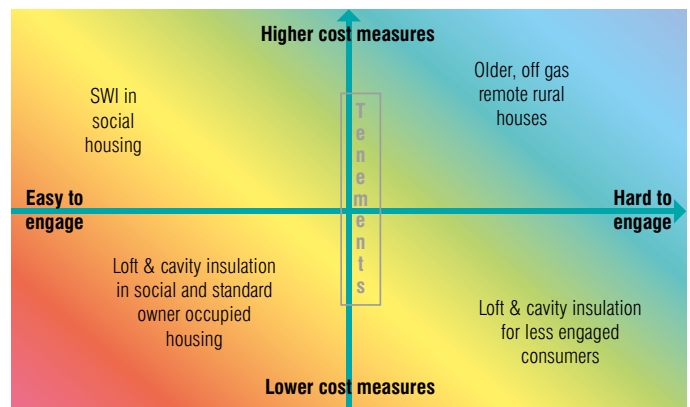
⁶⁴ <http://www.scotland.gov.uk/Publications/2013/05/2162/3>

⁶⁵ <http://www.resourceefficientscotland.com/>

The Scottish Government has already increased the energy efficiency standards required for new buildings, and has also published *Scotland's Sustainable Housing Strategy* in June 2013, setting out a vision for warm, high-quality homes that are affordable to heat, and for a housing sector that helps to establish a successful low carbon economy with a route-map to 2030.

Despite the considerable improvements in the energy efficiency of housing in Scotland in recent years, data show that these improvements have, overwhelmingly, been delivered through widespread take-up of low cost measures (loft and cavity insulation). These measures were delivered free, or at low cost, to all householders under the combination of the Universal Home Insulation Scheme (UHIS) and CERT, which was the previous energy company obligation which closed in December 2012.

While there remains scope for, in particular, cavity wall insulation and loft top up, the data suggest that the majority of low cost actions have already been taken in easy to engage households⁶⁶.



As a result, the potential for large-scale improvements to domestic energy efficiency through delivery of these low cost measures is now more limited. It is also likely to require different approaches to engagement and regulation compared to those in the past, perhaps working to a greater extent through trusted local intermediary organisations and focusing on the private rented sector⁶⁷.

Specific approaches dealing with flats and tenement properties, where the lack of communal agreement even for free measures has been a barrier in the past, are also likely to be necessary.

⁶⁶ Scottish House Condition Survey, chapter 3.
<http://www.scotland.gov.uk/Publications/2012/12/4995/downloads>

⁶⁷ <http://www.consumerfocus.org.uk/scotland/files/2011/02/Energy-efficiency-in-private-sector-housing-in-Scotland-Regulation-and-the-consumer-interest.pdf>

These issues are complicated further because of the current delivery of measures by energy supply companies under ECO. While ECO has the potential to fund a very large range of measures, including those suitable for HTT houses, Ofgem progress reports on ECO show that the great majority of measures delivered at this stage remain those with lower cost. This suggests that the measures needed to improve the energy efficiency of much of the remaining, less energy efficient housing stock are likely to be more expensive, especially where there is no access to mains gas. Fewer such houses can benefit from a given funding pot, and the installation can also be much more disruptive for consumers than basic measures.

The Commission agrees that measures such as renewable heating (through the provision of local networks, as well as at the individual building level) and solid wall insulation offer the greatest remaining potential for improvement in these areas, given the lower remaining opportunity for basic insulation measures. The Commission would expect an independent Scottish Government to continue to give a high priority to pursuing and implementing such measures.

Further action in this area helps safeguard future occupants of those houses against the risk of fuel poverty, however, the Commission is aware that the main energy efficiency challenges relate to existing housing and non-domestic buildings and processes. The Commission believes that the Scottish Government should conduct a discrete and thorough review of the potential additional measures and opportunities afforded by new financial powers and regulatory controls to support an increase in energy efficiency and demand reduction in the non-domestic (commercial, industrial and public) sectors.

Energy Efficiency in the Transformation Sector

Traditionally there has been less emphasis on efficiency in gas and electricity transformation (that is, the efficiency of transforming fuel inputs into electricity and heat outputs, and the efficient transmission of electricity and gas) and their distribution networks.

Operating an electricity network with a high density of renewables poses new challenges for the electricity network. Thermal power stations in particular need to respond efficiently when the frequency of plant cycling in response to renewable generation output is higher and the normal point of operation may shift from a base or mid-merit load, to a requirement for more flexible operation.

Article 15 of the Energy Efficiency Directive (2012/27/EU) requires energy regulators to ensure that an energy efficiency assessment of National gas and electricity networks is carried out by June 2015. **The Commission recommends that the new Scottish Regulator take an overall system approach to energy efficiency which will allow for a more integrated approach to energy supply.**

This new world requires the introduction of new technology and offers opportunities for development of both hardware and software to accommodate these changes and raise the efficiency of the overall system's operation. **These measures should include the dynamic management of demand side consumption both in industry as well as in the home. Scotland with its high level of renewables and its relatively confined geography is an ideal place to develop such system and necessary components. This should be encouraged by policy and supported by the Regulator who should encourage and incentivise suitable innovation and its testing.**

The Role of District Heating and Combined Heat and Power

Many parts of Europe benefit from heat networks which allow both the very high efficiency generation of electricity and heat in combined heat and power (CHP) and the introduction of a range of heat sources, both fossil and renewable, into otherwise difficult to address architectures.

Combined heat and power is adding to the efficiency and productivity of Scotland's industrial and manufacturing base today. There is currently around 500 MWe of high efficiency CHP in Scotland⁶⁸, with notable examples such as the biomass CHP plants in the paper mills at Markinch and Irvine. The average penetration of CHP across Europe is 11%, although penetrations up to 25% exist in several Member States. District heating with CHP, meanwhile, has been shown to provide a very high efficiency solution for space heating.

⁶⁸ <https://www.gov.uk/government/publications/energy-trends-september-2013-special-feature-articles-combined-heat-and-power-in-scotland-wales-northern-ireland-and-the-regions-of-england-in-2>

The wider use of CHP in industry and district heating should be more widely explored in Scotland and encouraged by the Regulator as an energy efficiency measure in the transformation network itself. The

Commission acknowledges the work carried out in this area to date. This includes the publication by the Scottish Government of a *District Heating Action Plan* and the support available under the District Heating Loan Fund⁶⁹.

The Commission also notes the latest position and targets for district heating as set out within the Scottish Government's draft *Heat Generation Policy Statement* – an overarching target of 1.5 TWh of heat to be delivered to households and business, industry and the public sector by 2020, and a target of 40,000 homes to be supplied with affordable low carbon heat through district heating and communal heating by 2020. There are successful examples of district heating already across Scotland – such as the schemes in Aberdeen⁷⁰ and Shetland⁷¹.

Renewable Heat

The Commission believes that renewable heat provision has a potentially significant role to play in helping to tackle fuel poverty, as well as improving energy efficiency. The Scottish Government's target for renewable heat, elaborated upon below, is challenging, but remains an important part of efforts to secure progress in this area – as are market mechanisms such as the Renewable Heat Incentive.

Regulation of this growing sector will also play an important role over time in assisting the penetration and development of renewable heat in an independent Scotland. The style and scope of the necessary regulation should be commensurate with the scale of the heat market, keeping pace appropriately as that market grows. Such regulation should be designed to support development without creating undue barriers, or placing excessive costs on the sector which could be passed on to consumers.

Estimates suggest that heat accounts for over half of Scotland's total energy use. The Scottish Government has set a target of delivering 11% of Scotland's projected 2020 heat demand from renewable sources, such as biomass, heat pumps (ground source, air source and/or water source), heat from waste biomass and anaerobic digestion, including bio-gas, solar heating, wind to heat and geothermal heat.

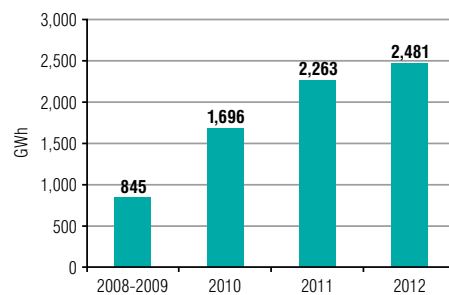
69 <http://www.energysavingtrust.org.uk/scotland/Take-action/Get-business-funding/District-heating-loan-fund2>

70 <http://www.aberdeenheatandpower.co.uk/>

71 <http://www.sheap-ltd.co.uk/>

The Scottish Government estimates⁷² that, between 2011 and 2012, renewable heat capacity in Scotland increased by 0.077 GW, and output increased by 218 GWh, from 2,263 GWh to 2,481 GWh. Figure 5.9 shows the estimates of renewable heat output in Scotland between 2008 and 2012, demonstrating that renewable heat output has increased by over 150% between the measurement in 2008-2009 and 2012.

Figure 5.9: Renewable heat output, Scotland, 2008-2009 and 2012



Source: Renewable Heat in Scotland (2012), a report by the Energy Saving Trust for the Scottish Government
<http://www.energysavingtrust.org.uk/scotland/Take-action/Get-business-funding/Renewable-Heat-in-Scotland-2012>

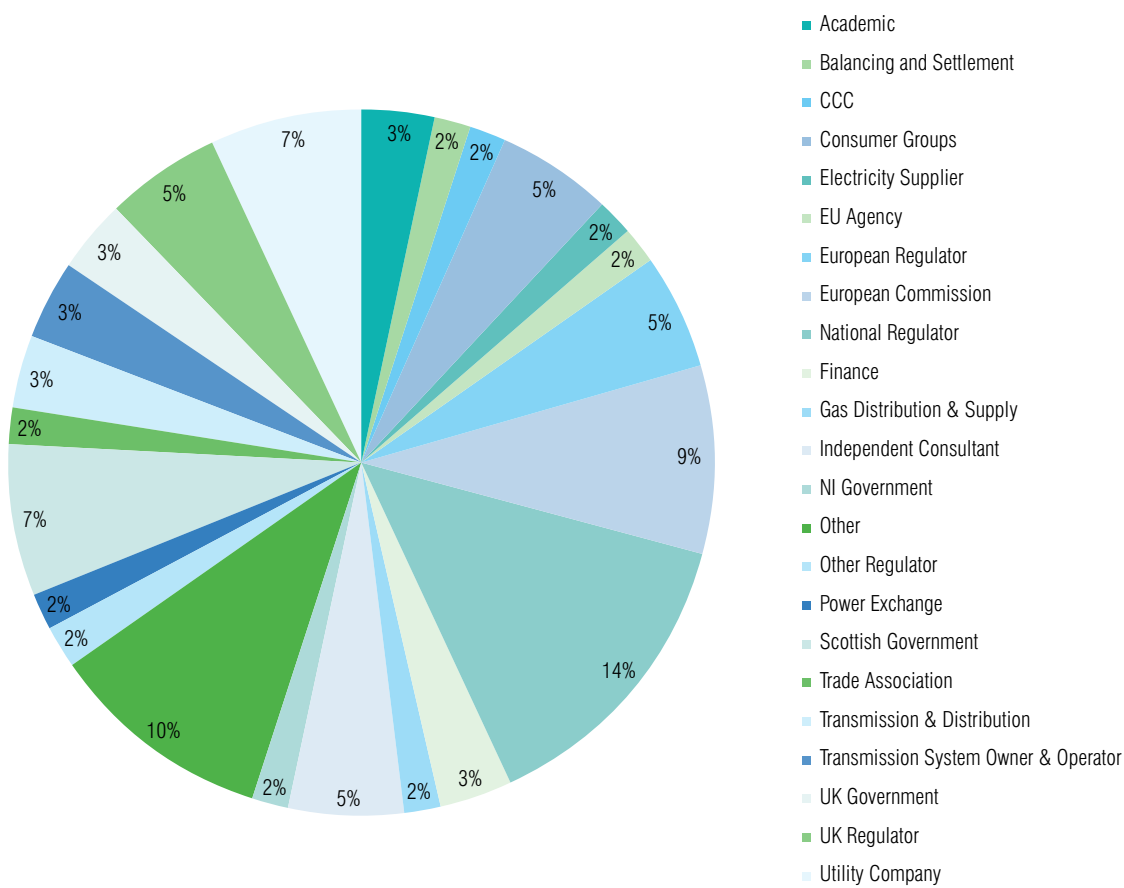
The Commission is aware of the measures put in place by the Scottish Government to support renewable heat, including funding through its Renewable Energy Investment Fund and Warm Homes Fund. These incentives, alongside the requisite availability of technical advice and support, will help increase the uptake of the relevant technologies.

72 <http://www.scotland.gov.uk/Resource/0044/00444530.pdf>

Stakeholder Engagement

During the course of the work of the Expert Commission, we have engaged with a diverse range of stakeholders across utilities, regulators (UK, EU and beyond), consumer organisations, trade associations, the finance community, the European Commission, and other relevant sectors, as displayed in the chart below. All discussions were held under Chatham House rule.

Meetings (by category)



The Commission are extremely grateful for the insight and comments provided by the following organisations: DECC, The Cabinet Office, Scottish Government Energy Division, ACER, CEER, DG Energy, ENTSO-E, the SEM, DETINI, and all other stakeholders they met with.

ANNEXE A – INTERNATIONAL REGULATION

A Scotland-rGB Electricity Market

As a starting point, the table below identifies the key statistics for the operation of a single electricity market between Scotland and rGB in the event of independence.

	rest of Great Britain	Scotland
Population (thousands)⁷⁴	55,240	5,222
Land Area (Sq km)	151,012	77,925
Installed Capacity (MW)⁷⁵	63,542	10,751
Demand (TWh)⁷⁶	330	37
Estimated Peak Demand (GW)⁷⁷	56	6
Renewable Electricity Target⁷⁸	30% of generation from renewable sources	Equivalent of 100% of gross consumption from renewable sources
Transmission System Owners	National Grid	Scottish Power Scottish & Southern Energy
Transmission System Operators	National Grid	Scottish System Operator
Interconnectors⁷⁹	2GW to France (IFA) 1GW to the Netherlands (BritNed) 500MW to the Republic of Ireland (East West) NB – there is also currently a little over 3GW of transfer capacity available via the existing cross-border circuits between Scotland and England	500MW to Northern Ireland (Moyle)

73 <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-247453>

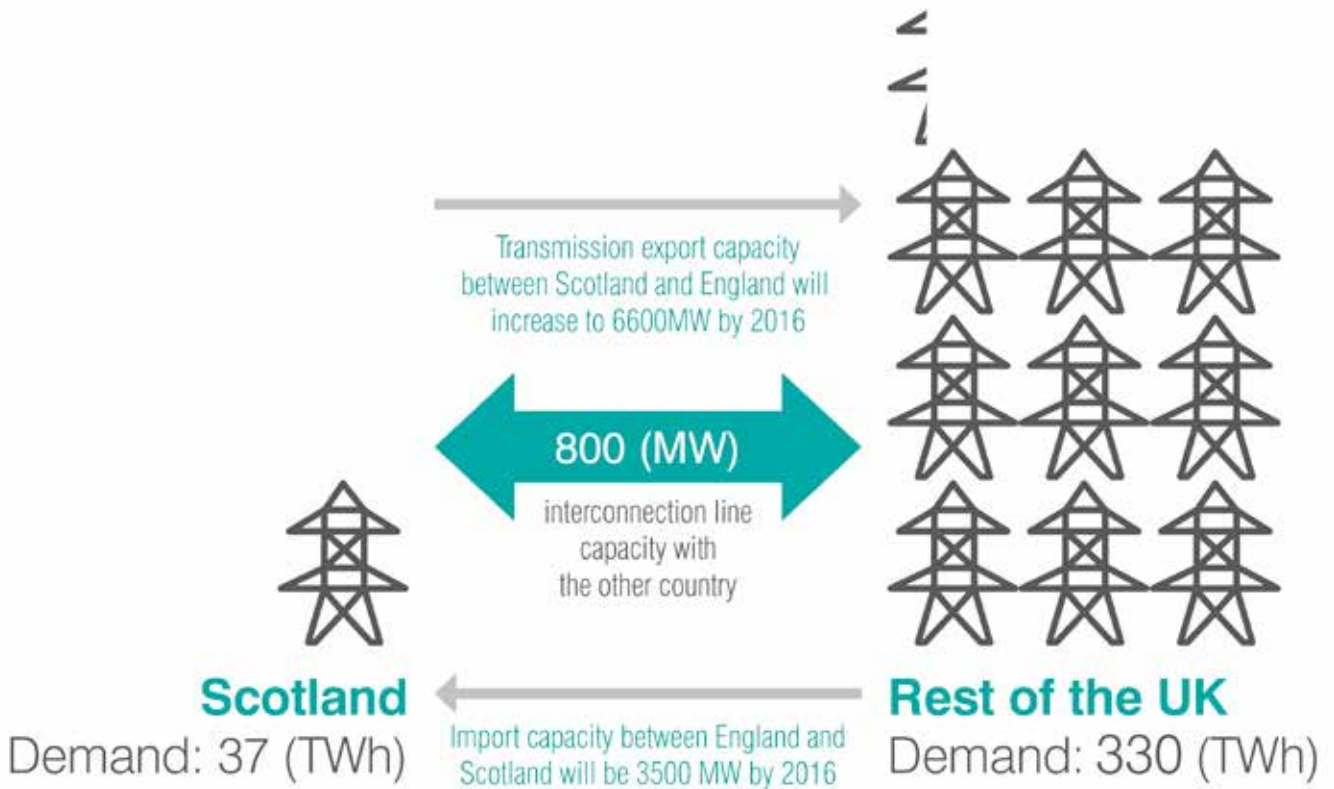
74 <http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/Electricity-ten-year-statement/Current-statement/>

75 <https://www.gov.uk/government/publications/energy-trends-december-2013-special-feature-article-electricity-generation-and-supply-figures-for-scotland-wales-northern-ireland-and-england-2>

76 SG estimates based on - <http://www2.nationalgrid.com/uk/industry-information/future-of-energy/fes/Documents/>

77 The 30% renewable electricity target is a UK-wide target, which contributes to the UK's 15% energy target.

78 <https://www.ofgem.gov.uk/electricity/transmission-networks/electricity-interconnectors>



Electricity consumption in Scotland is a little over 11% of the demand in England and Wales. At present, Scotland has a transfer capacity to England and Northern Ireland of around 3.5GW which represents approximately a third of Scotland's installed generating capacity. From upgrades to the transmission system, this transfer capacity will increase to 6.6GW by 2016, or around 62% of the existing installed generating capacity in Scotland.

The Single Electricity Market (SEM) – Republic of Ireland, Northern Ireland

The development of the SEM was based upon a strong foundation, comprising open and transparent memoranda of understanding between both the Regulators⁷⁹ and the UK and Irish Governments⁸⁰. These established clear frameworks for the task to be undertaken and provided a platform for the engagement which followed. It seems to the Commission that the frequency of engagement is a key factor, and that meetings on at least a quarterly basis between the Scottish and rUK Government ministers and working parties would be a necessary component of success.

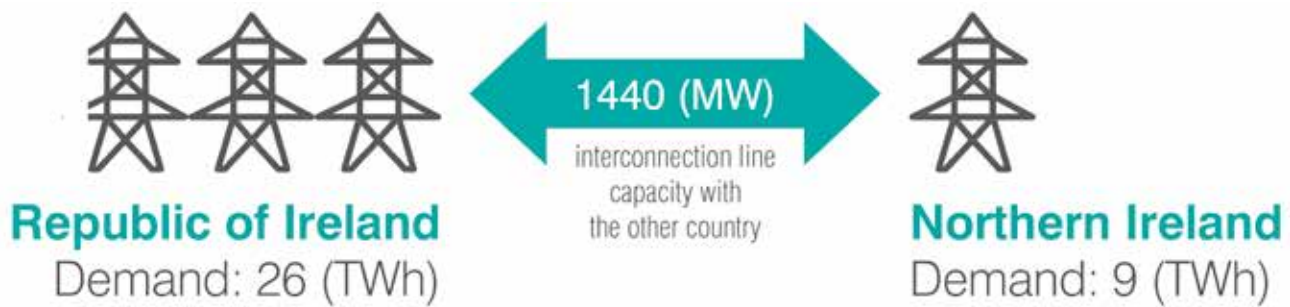
The SEM approach was built upon a clear statement from the outset regarding the intent and the nature of the relationship between the partners. The following sections provide further detail regarding how such relationships can be established, maintained and regulated.

Key statistics

	Republic of Ireland (RoI)	Northern Ireland (NI)
Population	4.6 million	1.8 million
Land Area	54,421 km ²	13,843 km ²
GDP (2012)	€164 million	--
Installed Capacity (MW)	7,135	2,592
Demand (TWh)	26	9
Forecast Peak Demand (MW) (2020)	5,210	1,915
Renewable Energy Targets	40% of generation by 2020	40% of consumption by 2020
Transmission Owner	ESB Networks	Northern Ireland Electricity
System Operator	Eirgrid plc	System Operator for Northern Ireland Ltd (SONI)
Interconnections and Capacity	East – West (RoI to Wales) 500MW	Moyle (NI to Scotland) 500MW
	Three Electricity Interconnectors between RoI and NI. Two 275kV circuits of 600MW, totalling 1,200MW, plus two 110kV standby North-South Interconnectors with a capacity of 120MW each Total RoI/NI Interconnection is 1,420MW	

79 http://www.uregni.gov.uk/uploads/publications/CER_OFREG_Memo_of_Understanding_Final.pdf

80 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/272399/7002.pdf



Demand in the Republic of Ireland is around three times that of its neighbour. Meanwhile, the existing transfer capacity of 1,420MW between the two countries represents a little over half (55%) Northern Ireland's current installed generating capacity, and around 20% of the Republic of Ireland's.

The all-island Project is a joint initiative that has been run by the Commission for Energy Regulation (CER) and the former Northern Ireland Authority for Utility Regulation (NIAUR) – now known as the Utility Regulator for Electricity, Gas, Water, Northern Ireland (UREGNI). The aim of the project was to create a single market for natural gas and electricity on the island of Ireland. The project was started following a joint policy decision by the Minister for Enterprise, Trade and Investment in Northern Ireland and the Minister for Communications, Marine and Natural Resources to create the all-island energy market. On 1 November 2007 the Single Electricity Market (SEM) went live, commencing the trading of wholesale electricity in Ireland and Northern Ireland on an all-island basis.

As part of the establishment of the SEM activity, the Regulatory Authorities identified four areas as key SEM regulatory functions:

1. Trading and settlement code
2. Market monitoring unit
3. Market modelling group
4. Single market operator regulation

The single Irish market is regulated by the SEM Committee. Its powers are based on a memorandum of understanding between Ireland and Northern Ireland. The Committee consists of three UREGNI representatives, three CER representatives, an Independent Member and a Deputy Independent Member. Each regulator gets one vote with the casting vote from the Independent Member.

As recently as February 2014, the UREGNI and the Commission for Energy Regulation (CER) signed a Memorandum of Understanding⁸¹ that outlines how the two organisations will maintain and facilitate effective and beneficial cooperation and collaboration. This signifies the ongoing commitment of both regulatory authorities to work together to ensure the efficient delivery of both joint and separate statutory remits and for the customers of the energy and water sectors they regulate.

The SEM committee structure has provided a well-governed approach to joint regulation of the single market. However, it is acknowledged that from the outset, due in part to the set-up of the committee structure, it has had difficulty in addressing and resolving many issues that were outstanding at the time of implementation. Issues deemed to be 'too difficult' were assigned by both industry and regulatory groups as 'a SEM issue'.

The Committee meets once a month with the location alternating between Dublin and Belfast. The two Regulator bodies each have approximately 120 staff. CER is Ireland's independent energy regulator, with a range of economic, customer and safety functions though it primarily regulates electricity, water and gas. UREGNI regulates the electricity, gas, water and sewerage industries in Northern Ireland, promoting the short and long-term interests of consumers.

81 http://www.allislandproject.org/en/about_us_overview.aspx

The Nordic Market – Norway, Sweden, Denmark, Finland, Iceland,

The national energy regulators of Norway (NVE), Sweden (Energy Market Inspectorate – Ei), Denmark (Danish Energy Regulatory Authority), Finland (Energy Market Authority) and Iceland (Orkustofnun – National Energy Authority) work co-operatively under the umbrella of NordREG. The vision of NordREG is that all Nordic electricity customers will enjoy free choice of supplier, efficient and competitive prices and reliable supply through the internal Nordic and European electricity market.

NordREG's mission is: to actively promote legal and institutional framework and conditions necessary for developing the Nordic and European electricity markets.

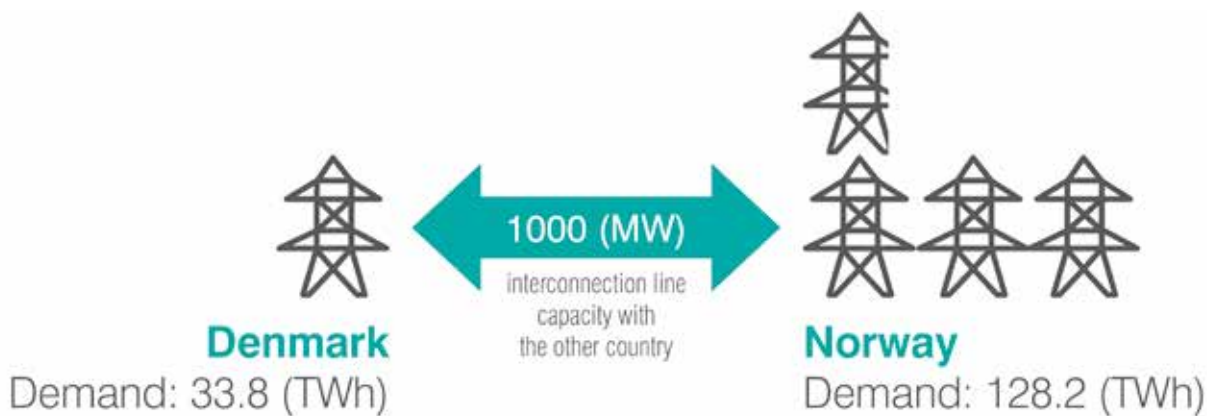
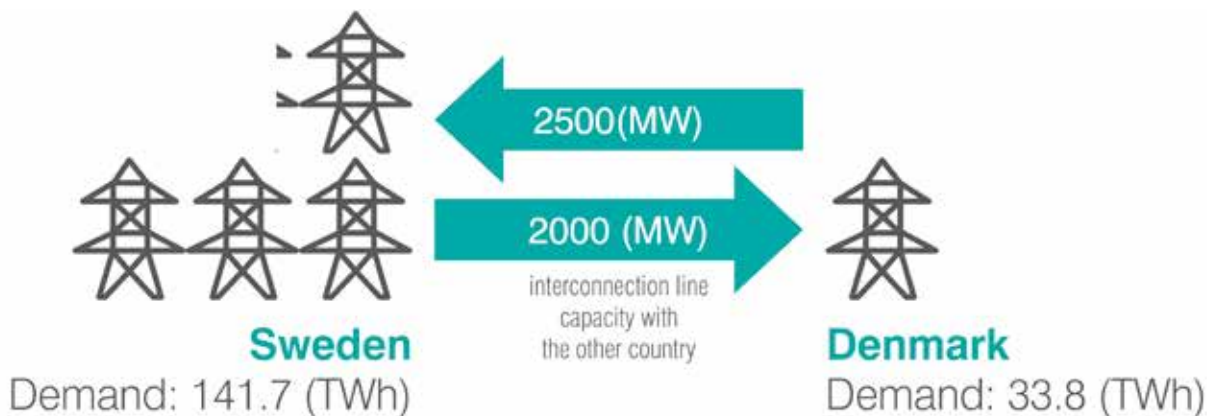
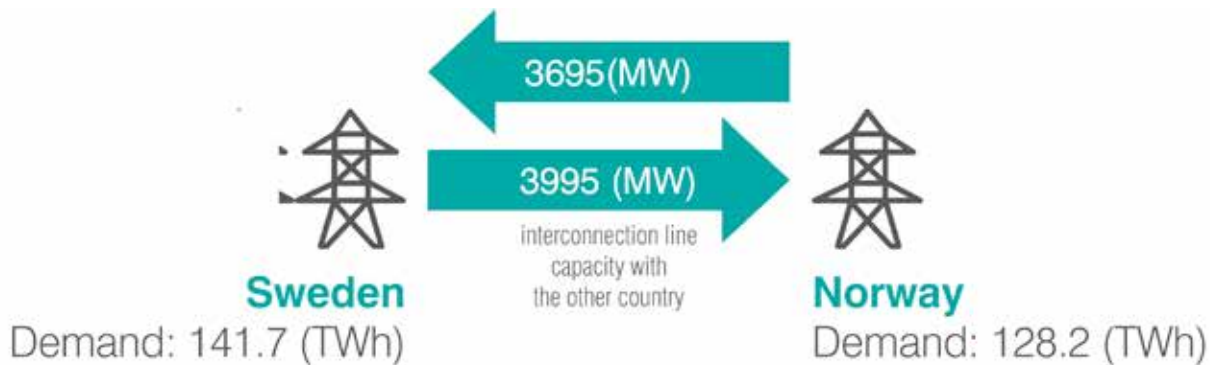
It's strategic priorities are: a truly common Nordic retail market with free choice of supplier; a well-functioning Nordic wholesale market with competitive prices; reliable supply; efficient regulation of TSO.

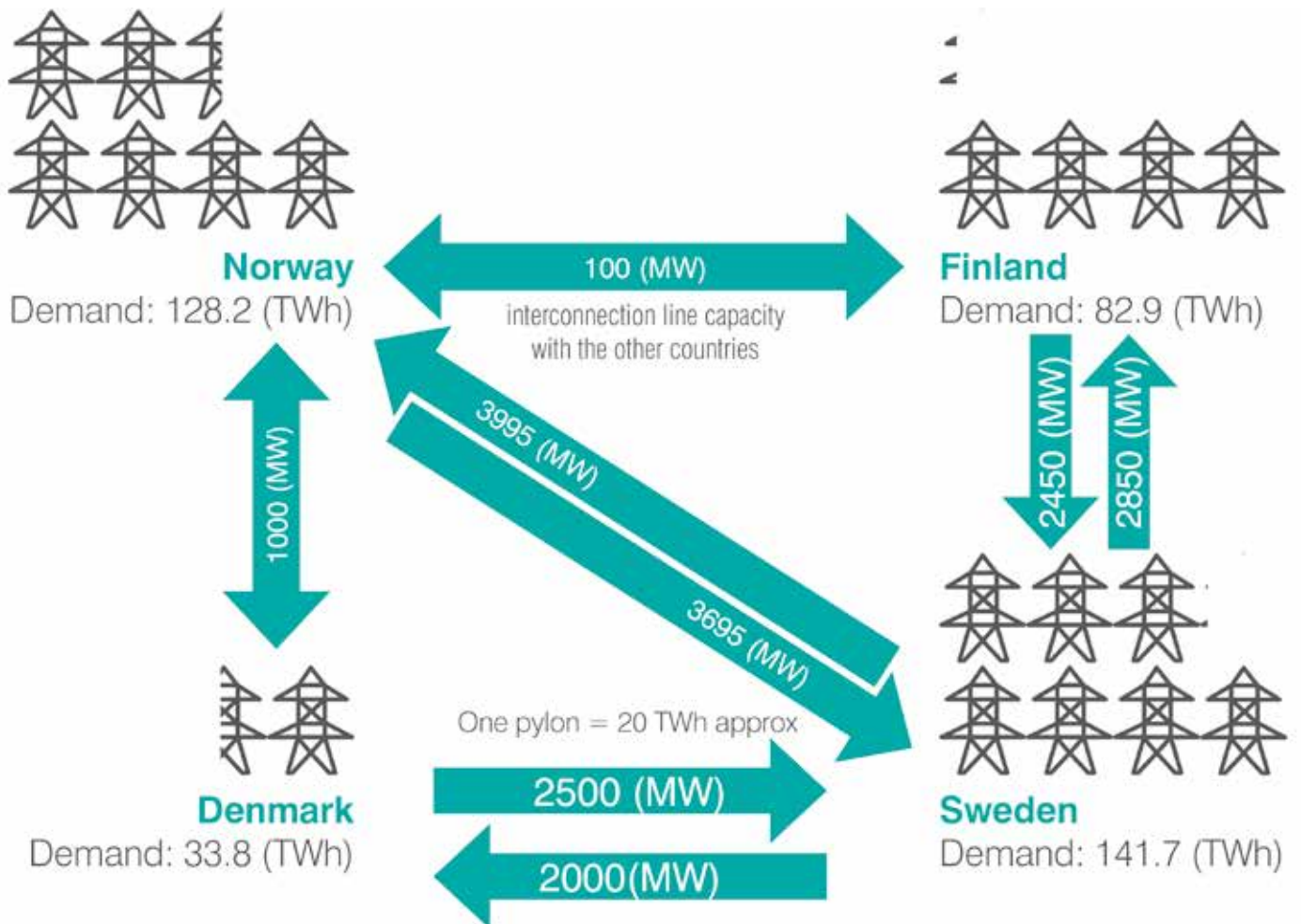
Its powers are based on a Memorandum of Understanding between the participating countries.

Key statistics⁸²

	Norway	Sweden	Denmark	Finland
Population	5.019 million	9.517 million	5.590 million	5.414 million
Land Area	385,199 km ²	449,964 km ²	43,094 km ²	338,424 km ²
GDP (2012)	€385 million	€408 million	€245 million	€192 million
Installed Capacity (MW)	32,512	37,353	14,020	16,947
Demand (TWh)	128.2	141.7	33.8	82.9
Forecast Demand (2020)	120.2	138.8	31.7	84.4
Renewables Targets	113.6% of demand by 2020	62.9% of demand by 2020	51.9% of demand by 2020	33% of demand by 2020
Transmission Owner	Statnett SF	Svenska Kraftnät	Energinet.dk	Fingrid
System Operator	Statnett SF	Svenska Kraftnät	Energinet.dk	Fingrid

⁸² Data on Iceland is not included as it is not a contiguous part of the Nordic energy market.





Taking demand and across the NordPool area as a whole, the proportion accounted for by each country, plus each country's total transfer capacity as a percentage of its total installed capacity, is as follows:

Norway – 33% / 15%

Sweden – 37% / 24%

Finland – 21% / 15%

Denmark – 9% / 25%

The NordREG Regulators

NVE

The Norwegian Water Resources and Energy Directorate (NVE) is subordinated to the Ministry of Petroleum and Energy, and is responsible for the administration of Norway's water and energy resources. The goals of NVE are to ensure consistent and environmentally sound management of water resources, promote an efficient energy market and cost-effective energy systems, and contribute to the economic utilisation of energy.

The sectors covered by NVE include: hydrology, landslides, flood and river management, licensing, electricity and gas. Overall there is a staff of 580 people, of which approximately 100 cover electricity, with a few on gas, and 50 are directly responsible for market and monopoly regulation. NVE has an annual budget of €58 million, of which €4.4 million is allocated to energy, and €4 million is for energy market regulation.

Ei

The Energy Markets Inspectorate (Ei) supervise the Swedish electricity, natural gas and district heating markets. The Inspectorate works for an improvement of the functioning and efficiency of these markets and has a staff of approximately 100, of which 23 cover licensing.

DERA

The Danish Energy Regulatory Authority (DERA) regulates the infrastructure of the electricity and gas sectors as well as access to this infrastructure. For supply-obligation companies providing electricity, the Authority is also responsible for price control, partly based on requirements for security of supply. Furthermore the Authority carries out benchmarking of the regulated enterprises.

The purpose is to ensure that consumers – households and enterprises – are charged reasonable and transparent prices under reasonable, uniform and transparent terms of supply.

If it is a matter of transparency, DERA regulations can also apply for areas subject to competition, e.g. publication of prices and terms.

DERA's competence is laid down in the three energy supply acts – the Electricity Supply Act, the Natural Gas Supply Act and the District Heating Supply Act; and also the Energinet.dk Act.

Energiavirasto

The Energy Market Authority (Energiamarkkinavirasto), established in 1995, is an expert authority in the Ministry of Trade and Industry's field of administration. Its tasks are related to the electricity and natural gas markets as well as emissions trading.

Operating under the administrative sector of the Ministry of Employment and the Economy, the Energy Authority verifies the functionality of the converging electricity and gas markets, and the reasonableness of network service pricing. Functional emissions trading, the use of renewable energy and energy efficiency promote the fulfillment of climate targets in a cost-efficient manner.

The NordREG Board and Members

The main organisation of NordREG is a rotating Presidency whose appointment changes every year. The Board meets at least twice a year. The work in NordREG is organised through an annual Work Programme approved by the Board. Official Nordic cooperation is channelled through two organisations: the Nordic Council and the Nordic Council of Ministers.

NordREG Strategic Priorities	
Strategic priorities	Objectives
A truly common Nordic retail market with free choice of supplier	<p>To develop a common balance management and settlement system</p> <p>To ensure easy and harmonised switching procedures in the whole Nordic market</p> <p>To create harmonised criteria for unbundling to ensure neutrality</p>
A well-functioning Nordic wholesale market with competitive prices	<p>To promote competitive market structures</p> <p>To ensure smooth interaction with other European regions</p> <p>To ensure a well-functioning power exchange</p> <p>To ensure adequate level of transparency in the market</p>
Reliable supply	<p>To promote market-based or legal environment for security of supply</p> <p>To ensure harmonised procedures for handling extreme situations</p>
Efficient regulation of TSO	<p>To regulate and monitor the TSOs with focus on efficiency and Nordic harmonisation</p> <p>To promote adequate transmission capacity and efficient market-based congestion management methods</p>

NordREG Memorandum of Understanding

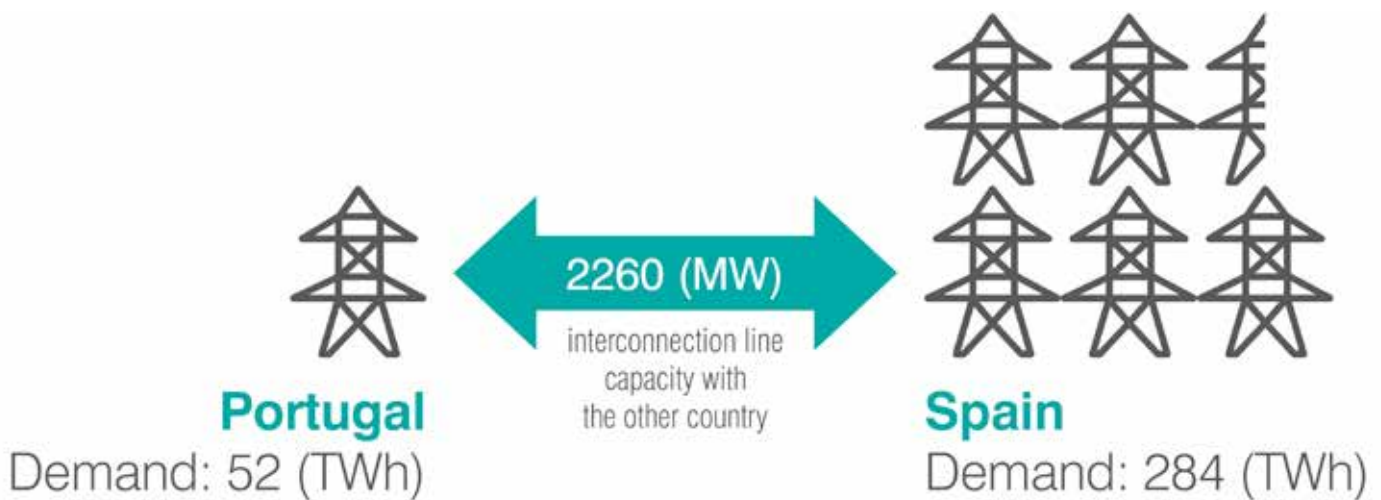
- » Promote the development of efficient electricity markets in the Nordic area, consistent with the development within the European Union
- » Co-operate in order to promote a competitive Nordic market in electricity, in which the principles of transparency and non-discrimination are ensured. 'The Regulators' will monitor, reinforce and follow up these processes of liberalisation in the electricity market
- » Co-operate in issues relating to energy markets in which 'The Regulators' have responsibilities according to respective national legislation
- » Set up the appropriate mechanisms of cooperation, information exchange and assistance amongst 'The Regulators', and reinforce their level of common representation in the cooperation within the Council of European Energy Regulators and joint actions especially in connection with the cooperation among the Nordic transmission system operators (Nordel)
- » Provide a framework for the discussion of regulatory issues and exchange of experience in order to facilitate convergence of views and common positions when appropriate
- » Provide the necessary elements for the development of regulation and promote increased harmonisation and efficiency in the regulatory framework and processes
- » Provide where appropriate the necessary elements for developing joint approaches vis-a-vis transnational energy utilities and companies that operate in separated regulated utility markets (multi-utilities)
- » With due regard to national differences in the legal framework and responsibilities, work to establish common policies toward agreed issues

Iberian Market (MIBEL) – Spain, Portugal

The Iberian Electricity Market (MIBEL) constitutes a joint initiative from the Governments of Portugal and Spain, with a view to the construction of a regional electricity market. With the materialisation of MIBEL, it became possible for any consumer in the Iberian zone to acquire electrical energy under a free competition regime, from any producer or retailer that acts in Portugal or Spain.

Key statistics

	Spain	Portugal
Population	47.3 million	10.5 million
Land Area	505,992 km ²	91,985 km ²
GDP (2012)	€ 1,029 million	€ 165 million
Installed Capacity (MW)	c 100,000	19,000
Demand (TWh)	284	52
Forecast Demand (TWh, 2020)	359	65
Renewable Electricity Targets	36% of generation by 2020	55% of consumption by 2020
Transmission Owner	Red Eléctrica de España	Rede Eléctrica Nacionais
System Operator	Red Eléctrica de España	Rede Eléctrica Nacionais
Interconnections	Currently seven lines between Spain and Portugal (four of 400kV and three of 220kV), creating capacity of between 2,000 and 2,400MW. Two new lines planned which will raise capacity to 3,000MW by 2015	



Demand for electricity in Portugal is a little less than 20% of the equivalent in Spain. The transfer capacity between the two countries amounts to slightly more than 10% of Portugal's installed generating capacity, and between 2-3% of Spain's.

MIBEL's main goals are:

- » To benefit the electricity consumers of both countries, through the integration of the respective electric systems
- » To structure the market organisation based on the principles of transparency, free competition, objectivity, liquidity, self-financing and self-organisation
- » To support the development of the electricity market of both countries, with the existence of a single reference price for the whole of the Iberian Peninsula
- » To allow all the participants free access to the market, under equal conditions of rights and obligations, transparency and objectivity
- » To promote economic efficiency of electrical sector companies, encouraging free competition amongst them.

When initially established, the Board of Regulators comprised of four representatives from the two jurisdictions, two from Portugal – the Portuguese Energy Services Regulatory Authority (ERSE) and the Portuguese Securities Market Commission (CMVM), and two from Spain – representatives of the Spanish National Energy Commission (CNE) and the Spanish Securities Market Commission (CNMV). Its powers are based on a memorandum of understanding between the participating countries.

The CNE employed a staff of almost 400 employees, but also covered a wider range of responsibilities to ERSE which justified the larger number of people involved. For example CNE were directly involved in renewable energy policy decisions, had capability to undertake direct audits and propose the regulated companies revenues settlement.

The Spanish regulator was restructured during 2013 enlarging its responsibilities for regulation from electricity, natural gas and fuel to a structure that today also involves the Competitiveness authority and Telecommunications and Audiovisual, Rail and Air Transportation and Postal Services regulation – now referred to as CNMC (National Commission on Financial Markets and Competition). It is a public body independent of Government and is subject to parliamentary control. It became operational on 7 October 2013 and comprises 515 people.

CNMC has a Governance structure which includes a president, one vice president and a council of eight members elected by Parliament. The term of the members is restricted to six years, non-renewable, and they must operate under a strict policy regarding conflicts of interest. Organisationally, CNMC is structured into four groups: Competition, Energy, Telecommunications, Audiovisual, Transport and Postal Services.

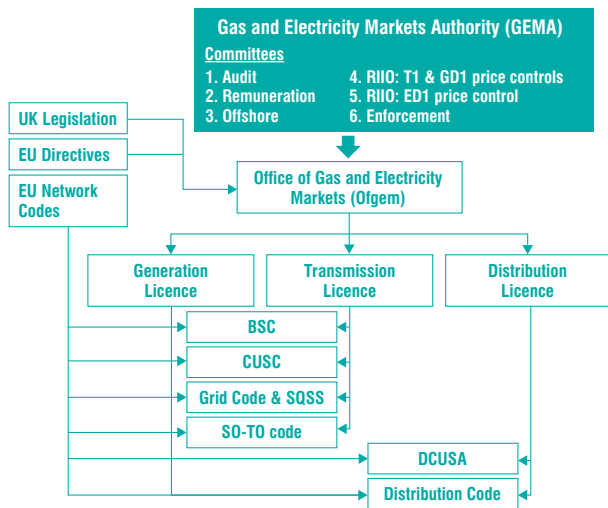
ERSE has a staff of around 75 people and the regulator covers both electricity and gas within the structure outlined below. There are three functional groups: a central function dealing with regulation, and two support functions – Human Resources and administration, and Legal services. The central regulatory function is further divided as follows:

- Costs and Revenues – regulated accounts – which provides the definition of the annual revenues to be received by each regulated company
- Tariffs and Prices – defining infrastructures and network access tariffs
- Infrastructures and Networks – supervision of infrastructures and networks investments, planning, third-parties access, quality of supply and use and systems operation and
- Ancillary services, and
- Markets and Customers – supervision of markets and customer topics.

ANNEXE B

The following sections highlight the existing structures and processes by which the single GB-market, business infrastructure, connection to and operation of the power network are maintained, and identify a number of international comparators (further examined in Annexe A), which have relevance for the types of process and relationship that Scotland and rUK could follow and establish as components of the strategic partnership.

Current Arrangements



UK Government, through the Department of Energy and Climate Change (DECC), sets the direction of travel within energy policy for the UK. The promotion of renewable energy and energy efficiency are currently devolved to Scotland. The efficient functioning of the electricity and gas markets, and regulation of the 'wires and pipes', are the responsibility of the Office of Gas and Electricity Markets (Ofgem, which is the executive (operational) arm of the Gas and Electricity Markets Authority (GEMA).

Ofgem and GEMA

Ofgem's powers are derived from statute through the following legislation: Gas Act 1986 (part 1), Electricity Act 1989 (part 1), Competition Act 1998, Utilities Act 2000, Enterprise Act 2002, and the Energy Acts of 2004, 2008, 2010, 2011 and 2013. As an example, under the Gas Act 1986 and the Electricity Act 1989 certain activities concerning gas and electricity may only be carried out with a licence (or under a relevant exemption or exception). One of the responsibilities of Ofgem is to determine the content of gas and electricity licences, and to grant licences to successful applicants in accordance with published criteria.

Ofgem is governed by GEMA (The Authority). The Authority members are appointed by the Secretary of State at the Department of Energy and Climate Change and include seven Non-Executive Directors; the board has a membership of nine, and decisions of the Authority are made by ordinary resolution of the Board which meets monthly. In addition to the activities of the Board, GEMA operates six committees which have different roles and frequency of meetings. These committees serve to review the internal transparency and governance of the regulator, and also to ensure oversight of operational activity areas delivered by Ofgem.

Ofgem's principal objective is to protect the interests of existing and future electricity and gas consumers. Its aims include promoting value for money, promoting security of supply and sustainability for present and future generations of consumers, the supervision and development of markets and competition, and regulation and the delivery of Government schemes.

Strategy and Policy Statement

To ensure the independence of the Regulator from Government, the Energy Act 2013 introduced a requirement for a Strategy and Policy Statement (SPS). The SPS takes the form of a transparent process to improve alignment between the Government's strategic energy objectives and regulation of electricity and gas markets by the independent Regulator, Ofgem, while respecting Ofgem's independence in making regulatory decisions⁸³.

Industry Codes⁸⁴

The industry codes underpin the electricity and gas wholesale and retail markets. Licensees are required to maintain, become party to, or comply with the industry codes in accordance with the conditions of their licence.

The codes define the terms under which industry participants can access the electricity and gas networks. The table below sets out the codes, and identifies the organisations responsible for the process of changes and modifications to the codes.

Code	Type	Contact	Website
Balancing and Settlement Code (BSC)	Electricity	Elexon	www.elexon.co.uk
Connection Use of System Code (CUSC)	Electricity	National Grid	www.nationalgrid.com/uk/electricity
Distribution Use of System Agreement (DCUSA)	Electricity	Electralink	www.dcusa.co.uk
Master Registration Agreement	Electricity	Gemserv	www.mrasco.com
Grid Code	Electricity	National Grid	www.nationalgrid.com/uk/electricity
Distribution Code	Electricity	Energy Networks Association	www.dcode.org.uk
System Operator – Transmission Operator Code (STC)	Electricity	National Grid	www.nationalgrid.com/uk/electricity
Uniform Network Code (UNC)	Gas	Joint Office of Gas Transporters	www.gasgovernance.co.uk
Independent Gas Transporter UNC (iGT UNC)	Gas	Gemserv	www.igt-unc.co.uk
Supply Point Administration Agreement (SPAA)	Gas	Electralink	www.spaa.co.uk
Smart Energy Code (SEC)	Gas and Electricity	Gemserv	www.smartenergycodecompany.co.uk

⁸³ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65669/7202-energy-bill-provisions-for-ofgem-strategy-and-supp.pdf

⁸⁴ <https://www.ofgem.gov.uk/licences-codes-and-standards/codes>

International Comparators

The Commission has identified several international comparators of joint regulatory models gained from Regulators governing countries or regions of comparative size to Scotland where two or more countries co-operate to regulate a single market. These include: the Single Energy Market (SEM), established between Northern Ireland and the Republic of Ireland, and the Nordic and Iberian markets. Additional regulatory insight has been gained from discussions with regulators in the Minnesota Public Utility, and experts advising the Australian Energy Regulator.

The resource requirement for regulating the electricity, gas and/or water sectors varies in terms of budget, and also staffing level, depending on the relative and absolute size of the market and sectoral scope. For example, the Spanish multi-utility regulator – the National Commission on Financial Markets and Competition (CNMC) – covers, electricity, natural gas and fuel, telecommunications and audio-visual, rail and air transportation and postal services as well as the competitiveness authority – it has a total staff of 515. Its counterpart in Portugal – ERSE, has a staff of around 75 and covers electricity and gas; the individual regulator counterparts in the SEM each have around 120, which appears broadly consistent with the circa 150 seen for NVE (Norway) and 100 for Ei (Sweden) on electricity and gas and district heating. We have not considered the resources required beyond this within the scope of the CER.

The examples of the SEM, Nordic and Iberian markets are distinct in that they encompass arrangements and agreements designed to join together markets which were previously separated. The situation for Scotland and rUK would clearly be different. In the event of independence for Scotland the two nations would separate, but work to retain and regulate the single wholesale markets and associated business infrastructure for electricity and gas.

GLOSSARY

AC Synchronous Power Grid – alternating current electrical network across the UK, where power flows must be controlled and operated within acceptable voltage limits.

Ancillary Services – a range of functions which transmission system operators contract so that they can guarantee system security. These include black start capability (the ability to restart a grid following a black-out); frequency response (to maintain system frequency with automatic and very fast responses); fast reserve (which can provide additional energy when needed); the provision of reactive power and various other services.

Balancing Mechanism – the mechanism used by the National Grid Company to balance the supply and demand of electricity.

Black Start – the procedure to recover from a total or partial shutdown of the transmission system which has caused an extensive loss of supplies. This entails isolated power stations being started individually and gradually being reconnected to each other in order to form an interconnected system again.

British Electricity Trading And Transmission Arrangements (BETTA) – the BETTA arrangement was introduced in 2005 to create a single wholesale electricity market for Great Britain. It replaced the New Electricity Trading Arrangements (NETA), which did not cover Scotland.

Capacity Mechanism (CMI) – a mechanism, currently being developed under the UK Government’s electricity market reforms, requiring electricity industry participants to provide a defined level of generating capacity.

Capacity Allocation and Congestion Management (CACM) – process of allocating and calculating interconnector capacity across different European networks and zones, an important part of moves towards a single market.

Carbon Reduction Commitment (CRC) – the CRC is a UK government emissions trading scheme for large organisations which are not eligible for EU Emissions Trading. This includes banks, large offices, universities, large hospitals, large local authorities and central government departments. The scheme is mandatory. The CRC is expected to deliver emissions reductions totalling 0.5m tonnes of carbon (Mtc) per year by 2015.

Combined Heat and Power (CHP) – process of generating electricity which also captures and uses the associated heat, rather than its being lost or wasted (e.g. vented to the atmosphere via a chimney).

Common Tariff Obligation – mechanism designed to ensure that electricity suppliers in the North of Scotland are not able to charge comparable domestic customers different prices solely on the basis of their location within the area.

Compressor Stations – facilities located along a natural gas pipeline which compress the gas to a specified pressure, thereby allowing it to continue travelling along the pipeline to the intended recipient.

Contracts for Difference (CfD) – in the context of the UK electricity market, a support mechanism for low carbon power production which will pay (or charge) the difference to eligible low carbon generators between a reference wholesale power price value and the ‘strike price’ applicable to that low carbon generating technology.

Decarbonisation – refers to the need to reduce the power sector’s carbon intensity, that is, the emissions per unit of electricity generated (often given in grams of Co₂ per kWh). This is necessary to achieve the mandatory greenhouse gas emission targets set by the Scottish and UK Governments.

Distributed Generation – electricity generation, usually on a relatively small scale, that is connected to the distribution networks rather than directly to the national transmission systems.

Electricity Market Reform (EMR) – programme of reforms introduced by the UK Government in 2010, aimed at maintaining sufficient generation within the market to meet demand while meeting legally binding targets for renewable electricity and emissions reductions.

Elxon – the body responsible for balancing and settling the wholesale electricity market, utilising market trading information and metered data for energy generators and consumers from generation and production accounts.

Emergency load shedding – circumstances where supply of electricity to the network is deliberately switched off (i.e. demand reduced very quickly) in order to ensure safe management of the network.

Emissions Performance Standard – an annual limit on carbon emissions from new fossil fuel generating stations, part of the current package of reforms to the UK electricity market.

Emissions Trading Scheme – A market mechanism that allows emitters (countries, companies or facilities) to buy emissions from or sell emissions to other emitters. Emissions trading is expected to bring down the costs of meeting emission targets by allowing those who can achieve reductions less expensively to sell excess reductions (e.g. reductions in excess of those required under some regulation) to those for whom achieving reductions is more costly.

Energy Efficiency – achieving desired levels of lighting, heating or cooling for minimum energy use. Cutting down on waste energy.

Energy Trilemma – refers to the balance which Scottish and UK Government energy policies aim to strike between ensuring that energy is affordable, that it is produced sustainably, and that supplies of energy are secure.

Fuel Poverty – a person is living in fuel poverty according to the Scottish Government's definition, if, to heat their home to a satisfactory standard, they need to spend more than 10% of their household income on fuel.

Grandfathering – exemption of particular parties from effects of changes in circumstances or law.

Hydro Benefit Scheme – designed to protect consumers from the high costs of distributing electricity in the North of Scotland. It is funded by charges on all licensed suppliers across Great Britain.

Industrial Emission Directive – a European Union directive from 2010 which commits European Union Member States to control and reduce the impact of industrial emissions on the environment.

Interconnector – an energy link between different countries or systems. Examples are the electrical interconnectors between the UK and France, or Scotland and Northern Ireland, and the gas pipeline linking the UK with the European gas network at Zeebrugge in Belgium.

Large Combustion Plant Directive – a European Union directive which requires Member States of the European Union to legislatively limit emissions from combustion plants with a thermal capacity of 50 Megawatts (MW) or greater. As well as fossil-fuel power stations, the directive applies to other large thermal plant, such as steelworks and petroleum refineries.

Megawatt – A megawatt (MW) is one million Watts.

Micro-Generation – the small-scale generation of energy, for example solar panels or domestic wind turbines. These are often referred to as generation from renewable sources at a domestic or small community level.

National Grid – The National Grid owns the main transmission systems and is responsible for transmitting the electricity from the generator to the local RECs area. All electricity generated in mainland UK is put into the National Grid before fed into distribution networks.

National Transmission System (NTS) – National Grid's high pressure gas network.

Network Code (NWC) – The rules and procedures that govern the way National Grid and all shippers operate within the deregulated market.

Ofgem – electricity and gas market regulator in Great Britain.

Peak Demand – Point of maximum electricity demand on the national system.

Regulator – organisation charged with protecting and advancing the interests of consumers through use of regulation where necessary and the promotion of competition within the market.

Regional Electricity Market – market trading zones within the European Union, comprising two or more different countries, formed as part of moves towards a single European energy market.

Renewable Energy – used to describe the energy produced using naturally replenishing resources, including wind, wave, tidal, hydro and solar power.

Renewable Obligation (RO) – legislation (separate Orders exist in Scotland, Northern Ireland and England/Wales) which places an obligation on UK electricity suppliers to source an increasing proportion of the electricity they supply from renewable sources.

Retail Energy Market – market in which electricity and gas is sold to end-use customers, such as households and businesses.

rGB – a geographical entity, including England and Wales.

rUK – a political entity, including England, Wales and Northern Ireland, that would result from Scottish Independence.

Settlements Agency – This is the body that 'settles' the distribution of electricity to establish where and to whom the generated load has been distributed to.

Smart Metering – will give consumers (via an in-home display) the ability to monitor gas and electricity meters, thus tracking the amount of energy being used and its cost.

Socialisation of Costs – in the context of energy network investment costs, the spreading of those costs across the network as whole rather than concentrating them within distinct geographical zones.

State Aid – an advantage in any form whatsoever conferred on a selective basis to undertakings by national public authorities.

Statutory Independent Undertakings (SIUs) – in the Scottish context, these are gas pipelines in a number of locations, which are not connected to the rest of the network, and the costs of investment in which, are socialised across the network as a whole.

Storage – refers to devices or technologies which enable energy (heat or electricity) to be stored upon production and used at a later date when demand exists.

System Operator – entity charged with ensuring transmission of gas and electricity through the necessary infrastructure (pipelines or cables), and to balance the system in real time.

Thermal Generating Capacity – generating stations which burn fuel (e.g. coal, gas, uranium, straw, municipal waste) to produce steam which drives a turbine, generating electricity and heat.

Transmission – the transfer of electricity at high voltage from the power stations across the UK through wires on pylons to points where it can be distributed to users. This is known as the Grid System and is owned and operated by the National Grid Company (NGC).

Transmission Charges – costs paid by all users of the electricity transmission infrastructure, with charges varying across the different geographical zones of the UK. Gas transmission charges are made up of entry charges and commodity charges.

Transmission Losses (Line Losses) – when transmitting electricity from generator to local distribution network areas some electricity is lost. Specific calculations have to be made by suppliers to determine the level of these losses.

Terawatt Hours (TWh) – one thousand Gigawatt hours.

Wholesale Energy Market – series of contracts, derivatives and bilateral trades between generators and suppliers for the onward provision of gas and electricity to final customers.

XOSERVE – Xoserve, delivers transportation transactional services on behalf of all major gas transportation companies.



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