Co-Op 26

How cooperation can spur Scotland's green revolution.

Nick Butler

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Scotland's Energy Future

Over the next two decades the ways in which we produce, process, distribute and consume energy will be transformed. The energy system of 2040 will be completely different to the one we live with today. The coming change is in part driven by policies designed to mitigate the risks of climate change by reducing our reliance on hydrocarbons - oil, gas and coal - but also by advances in technology which are making available new sources of supply and new means of consumption at competitive prices . The changes will affect everyone – businesses and households, car drivers and train passengers, farmers and council housing tenants. Although the changes might not come quickly enough to eliminate all the risks of climate change their impact will be felt everywhere – in Scotland, across the UK and Europe and around the world.

The transformation of the energy system will require huge investment but will also provide large numbers of jobs – producing new supplies, putting in place the necessary infrastructure and replacing existing equipment from cars and buses to household heating systems and industrial furnaces.

The question is whether as this transition proceeds Scotland can capture a material share of the potential value involved rather than becoming reliant on imported technology. Can Scotland create the new industries necessary to deliver a new energy system which are capable of matching and replacing or even exceeding the economic and employment impact of North Sea oil and gas?

These are important questions. What happens in Scotland matters. But energy and climate change are prime examples of the limits of introspective nationalism. A clean Scotland in a dirty world is a meaningless achievement. Even more important than what happens within Scotland is the extent to which Scotland can shape the international process of change necessary if the risk of global climate change is to be eliminated.

Later this year leaders from across the world will gather in Glasgow for the COP26 meeting designed to review and accelerate global progress in tackling climate change.

With the UK as host, the opportunity exists to shape the outcome, putting much needed substance behind the aspirations of reducing emissions now being expressed by countries across the world.

The UK has committed to reducing its emissions by 68 per cent from a 2020 baseline by 2030. Scotland can now lead the way by showing what is possible in the short term.

Extensive funds are being allocated in support of the UK Governments plans to advance some of the technologies which will be essential if emissions are to be reduced to safe levels. The list of technologies include energy storage, the use of hydrogen, carbon capture and the development of smaller, safer and lower cost nuclear facilities. Scotland should be seizing the opportunity to use those funds and to create international partnerships with Governments, academics and private sector companies working on the same agenda.

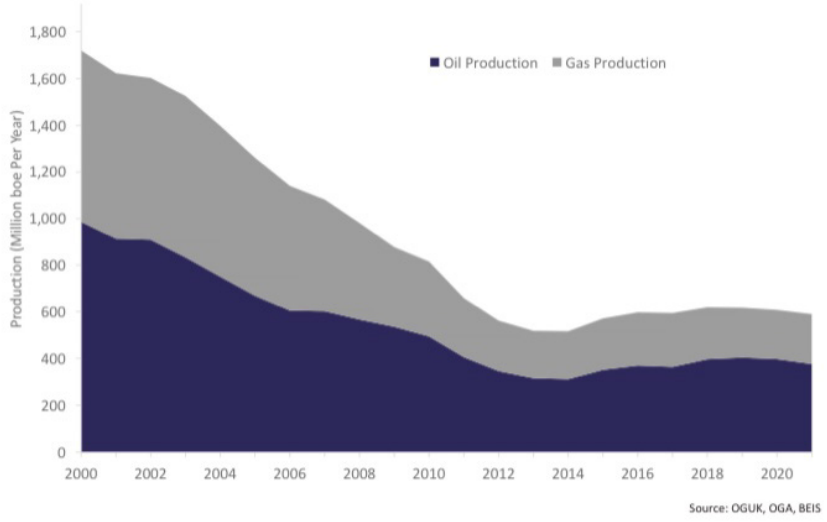
The COP26 meeting will identify both areas of agreement and the subjects on which there is still no international consensus including the pace of change and the extent to which countries at different stages of development can be helped to move in a common direction. Scotland as part of the U.K. should create, out of whatever emerges from the meeting in Glasgow, a new level of dialogue and climate diplomacy.

In all these ways COP26 should be seen as a starting point for next crucial steps in dealing with the global climate risks. For Scotland COP26 offers the chance not just to provide hotel rooms and hospitality but also long term leadership.

Such steps of course can only be taken if Scotland is part of the United Kingdom with full access to Britain's collective strengths and resources. To those who say the UK Government's policies are too vague and inadequate the answer to lead the process of developing them, providing answers and ideas. As part of the UK Scotland has a voice. Alone, that voice would carry no weight.

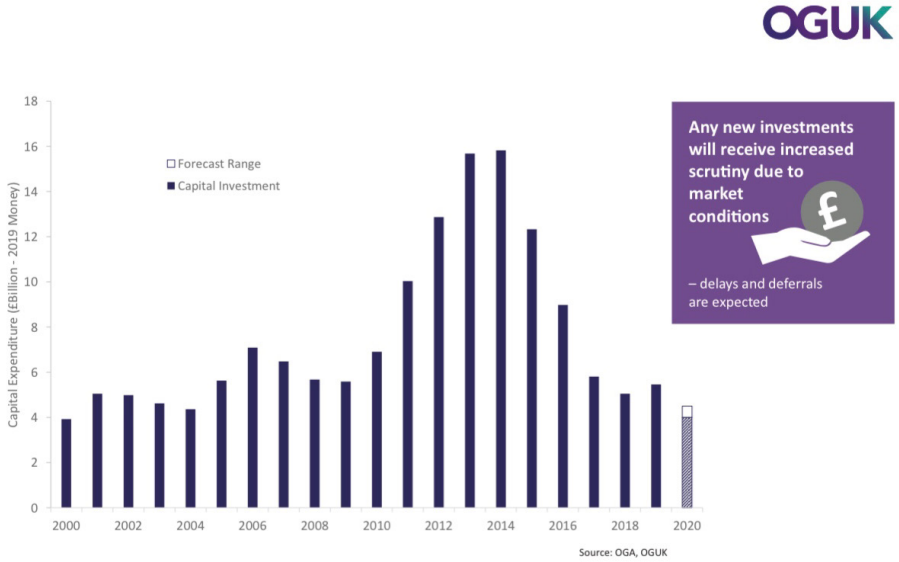
For most of the last fifty years the North Sea oil and gas industry has dominated discussion of energy issues in Scotland. Development of the North Sea has provided tens of thousands of high quality jobs, and enabled the development of service companies specialising in offshore work and capable of competing successfully with the best in the world. North Sea related activity has sustained whole communities particularly in the North East and generated a crucial source of revenue to the UK and to Scotland itself. The oil and gas industry provides 6.6 per cent of Scotland's GDP and supports directly and indirectly 101,000 jobs. Most of the oil and gas produced in Scotland is exported. In 2018 those exports were worth £25 bn.

The North Sea oil and gas industry is now mature, with production well past its peak and likely to fall further particularly in an era when global prices for both oil and gas are low. With production having stabilised in recent years the prospects now are clouded by the uncertainty of new investment.



Source: OGUK, OGA, BEIS

Even though between 10 and 20 bn barrels of oil and gas remain undeveloped across the UK continental shelf the small size of the remaining accumulations poses major cost challenges. The North Sea will not die overnight, and existing producing fields will continue to operate not least because the industry has proved adept at reducing costs. But investment has fallen and as Oil and Gas UK rightly emphasise in the graphic below all new investment is under extreme scrutiny and is liable to be reduced or delayed.



Overall, the North Sea outlook is for a continuous if gradual reduction in activity, production, revenue and employment.

The situation poses the challenge of how to replace the economic benefits which the exploration and development of oil and gas has brought since the first wells were drilled in the North Sea in the late 1960s.

Responses to that challenge are available. Energy will continue to be needed and will require the development of new sources of supply, along with new processing and distribution systems. The ways in energy is consumed – from vehicles to communications technology to home heating and cooling systems will also be modernised. The transition will be the product of both individual choices, commercial activity by business and crucially public policy expressed through regulation, the creation of incentives and disincentives and where necessary through direct investment.

Sustaining North Sea Activity

The first priority is to ensure that recovery of remaining resources is maximised. The world will continue to need oil and gas for many decades to come even if demand peaks within the next decade. The danger is that short term economic judgments could lead to the premature rundown of operations in areas such as the North Sea, leaving supply in the hands of OPEC and Russia and putting at risk energy security as well as thousands of jobs. That risk has been increased by changes in ownership of North Sea assets – with the departure of the major oil companies which were strong enough to sustain activity through periods of volatility and their replacement by speculators placing bets on future oil price spike, or investors who could use their ownership of assets in the North Sea for political purposes. The Chinese company CNOOC states openly on its website that it operates 25 per cent of the UK's North Sea production.

Strategic intervention by Government is needed through fiscal mechanisms or even in some instances direct investment to ensure continued investment in projects which would otherwise remain undeveloped. Investment carries a cost of course but some of the risks can be offset by structuring the support in ways which ensure that profits from supportive investment are shared. The costs involved should be judged against the costs of the unemployment which will result if projects cannot proceed and the benefits of continuing to maintain some degree of security from local supplies.

Such selective investment, however, will not fully protect the industry or all existing jobs. Decline, even if at a more measured pace, will continue and public investment can only mitigate the pace of that decline. But the fact that one part of the energy business is declining does not mean that energy will be less important as a source of economic activity and employment in Scotland.

Scotland's energy future will differ from the past but the potential is very substantial. It is perfectly possible that a new pattern of energy production and consumption will create even more jobs than the North Sea oil and gas industry.

The most immediate opportunity lies in the decommissioning work now necessary to manage the extensive range of production and processing facilities – on and offshore which must be taken out of operation over the next two decades.

Decommissioning

Although the prospects for new oil and gas developments are extremely limited a new opportunity is opening up in the North Sea as fields reach the end of their commercial life and cease production. According to the expert consultancy Rystad an average of 23 assets a year are likely to be decommissioned over the next five years, 80 per cent of which will be in the UK sector. The estimated total expenditure on decommissioning required across the region to 2024 is $17 billion.

That expenditure will be divided between the plugging and abandonment of wells followed by the removal of platforms. Overall more than 2500 oil and gas wells are expected to be decommissioned across the North Sea over the next decade, of which 1500 are in the UK. 300,000 tonnes of topsides (platforms) are due to be removed over the next five years along with up to 100,000 tonnes of substructures.

The work involved is complex and given the regulations and environmental concerns as well as the physical challenges of the North Sea every aspect of decommissioning will require skilled labour. The service sector is strong but some significant retraining will be required. Environmental standards of decommissioning will be closely scrutinised and the industry will need to be able to demonstrate delivery of the standards which will be required.

The North Sea, and in the UK are not alone in decommissioning. Rystad estimate that the global market for decommissioning over the next five years amounts to some $42 billion.

There is no reason why a strong highly skilled decommissioning activity established in the UK cannot be a leader in developing this global business sector just as UK based firms have contributed to the development of the international offshore oil and gas business over the last half century.

Managing the legacy issues associated with fifty years of oil and gas development is important and could be a source of thousands of jobs over several decades. The challenge for the UK is that the work involved could be centred in any of the countries surrounding the North Sea and indeed from further afield if businesses with relevant skills based in countries such as the US or Korea seize the opportunity. Scotland has the chance to build a new industry but it must move quickly if that opportunity is not to be lost.

That message applies to the other energy activities which will over time replace the use of hydrocarbons, in particular the numerous possibilities around the shift to a lower carbon economy.

Renewables

The commitment to reduce emissions and to reach by 2050 or sooner a position where human activity generates no net emissions of greenhouse gases has been made by countries across Europe including the UK, and by numerous companies including energy producers and major users. The move has strong public support in Scotland and the endorsement of all the major political parties.

Long term commitments are important but to be taken seriously they need to be backed by detailed policy and planning and by the necessary investment to transform the way in which we produce, process, distribute and use energy.

Some key steps have already been taken – Scotland now produces over 90 per cent of its electricity from low carbon sources (including nuclear and hydro) and can soon reach 100 per cent. The renewables sector already provides some 15,000 jobs with more to come. Scotland some 11.9 GW of operating renewables electricity projects with another 13 GW under construction.

The progress made is important but represents just a first step towards the new energy economy.

Electricity currently accounts for only 20 per cent of total energy consumption and most of the major areas of energy use continue to rely on fossil fuels. Unless that dependence can be reduced Scotland will face a growing energy import bill over the next decade as production from the North Sea gradually falls.

Expanding Electrification

The immediate challenge is to expand the market for electricity both within Scotland and beyond.

Within Scotland the priority must be to open new sectors to prospect of electrification – such as home heating and transportation such as the rail network.

The Scottish Government's stated objective is that low carbon supplies should provide 50 per cent of total energy consumption including transportation by 2030.

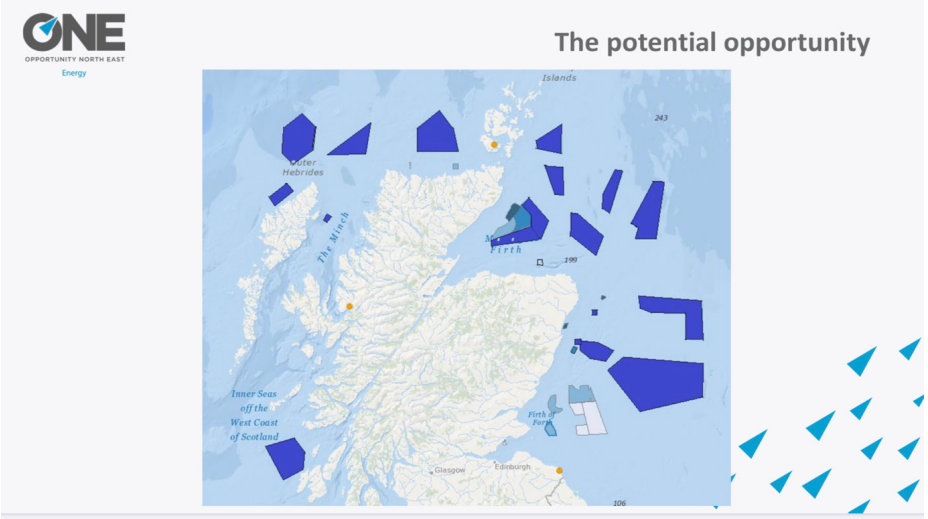
That shift is possible using existing technology and would be the source of many thousands of additional jobs. To happen the shift will require the alignment of public policy and large scale public and private investment not least in adapting and strengthening the electricity power grid.

A report commissioned by Scottish Power and published a year ago suggested that the total investment required to enable the UK wide grid capable of meeting the challenges of the transition to a net zero energy economy could be as high as £48 billion. An estimated £23 bn will need to be invested by 2030 to support the energy networks, electric vehicles, heat pumps necessary to achieve a net zero result.

Exporting Power

Even if electrification can be extended in this way Scotland's potential production of power from renewables led is still likely to exceed demand. The graphics below show the current capacity of offshore wind and the potential.

In total the amounts available according to recent estimates includes 36 GW of wind power, 7.5 GW of tidal and 14 GW of wave power. Although costs will dictate how much of this is actually developed the opportunity clearly exists for Scotland to become a significant exporter of low carbon electricity earning revenue and securing further jobs.



The market for power beyond Scotland

Beyond Scotland the next obvious market for low carbon power is the rest of the UK. Exports of electricity in 2019 amounted to 15.9 Twh with a market value of £0.74 bn.

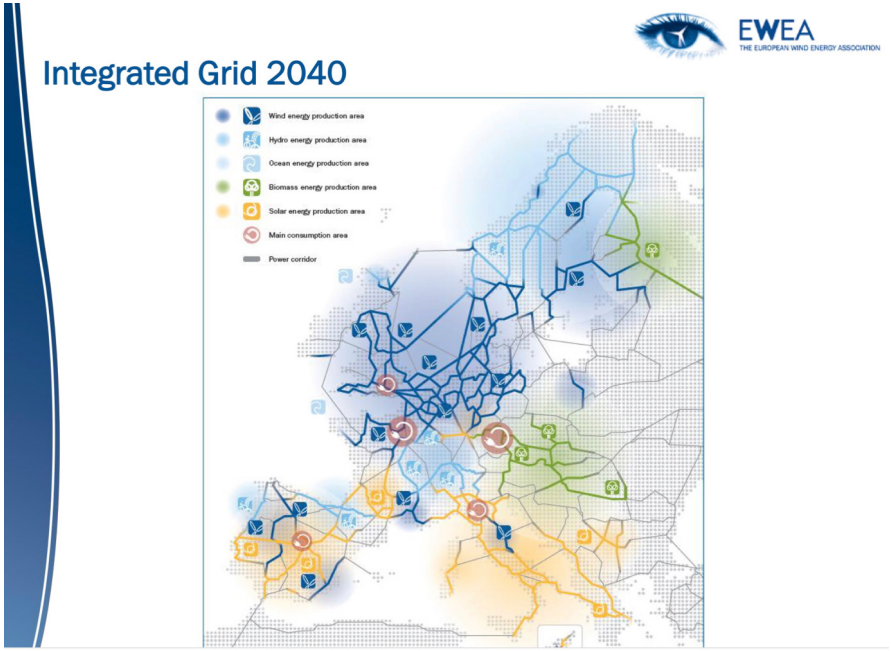
The failure of the UK Government's existing plans to develop new nuclear capacity, and the obvious reluctance to rely on Chinese investment creates an opening for a further significant expansion of power generated from renewables, particularly if grid level storage technology can be advanced. Proximity makes this an attractive prospect but power from Scotland will still need to compete with powered supplied from other UK sources, a calculation which will include the costs of transportation.

Beyond the UK the development of a larger renewables industry in Scotland will depend on access to wider markets. Europe could be accessible through a North Sea grid – able to pick up power from wind and other sources such as the surplus hydro currently available in Norway. The project would be an ambitious commitment requiring international agreement and a very substantial investment of public and private capital.

The development of the Dogger Bank wind farms by the Norwegian state company Equinor and SSE in an area in the centre of the North Sea shows what is possible.

In the long term a North Sea grid could be part of a much greater pan European power system. The graphic below shows one vision of how a grid could link the different sources of clean power. At the moment the promotion of the idea of constructing such a grid is centred in Denmark and Norway. Givens the potential resources which are available Scotland and Scottish companies should put themselves at the heart of the plans.

Britain's departure from EU does not increase the prospects of such a project but the door is not completely closed – Norway is not a member of the EU.



Electricity supply could become a major Scottish business and an earner of export revenue. That would provide new generation of skilled employment, not just in the production of power but also in the construction of new facilities and the adaptation of existing consumption infrastructure.

One example of a potential business opportunity is the development of cables needed both to take power from offshore wind installations to the shore and through inter connectors linking one country to another. This is a growing global business, made even more attractive by advances in grid technology which are enabling long distance transmission of power without the losses which have previously made such trade uneconomic. The expertise necessary to develop such links in the North Sea could easily be transferred to the global market. The scale of the opportunity currently available in Europe and beyond is already considerable and continues to grow. A recent estimate by the advanced technology company ProServ suggests a market of thousands of kilometres of cable driven by the expansion of the offshore wind sector in Europe and across the world. If local businesses do not take up that opportunity the UK including Scotland will remain dependent as now on supplies of equipment from Asia.

The current generation of low carbon supplies is an established sector. The need for subsidies or special treatment in the form of protected market shares is disappearing thanks to the continuing fall in production costs. As the wind and solar businesses mature with mass production and further advances in turbine and photovoltaic technology, costs are likely to fall still further. At present power from wind and solar facilities can be used only at the time of production. Much potential power is wasted and when immediate demand is low some facilities find themselves closed and paid not to produce. Such waste could be dramatically reduced through the use of storage facilities. The need to back up renewable capacity with other supplies (usually using natural gas) to meet demand when the wind is not blowing could then be eliminated.

Electrification is an important part of the picture but is not the whole story. Even if the share of electricity in meeting energy needs doubles 60 per cent of total energy demand will still need to be met by hydrocarbons unless further advances can be made.

Hydrogen

The starting point for the next generation of renewables is hydrogen – produced either from natural gas using carbon capture and storage to eliminate emissions (creating so called "blue hydrogen") or through electrolysis powered by renewable power ("green hydrogen"). The hydrogen produced can then be used as an alternative to natural gas or in fuel cells to power transport potentially halving the emissions by comparison with the use of natural gas without carbon capture.

In both cases the technology is proven and readily available but the transformation of existing energy systems requires major investment. The costs of "green hydrogen" are high and will need to be dramatically reduced if it is to become a competitive source of supply.

Around the world different countries have established strategies for the development of hydrogen.

In Japan, the strategy launched in 2017 is focused on putting in place the facilities to import hydrogen (produced from hydrocarbons) for use in different areas of the transport sector, including the hydrogen cars being developed by Toyota and other major companies. Initial supplies will come from Australia but supplemented over time by "green" hydrogen which is the subject of research and development work.

Germany has committed 9 billion Euros to develop the market for hydrogen and to reduce costs particularly for green hydrogen with the aim of creating a new globally competitive industry over the next decade.

The European Union as a whole has put hydrogen at the heart of its planned "Green Deal". The focus of the European strategy is on green ("clean") hydrogen to replace fossil fuels in some carbon intensive industries such as steel and chemicals as well as providing a vector for renewable energy storage. The ambition set out in the strategy is to deliver 6 GW of renewable hydrogen electrolysers by 2030.

The UK is well behind the game with activity so far limited to plans such as the development of a cluster of activity near Ellesmere Port in Cheshire where plastic waste will be turned into hydrogen and the Saltend project in the Humber Estuary. The aim is to explore the potential for using hydrogen to power a number of different activities including the industry and transport sectors located within a limited geographic area. The current programme is clearly inadequate but could easily be expanded. Scotland has every opportunity to be part of the next phase of hydrogen development not least because of the potential to use surplus renewable power – for instance from offshore wind in the North Sea to fuel the green hydrogen process.

One project already under discussion is the use of hydrogen to power Aberdeen's bus fleet taking advantage of the city's location and existing skill base. That would be a good start but to create a new industry around hydrogen will require such projects to be expanded to cover the whole of Scotland and ideally even wider areas. There is no reason why over the next decade all new buses should not be hydrogen powered.

Hydrogen is a technology for the medium term future – for the 2030s and beyond. According to the estimate produced by the International Energy Agency hydrogen has the potential to play a major part in global energy supply in the second half of this century - with a share of the market comparable with that of the nuclear industry today. Getting to that point depends on the development of the market.

Carbon Capture and Storage

Alongside Hydrogen comes carbon capture and storage (CCS) – a technology neglected in the UK since the decision in 2015 by then UK energy secretary Amber Rudd to abandon well advanced plans for development of CCS at a facility in Peterhead.

CCS is essential if "blue hydrogen" produced from natural gas or other fossil fuels is to be developed without adding to emissions. Scotland has the potential to be a base for CCS development using the existing capacity of oil and gas fields in the North Sea as they cease production. Blue hydrogen is not popular with some environmentalists because it would support the continued development of hydrocarbons but given its current significant cost advantage over hydrogen produced from renewables it is likely to be an attractive option in an economic environment in which keeping energy costs down will be crucial for competitiveness and for consumers.

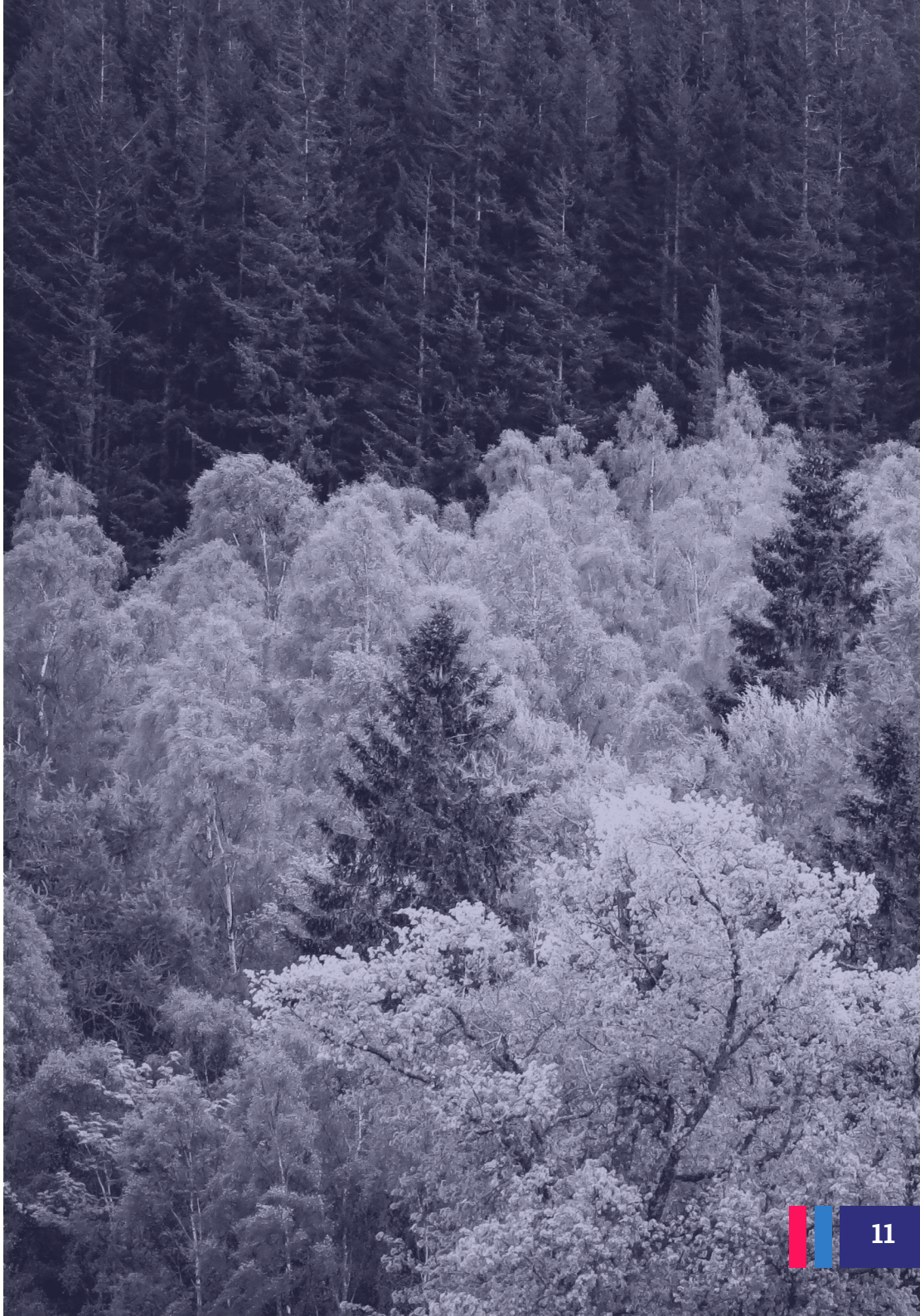
The development of CCS also open up the question of finding uses for the carbon – adding value and reducing the otherwise deadweight costs of separation and burial. The possibility of using the carbon to create building material or to use CO2 is already under consideration. They offer a further energy related activity in which Scotland could find industrial opportunities and employment.

Because of the existing offshore skill base and the potential storage capacity Scotland along-with Norway is the obvious location for the development of Carbon Capture and storage in Europe.

The development of hydrogen offers wider potential, both in terms of employment and social benefit. In Leeds the H21 project is designed to show that current natural gas grid can be used to carry Hydrogen offering a new option to penetrate the heating market.

A comparable transformation of the heating systems of Scotland's public housing would be a major step forward in improving the quality of housing as well as reducing emissions and making low cost power available to the many people currently living in energy poverty.

Last, but not least in the set of opportunities for Scotland is a very different form of carbon storage through the addition new woodland to lock up carbon in growing trees and in doing so to promote the use of wood, not least as a substitute for fossil fuels. Forestry already employs 30,000 people in Scotland and growth of the woodland cover from around 19 per cent of the land area would add more.



Energy Efficiency

Alongside a shift in the energy mix should sit a drive to improve the efficiency with which energy is used. Using less energy to generate each unit of GDP is an Excellent way of simultaneously enhancing energy security, assisting energy poverty, and cutting emissions

Scotland's track record on efficiency is good. The country currently uses less energy than it did fifteen years. But there is much more which could be done. Energy policy should set a clear and ambition objective to reduce energy demand in absolute terms and in terms of per unit of GDP.

Although the consumption side of energy gets little attention compared to production it is also a major source of employment. To achieve higher levels of efficiency will require the refurbishment of domestic and commercial buildings, transport systems and industrial plant , and schemes to replace old equipment from washing machines to lighting systems. In addition to the smart, digitally based systems which can manage the operation of national and international grids there is huge potential for optimising the use of energy in the home . In conjunction with variable tariffs smart systems can soften the otherwise inevitable peaks in business and household demand which have shaped the system requiring the provision of sufficient supply to meet each peak.

Although all these changes requirement capital investment, in many cases the transition is labour intensive and likely to create far more jobs than oil and gas development.

Across Europe total energy consumption has declined by almost 1 per cent per annum over the last decade. Individual European governments have adopted a range of different incentives and other mechanisms. There is no reason why Scotland cannot achieve a 1 per cent gain in efficiency each year, simply by emulating the performance of the best.

Every element of the shift to a more efficient and more sustainable pattern of energy supply and consumption offers the chance to create jobs.

Scotland has the potential to be involved in all these areas each of which carries the potential for employment and wealth creation.

- As a producer of oil, gas and renewables.
- As trader and exporter of both electricity and other forms of energy supply and of the technology necessary to produce, transport and consume that energy.
- As a user – by applying new forms of energy supply to modernise the existing economy including industry and sectors such as housing.
- As developer of new generation of both production and consumption technology for own use and for export to developing world. This export potential matters because the challenge of climate change is fundamentally connected to the challenge of development. Europe accounts for less than 10 per cent of global emissions. The growth in emissions over the next decade will come from Asia and other emerging economies which need low cost, low carbon solutions if they are to avoid an uncomfortable trade off between the economic growth necessary to eliminate poverty and the reduction in emissions necessary to limit climate change.

The opportunities exist but they are time limited. Technology moves quickly and globalisation has opened the UK and Scotland to competition not just from advanced economies but increasingly from emerging economies seeking ways to employ their own growing populations. Scotland must be part of that competitive process if it is not going to face economic decline in the world beyond North Sea Oil and Gas.

The future potential is visible and within reach but is not yet happening in Scotland or indeed across the UK. It is worth asking why.

The first reason is that there no clear coordination or strategy in relation to energy as the Royal Society of Edinburgh noted in its 2019 report.

A long term strategy – starting now but extending over the next twenty or thirty years would help to focus attention and resources on the key areas of potential. Public policy is important but private investment will also be needed given the limited public resources available. That investment should be incentivised and Scotland should be established as a great place in which to do business in relation to the energy transition, and also a great place from which to do business. Many of the opportunities mentioned above need to be developed at scale if they are to be economic and Scotland alone does not have a market of the necessary size. The energy transition is a global phenomenon and activity in Scotland can be a part of an huge international market.

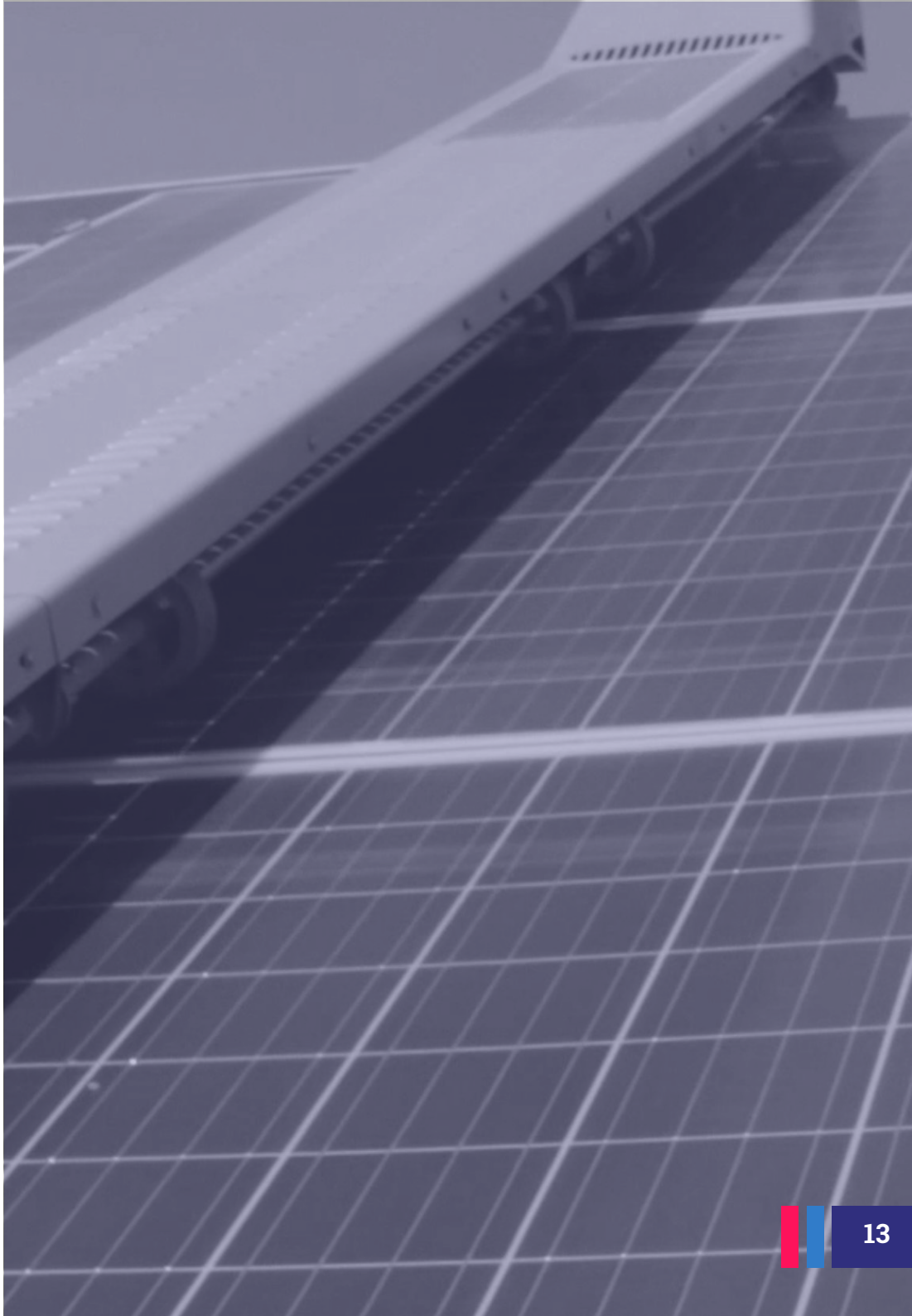
A Scottish energy strategy should also include the development of the skill base necessary to take up the available opportunities. The global competition to attract investment in every aspect of the energy business is intense and the presence of a skilled workforce is a crucial element in the choices being made. There is a strong case for the development of colleges dedicated to providing the multiple skills required – from engineering and construction to the design and production of new products and the expertise in IT and digital technology necessary to create and run smart systems through which energy can be consumed in a more sustainable way.

A long term strategy would also recognise that many elements of the future global energy mix remain untested at scale. Research and development is essential to make all the different technologies – from hydrogen to tidal power to geothermal commercially viable. In addition to those technologies already under active consideration there is every possibility that further technologies will emerge based on advances in biology (perhaps opening the door to large scale projects converting waste into power) in the chemistry around batteries and the development of plastics and other petrochemicals to the application of the breakthroughs now being made in advanced materials such as graphene and carbon nanotubes produced from methane.

Many of the possibilities set out above can be taken up using existing, proven technology. Others including energy storage, hydrogen and carbon capture and the potential uses of carbon dioxide need to be developed further to make them viable as options for businesses and household consumers. That sets a research agenda in which Scotland should be participating.

The track record on offshore technology which developed rapidly after the first offshore discoveries in the 1960s and 70s demonstrates the potential for Scotland to participate in the global agenda of finding solutions to the next challenge.

If as is reported to be under discussion in Downing Street, the UK Government is considering the creation of a national energy laboratory modelled on the highly successful US and German examples there is no reason why elements of that work should not be undertaken in Scotland. As with offshore technology over the last half century the application of successful research would have the potential to create a centre of expertise and businesses capable of taking the skills to the global market and creating thousands of high quality jobs in the process.



An Opportunity for Scotland – but not in Independent Isolation

The inescapable conclusion from any consideration of these opportunities is that Scotland alone does have the investment capability to support the range and scale of activity which is available and which is necessary to replace the North Sea jobs which will be lost.

Within the UK Scotland remains a net recipient of revenue from the rest of the country. The uncertainties over independence – in particular the risks that corporate taxation will have to be increased to balance the books and that Scotland will lose access to the UK market - will act as deterrents to major inward investment.

At a time when public policy is understandably focused on maximising employment an unhappy divorce is likely to encourage any Government in London to focus its own spending and investment on its own citizens. The trade in electricity for instance from Scotland to England and the rest of the UK could easily be substituted by other sources.

Against this warning should be set the positive potential of being part of UK with its larger consumer market, greater access to capital, and higher spending on research and development. Scotland has every opportunity to use the access which comes from being part of the UK to take a lead in the various elements which will make up the energy transition, and from that base to develop the technology and services capable of competing in global markets.

North Sea activity will decline and many of the jobs it has created will disappear over the next few years. That does not, however, mark the end of the energy sector as a major employer and source of wealth.

The necessary transformation in the energy market in UK and across the world will be rich in jobs.

For Scotland there is the opportunity of playing a major role in creating the technical and industrial base which will support that transformation. If that opportunity can be grasped, however good the last half century has been, the best is yet to come.

Our Scottish Future believes that good government in Scotland and across the United Kingdom has to be based on the values of cooperation, empathy, solidarity and reciprocity.

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