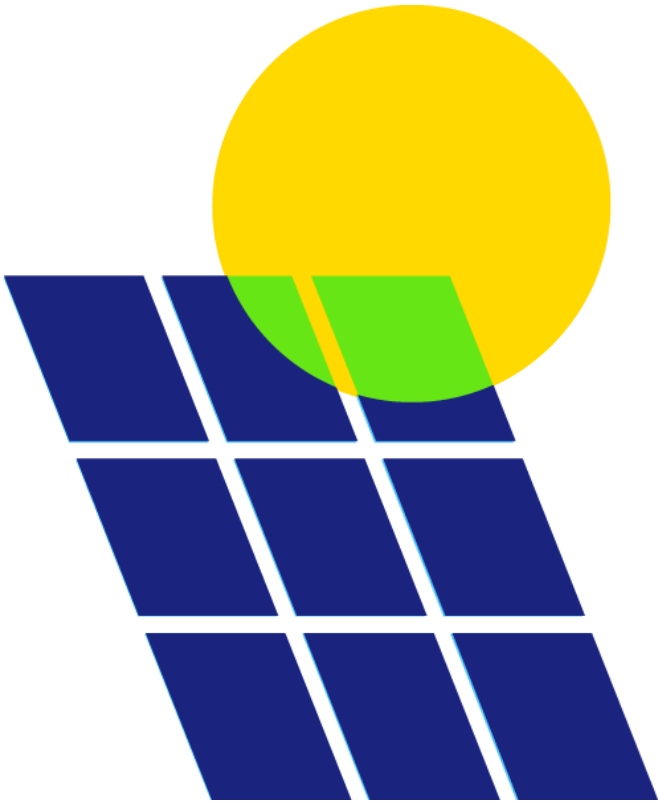
Scotland's fair share

Solar's role in achieving net zero in Scotland



About us

Solar Energy Scotland works to shape policy to realise the potential of solar and energy storage in Scotland, and to work with Government and all stakeholders to deliver on climate change obligations and net zero greenhouse gas emissions by 2045.

Solar Energy Scotland operates in coordination with Solar Energy UK. Since 1978, Solar Energy UK has worked to promote the benefits of solar energy and to make its adoption easy and beneficial for domestic and commercial users. A not-for-profit association, we are funded entirely by our membership, which includes installers, manufacturers, distributors, developers, investors, and legal and environmental consultants.

Our mission is to empower the UK solar transformation. We are catalysing our members to pave the way for 40GW of solar energy capacity by 2030 as a key delivery date on the path to reaching the recommended 85GW capacity by 2050 as recommended by the UK Climate Change Committee. We represent solar heat, solar power, and energy storage, with a proven track record of securing breakthroughs for all three.

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Foreword

Scotland requires a robust plan of action for the deployment of solar energy technologies. For too long solar has suffered unconscious bias that Scotland's weather better suits other renewable energy technologies that harness power from wind and water. This has resulted in solar being largely overlooked over the last decade as Scotland seeks to decarbonise its economy. The solar resource in Scotland is enormous. If all the sun's energy that hits the island of Hoy could be collected this would meet all of Scotland's energy needs, including power, heat and transport (Appendix 1).

As a technology, solar can generate both electricity and heat. It is modular, so can be deployed as a micro-renewable, or at utility scale. It can be located in rural locations or urban centres. It can be partnered with a broad range of other technologies such as wind, battery, hydrogen, and electric vehicles. It can make more efficient use of the electricity grid. And most importantly it has reduced in cost by 60% since 2010, making it a cheap and affordable technology that can compete with the cost of wind projects.[1] Unlike wind, it can be deployed as a micro-renewable, and deliver electricity at a price lower than households will pay from their suppliers. It can help Scotland to decarbonise homes while creating thousands of new low carbon jobs in communities across Scotland.

All these attributes make it a critical technology for the next decade as we strive to decarbonise energy through a Just Transition. Unlike most other technologies that are pushing for economies of scale solar offers an opportunity for community and residential investment and allows renewables to be accessible to all parts of society. Solar is therefore a powerful tool over the next decade to assist the Scottish Government to meet its ambitious renewable energy and social agenda targets. It is as close as you can get to a silver bullet.

For the full potential of solar in Scotland to be achieved, the solar sector needs to be given the attention it deserves, as without the right support it will continue to be an undervalued and underutilised technology. This paper sets the context as to why Scotland lags behind its near neighbours with solar deployment and what the Scottish Government can do to shine a light on the sector and stimulate investment so that Scotland gets its fair share of solar.

Thomas McMillan, Chair, Solar Energy Scotland

Executive summary

Solar Energy Scotland calls on the Scottish Government to commit to a minimum target of deploying 4000MW (4GW) of solar energy across the country by 2030 and declare a level of

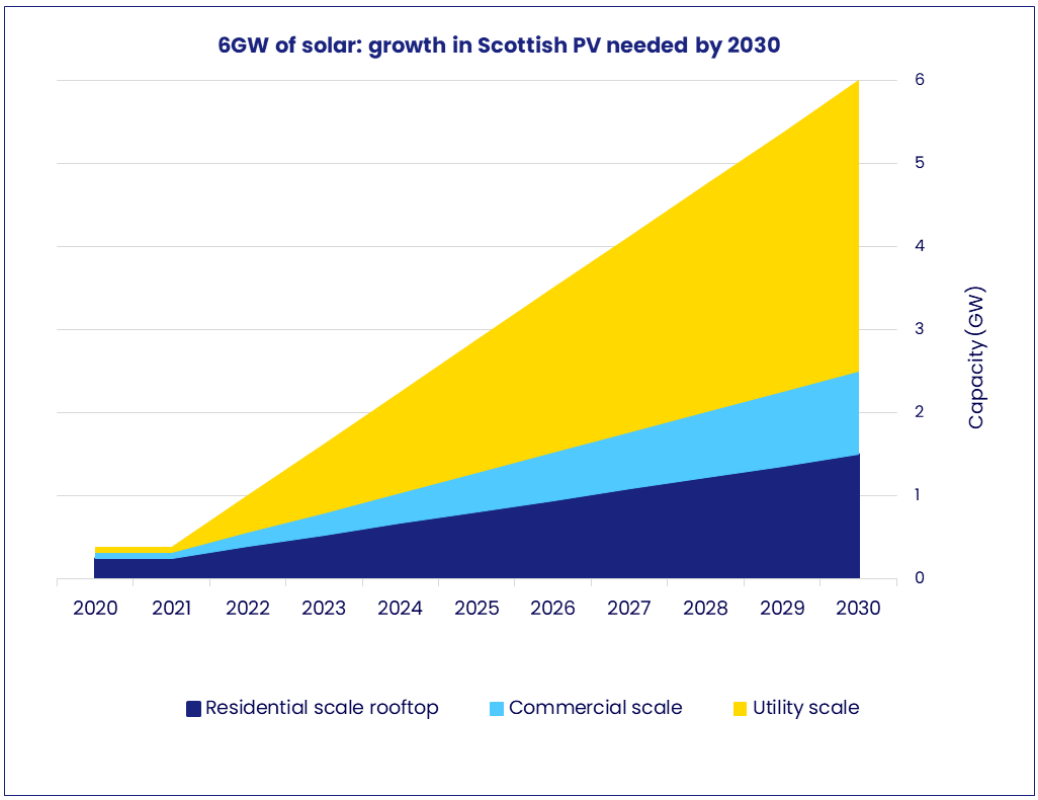
[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1001896/uk-rooftop-solar-panel-behavioural-research.pdf

ambition of 6GW. Figure 1 shows Solar Energy Scotland's 6GW ambition for 2030 with 3.5 GW of deployment coming from ground mounted solar (farms), 1.5GW from domestic rooftops and 1GW from commercial rooftops.

A specific solar deployment target of 4 to 6GW would ensure that solar technologies deliver their fair share of the clean energy required for Scotland to achieve its leading and legally binding commitments to 2030 on the way to a net zero economy by 2045.

Policy change promoted in this document and Solar Energy Scotland analysis shows that between 4 and 6GW in Scotland is deliverable and achievable by 2030.[2] This would be a major increase on its existing deployment of approximately 380MW.

Figure 1: Solar deployment needed in Scotland by 2030

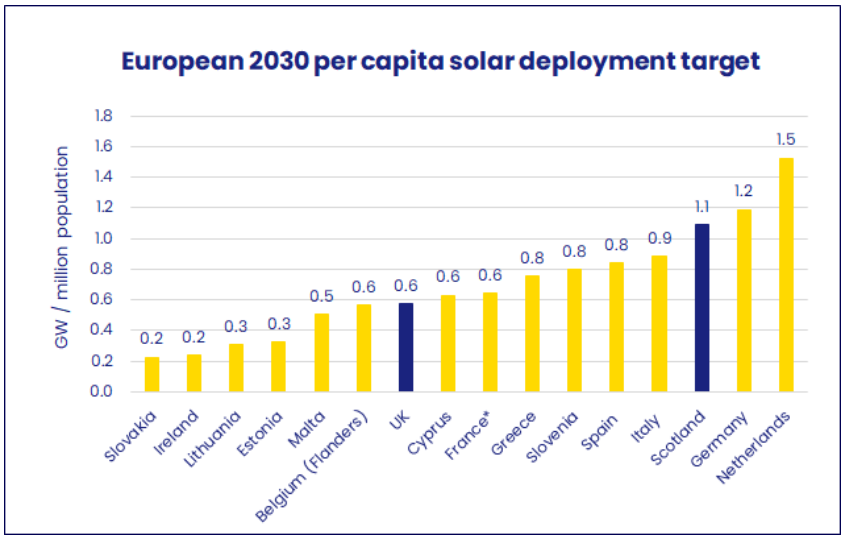


Deploying a more solar generation capacity would put Scotland on the path to achieving its fair share of solar energy. As Figure 2 shows, deploying 6GW of solar by 2030 would mean Scotland had approximately 1.1GW of solar generation capacity per million residents.

[2] Based on modelling carried out for https://solarenergyuk.org/wp-content/uploads/2021/06/Lighting-the-way-report.pdf.

This would put it near the top of the league table for European solar generation, and ahead of the UK as a whole – where it will need to be, given its more ambitious net zero target year of 2045.

Figure 2: How a 6GW Scottish solar deployment target would compare with European targets. Note that both the UK and Scotland targets are what Solar Energy UK and Solar Energy Scotland are calling on the Westminster and Scottish governments to set. Neither government has yet committed to a deployment figure.



The Scottish solar industry is uniquely poised to assist Scotland in delivering a low carbon future whilst also ensuring a Just Transition. By deploying from rooftop to utility scale, solar can provide a balanced and resilient energy mix, whilst ensuring the affordability to consumers of the decarbonisation of heat and transport. Empowering industry to do so needs a commitment to a target that would provide business with the confidence and stable policy environment to invest, as well as removing key barriers to deployment. It would also deliver broader benefits – helping to create jobs, diversify the economy, and ensure a green recovery from the Covid-19 pandemic.

This document outlines key policies the Scottish government should adopt to help solar energy deliver on its potential. They include recommendations on:

1. **Policy intent**: this should signal a commitment to solar power by setting a formal target for a minimum of 4GW (and upper ambition of 6GW) of solar power in Scotland by 2030

2. **Building regulations**: these should include a target for energy costs for new homes and recognise the role of exported solar energy in environmental performance, to ensure new homes are cheaper to run and support a Just Transition to electric heating systems.

3. **Planning rules**: these should extend permitted development rights up to 5MW rooftop solar projects

4. **Building Warrants**: this requirement should be removed for solar installations on production of a certified charted engineer's structural certificate (SER)

5. **Supporting a green recovery**: Exempt on-site solar and storage from non-domestic rates

6. **Investment in natural capital:** farmers and landowners should be permitted to claim under the Basic Payment Scheme for solar projects on agricultural land, where they can meet natural capital and biodiversity objectives

7. **Grid Infrastructure costs**: energy policy should spread the cost of electricity grid reinforcement between solar, energy storage and wind generation technologies

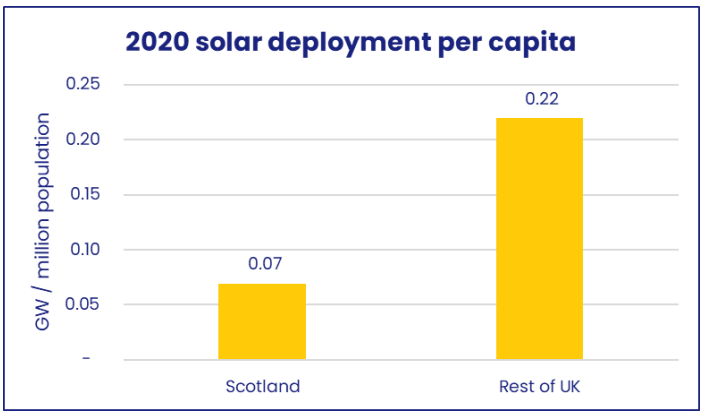
8. **Land use**: The National Planning Framework 4 and Scottish Planning Policy should explicitly support solar developments in green belts as a low impact, biodiversity friendly technology. Planning reforms should substantially elevate the Climate Emergency and mitigation through renewable energy development as a significant material consideration in decision making.

Introduction

Scotland has a legally binding commitment to deliver net zero by 2045, five years ahead of the rest of the UK. Its interim target is to deliver at least a 75% reduction by 2030 and a 90% reduction in greenhouse gas emissions by 2040.[3] These are welcome and ambitious goals. However, as of the end of 2020, Scotland had only around 3% of the UK's total deployed solar generation capacity – far below the per-capita deployment for the rest of the UK, as Figure 3 shows.

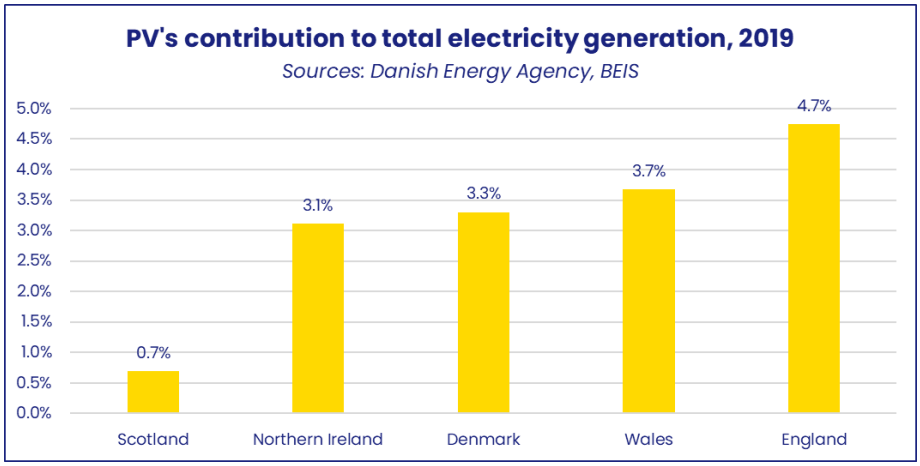
[3] https://www.gov.scot/news/reaching-net-zero/

Figure 3: Scottish and UK solar deployment to date



This is despite the fact that Scotland has significant solar potential and land areas that are very suitable; as Figure 4 shows, the share of power to which solar contributes in Scotland is also far lower than England and Wales, as well as Northern Ireland and Denmark, which are on an equivalent latitude.

Figure 4: solar contribution to 2019 electricity generation, selected countries



Scotland has significant unrealised solar power potential. The Scottish Government has the opportunity to show leadership and commit to setting a solar deployment target of at least 4GW of solar power by 2030, which would fill the deployment gap, support a Just Transition, and ensure that it is able to meet its 2045 climate change obligations.

With Scotland hosting COP 26, now is also the time to act. The SNP-Greens Cooperation Agreement included welcome support for the role of solar in August 2021 and has shown strong commitment to other areas of renewable energy. Whilst not specifically stated in the Programme for Government, we trust that solar, and its potential, will be recognised in the work of government, parliament, its committees, and public debate on the revision of the Climate Plan and Energy Strategy as soon as possible.

Policy recommendations

The Scottish government should implement the following policy reforms. Doing so would enable the residential rooftop, commercial scale, and utility-scale solar markets to maximise their potential and help deliver a minimum of 4GW of solar power by 2030.

Residential scale rooftop solar

Scottish domestic building regulations should include an affordability target for new homes and recognise the role of exported solar energy

The Scottish government is currently developing policies to provide low or zero-carbon heat in Scottish homes. These include the Heat in Buildings strategy published last week and work on new Scottish Building Regulations.[4] This is an important area of policy: ensuring warm, comfortable, and affordable homes for all is a vital social and public policy objective.

Heat policy is also directly related to climate change and energy policy, because producing domestic heat – for hot water and to warm buildings – is a major source of carbon emissions. Scottish homes contribute around 15% of Scotland total greenhouse gas emissions.[5] In its 2021 programme for government, the Scottish Government introduced a welcome target of decarbonising a million homes by 2030.[6] This will need to include measures that increase the number of installations of electric heating technologies, such as heat pumps, in new homes.

However, the combination of policies currently under consultation could have the unintended consequence of increasing the cost to consumers of decarbonisation. A planned uplift to building standards would leave a typical building heated with a heat pump, without any requirement for on-site generation. Whilst heat pumps provide a low carbon heating solution, data suggests they lead to higher running costs than alternatives. This policy in combination with a shift from gas heated new homes, is highly likely to have the unintended consequences of unaffordable energy bills therefore increases cases of and rises in fuel poverty.

Government can remedy this by either introducing a target energy bills requirement for new builds, or a requirement for on-site generation, particularly for those which will be electrically heated, through heat pumps or otherwise. Doing so would make energy more affordable and

[4] https://consult.gov.scot/energy-and-climate-change-directorate/heat-in-buildings-strategy/, https://consult.gov.scot/local-government-and-communities/building-regulations-energy-standards-review/
[5] https://www.gov.scot/publications/heat-buildings-strategy-achieving-net-zero-emissions-scotlands-buildings-consultation/pages/4/
[6] https://www.gov.scot/publications/fairer-greener-scotland-programme-government-2021-22/documents/

prevent those in fuel poverty being mandated to implement measures they can't afford. The addition of solar on buildings not only directly reduces running costs, ensuring a Just Transition, but has much wider benefits, including local grid resilience, engagement of consumers, and driving the electric vehicle transition.

Additionally, the new building regulations propose removing any benefit in the energy performance calculations for new homes from exported solar energy produced by rooftop solar panels. This is out of line with not just the rest of the UK, but many other national building regulations across the EU, which recognise the value of onsite solar power as part of the net energy position of the building. The effect is unfairly prejudicial to the uptake of solar and associated smart energy technologies.

To address this, the Scottish government should:

- *Include an affordability goal (for example, a maximum energy cost target) as part of its domestic new-build regulations. This would help ensure that developers include onsite power generation, such as solar PV, to offset running costs of electric heating.*
- *Modify the ASHP Notional House in building regulations to include solar PV, post the introduction of the New Build Heat Standard.*
- *Ensure that energy performance requirements acknowledge the carbon benefit of exported solar power from onsite generation, in line with the rest of the EU and other domestic building regulations.*

Commercial scale solar

Empower Scottish Businesses

Commercial-scale rooftop solar projects in England and Wales do not typically require full planning permission. Local authorities may require notice that a project is intended to be installed, but this will not in general be withheld for projects with an installed capacity of up to 1MW. Instead, such projects are classed as 'permitted development', under the existing planning permission for a building.

This is one proposed reason why the commercial rooftop sector in England and Wales has seen very rapid expansion. Indeed, April – June 2021 saw the strongest ever period of commercial rooftop solar sector growth in the UK.[7] The economics of solar mean that commercial rooftop projects are an extremely attractive investment for businesses, who can reduce their energy bills and their carbon footprint at the same time.

However, in Scotland, the potential for this is severely constrained due to a trio of barriers. At present, permitted development rights only extend to projects up 50kW in size

[7] https://solarenergyuk.org/news/135-mw-of-new-uk-solar-capacity-installed-in-the-second-quarter-of-2021/

(approximately 250sqm – compared to 5,000sqm in England); this limit artificially constrains the potential for commercial rooftop solar projects compared with England and Wales, and increases regulatory complexity for businesses. The Scottish government can make a simple change to address this, by raising the limit to 5MW; the space of a roof will automatically constrain the maximum size of a solar power project, which in any case will be subject to all other relevant planning requirements.

In addition, the requirement for a building warrant to install solar PV on commercial rooftops is significantly hindering the rate of deployment. The Scottish Government can remedy this by ruling that a warrant is not necessary in the absence of any structural alternation to the roof and provision of a SER certificate in line with English and Welsh planning regulations.

Since 2017 non-domestic rates for solar and storage have resulted in disproportionately high rates for 'businesses and public institutions', discouraging them from reducing carbon emissions and playing their part in delivering net zero. In some cases, the rates have risen by 800%.[8]The increase has prevented many installations across the commercial and industrial sector from going ahead by significantly reducing the savings solar affords and increasing payback periods. An independent study carried out this year on behalf of the UK Government found that SME's viewed non-domestic rates as "the single biggest barrier for the adoption of solar and SMEs felt it should be a priority for government to address this."[9] Government can stimulate investment in renewables by exempting solar and storage from non-domestic rates, supporting the rapid growth of the sector.

Favourable planning conditions for solar deployment will only be achieved if planning policies are in alignment. *To address this, the Scottish Government should:*

- *Extend permitted development rights for rooftop solar projects from 50kW to 5MW or abolish the threshold altogether.*
- *Remove requirements for commercial properties to need a building warrant to install solar on production of a certified chartered engineer's structural certificate (SER) in line with Wales and England/* Building.
- *Exempt on-site solar and storage from non-domestic rates.*

[8] Ibid

[9] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1001896/uk-rooftop-solar-panel-behavioural-research.pdf

Utility scale solar

Scottish agriculture, infrastructure and land use policy should incorporate a presumption in favour of solar deployment.

A major proportion of Scotland's solar deployment will need to come from the ground-mounted, utility scale sector. Given Scotland's solar resource and land available, there are few natural constraints on this. In fact, the deployment of 3.5GW of large scale solar would only use 14,000 acres of the 10.7 million acres available with potential (see Appendix 2). However, Scottish land and infrastructure planning rules means that there are key obstacles to Scottish solar developments.

One of these is the risk that agricultural policy inadvertently disincentivises the use of farmland for solar. This is a significant barrier to deployment as farmers have an interest in siting solar farms on their land as a way to diversify their income.[10] At present, if Scottish farms produce crops with "agricultural practices beneficial for the climate and environment," they are entitled to "greening payments" under the Basic Payment Scheme, which provides a financial safety net for farmers.[11] This helps Scotland's environmental goals, such as increasing biodiversity.

However, farmland that is used for solar power installations does not qualify for these payments, despite the evidence that well-designed and well-managed solar projects can support wildlife habitats, conservation sheep grazing and contribute to biodiversity.[12] This is inconsistent and should be rectified: if farmers can be rewarded for producing crops and increasing natural capital, they should also be rewarded for generating clean energy and increasing natural capital.

To address this, the Scottish government should:

- *Ensure that siting solar projects on farmland does not prevent the owners or tenants of that land from being eligible for greening and other Basic Payment Scheme payments, where the solar project is able to demonstrate the natural capital benefits.*

Second, there is currently an unfair burden placed on solar projects to fund the cost of future infrastructure, compared with other generation technologies such as wind farms. OFGEM rules require grid reinforcement on the basis of full output 24:7 which rarely, if ever, happens. There is a largely untapped opportunity for wind and solar to operate in tandem (when it is most sunny it is usually least windy and so grid capacity can be shared to a significant degree) On top of this, the use of system charges in the north of the UK are grossly out of step with the shift from the centralised power production system of the 1970s to the widely distributed power system of the 21st century.

[10] See, for example, https://www.theguardian.com/business/2021/jun/28/solar-farm-proposals-for-east-of-england-more-than-double.
[11] https://www.ruralpayments.org/publicsite/futures/topics/all-schemes/basic-payment-scheme/
[12] https://solarenergyuk.org/resource/natural-capital/

The Distribution Network Operators (DNOs) recognise the importance of solar on the grid but are more focused on delivering wind projects given government commitments to offshore and onshore wind targets by 2030. The wind only targets focus the DNOs strategic planning towards wind bias solutions.[13] A lack of a target for solar (and other renewable technologies) leaves the technology as a footnote in the DNO strategy documents and as a result strategies currently do not deliver a holistic plan that seeks to maximise solar deployment in Scotland.

To address this, the Scottish government should:

- *Set a clear vision for Solar in Scotland and thereby oblige DNOs to accommodate growth in solar deployment and maximise the utilisation of the grid so that solar and wind work together more efficiently that helps to maximise renewable energy in a cost-effective way.*

Solar works well when in close proximity to large urban centres where the cheapest grid connections are usually found. Unfortunately, large areas of land that are suitable for solar farm deployment are covered by green belt designations. There are 11 green belts in Scotland with several straddling more than one local authority.

When it comes to solar deployment in green belts, Local Authorities take different approaches – with Aberdeen City and Perth & Kinross supporting solar deployment in green belts, while Aberdeenshire and Stirling appearing not to support renewables at all in green belts. This hinders solar deployment as many developers see the lack of consistency around green belts as a planning risk, particularly where neighbouring local authorities take opposing approaches.

Greater clarity is also required in planning policy at national level for decision-makers at all levels to afford solar energy developments much more significant weight in the planning balance to reflect the need to tackle the climate emergency.

To address this the Scottish Government should:

- *Ensure that NPF4 and the next SPP should explicitly support solar in green belts*

- *Officially recognise that renewable can substantially elevate the Climate Emergency and mitigation, making renewables (including specific mention of solar) a significant material consideration in decision making.*

[13] https://www.gov.scot/publications/fairer-greener-scotland-programme-government-2021-22/documents/

The broader benefits

In addition to helping Scotland achieve its climate change goals, increasing solar deployment will deliver a number of other crucial benefits. These are outlined below.

Supporting a Just Transition

The solar power sector creates resilient, long term, sustainable jobs. Indeed, solar PV requires one of the highest percentages of labour compared to other renewable technologies. Solar Energy Scotland analysis suggests that deploying 6GW of solar in Scotland could support at least 3,000 FTE skilled and high-quality jobs, with the potential for many more throughout the supply chain and the wider economic impact to support jobs.[14][15]Furthermore, there is major job creation potential in the emerging energy storage sector, which will be vital to ensuring that the potential of Scottish renewable generation capacity is realised. There is already close to 600MW of utility-scale solar capacity in the Scottish deployment pipeline that will be co-located with energy storage, indicating the increase in storage – and employment – which can be expected should more solar be installed. Because solar and storage technology is quick to deploy, committing to a Scottish solar deployment target would therefore mean that the Scottish government could rapidly deliver skilled, high-quality jobs to rural and other parts of the country in weeks rather than years.

The opportunity to create high quality jobs is also important in the context of the debate around Scotland's offshore oil and gas industry, with the Scottish Government committing to £500 million in the North East and Moray Just Transition fund and the need to ensure that oil and gas workers are not left behind in Scotland's energy transition.[16] Solar could provide new employment for many of today's North Sea's offshore workers – with appropriate vocational and training support from the Government that could be put into place in a matter of months as solar is viable and deployable immediately. The extent of how much solar can be deployed is only limited by ambition. A solar deployment target of 4 to 6 GW by 2030 sets clear ambition for key stakeholders that have the ability to remove deployment barriers and create optimal market conditions.

Expanding Scotland's industrial base

Scotland has an established solar supply chain, involving a wide range of companies. They work on component design, manufacture and distribution, project development and management, solar system operations, maintenance and cleaning, software development, civil, infrastructure and landscape engineering, and legal, financial, and administrative

[14] https://www.gov.uk/government/statistics/solar-photovoltaics-deployment

[15] https://ukerc.ac.uk/publications/low-carbon-jobs-the-evidence-for-net-job-creation-from-policy-support-for-energy-efficiency-and-renewable-energy/

[16] https://www.ft.com/content/84a48e79-bc69-4cab-97f1-9bcf8e1b408

processes involved in all of these. The technology is established across the UK, the sector is mature and solar companies are used to integrating their work with that of the construction, roofing, and electrical and mechanical installation industries.

As such, there is a major opportunity to expand the supply chain further. Solar Energy Scotland estimates that deploying 4GW of Scotland would lead to around £2.5 billion of economic activity, as a minimum, in the areas above. Providing a clear market signal for Scotland's solar ambitions would provide the confidence Scottish companies need to invest in their workforce and operations, expanding the supply chain and helping to diversify the Scottish economy as part of its recovery from the Covid-19 pandemic. The Scottish solar sector is also willing and able to improve the level of domestic content, helping to maximise the potential for Scottish job creation.

Reducing pressure on the grid

One of the challenges of decarbonisation will be the significant increase in demand for electricity expected as a result of the electrification of heat and transport. The investment and engineering work required to be able to transmit this electricity is costly and takes time to plan and install, as noted elsewhere in this policy document.

However, one way to mitigate this challenge is to move to a smarter, more decentralised system of power generation and use. This means maximising the potential of local, 'onsite' generation – in other words, bringing electricity supply and demand as close together as possible. The distributed nature of solar power can help achieve this, both because homes and businesses with rooftop solar can 'self-consume' power, and because solar farms are flexible and can be installed close to major centres of demand. In addition, solar can be deployed in regions where there is a high density of wind farms (including where offshore wind comes onshore) to make more efficient use of the electricity grid. Maximising the deployment of solar power – which can be planned and constructed quickly and easily – will reduce time and investment pressure on the grid. Solar can therefore also help maximise the contribution of *other* clean energy technologies to Scotland's energy objectives.

In a broader context, the lack of focus to date of the potential of solar and storage by the Scottish Government is mirrored by the same low level of ambition by DNOs. This means that within their Future Energy Scenarios and draft business plans, they include worryingly low amounts of solar forecast between 2023-2028. Government must demonstrate leadership, setting high solar targets to encourage DNOs to reflect the same level of ambition in their Future Energy Scenarios and in their draft business plans for the period which are yet to be fully considered and approved by OFGEM.

Conclusion

The story of Scottish solar is only beginning. Scotland has major solar resource, but it is woefully underutilised. Policy and regulatory barriers to development and a lack of a national deployment target for 2030 are needlessly preventing solar from contributing its fair share to Scotland's net zero targets.

The Scottish Government has an excellent opportunity to demonstrate more leadership by setting a 4 to 6GW solar deployment target by 2030There are a relatively simple set of changes which the government could make that would create the enabling conditions for the Scottish solar industry to take off. In some cases, these would merely bring Scottish policy support in line with other parts of the UK. In others, they would go further, recognising the potential that solar has to offer and ensuring that it delivers on this.

Scottish solar companies are ready and willing to act. Indeed, the industry is already a global success story. And with a clear signal to invest, it would do just that in Scotland. Therefore, the Scottish Government should commit to a formal target of deploying a minimum 4GW of Scottish solar by 2030 and an upper ambition of 6GW. Doing so would help Scotland emerge from the Covid-19 crisis on a path that would maximise its clean energy potential, mitigating climate change while creating jobs, diversifying the economy, providing affordable energy bills, and supporting a just energy transition.

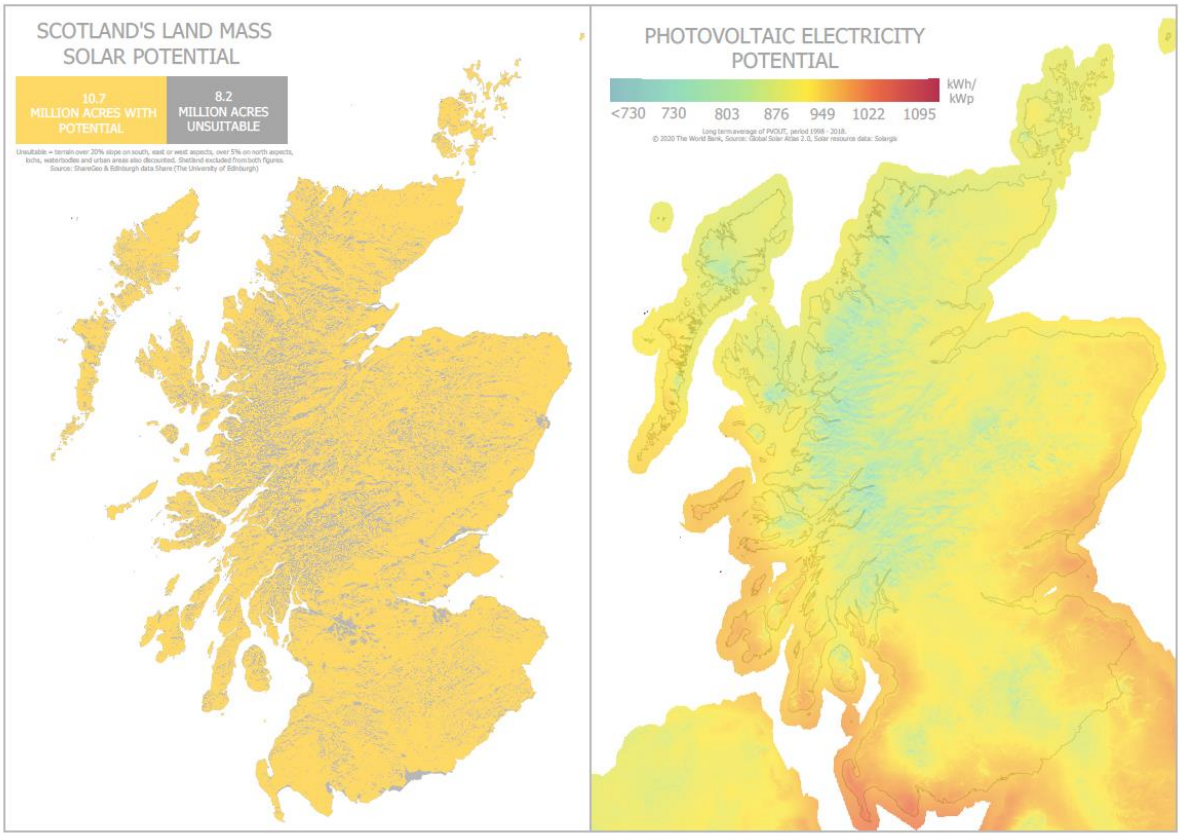
Solar Energy Scotland looks forward to working with the Scottish Government and all stakeholders to make this a reality.

ENDS

Appendix 1

Hoy	
Scotland Energy Use (TWh) (2018)	142
tWh/kWh	1,000,000,000
Scotland Energy Use (kWh)	142,000,000,000
GTI Irriadiance (kWh/m2)	987
km2/m2	1,000,000
GTI Irriadiance (john o'Groats) (kWh/km2)	987,000,000
Area in which enough soalr energy reaches the surface (km2)	144
Dimension of required square of land (km)	12
Land Area (HA)	14318
km2/HA	100
Land Area (km2)	143.18
% of Land required	**101**

Appendix 2 -Scotland's land mass potential for utility scale solar deployment


SCOTLAND'S LAND MASS
SOLAR POTENTIAL
10.7
MILLION ACRES WITH
POTENTIAL
8.2
MILLION ACRES
UNSUITABLE
PHOTOVOLTAIC ELECTRICITY
POTENTIAL
kWh/
kWp
<730 730 803 876 949 1022 1095