

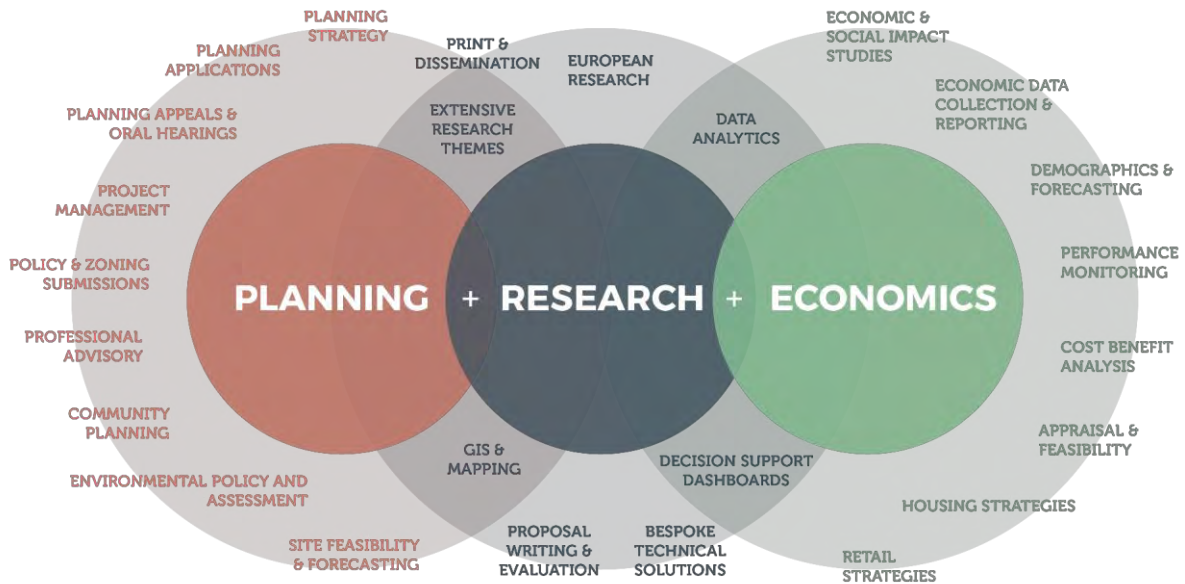


PLANNING AND DEVELOPMENT GUIDANCE RECOMMENDATIONS FOR UTILITY SCALE SOLAR PHOTOVOLTAIC SCHEMES IN IRELAND

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FutureAnalytics
Planning + Research + Economics

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Executive Summary

This report contains a set of planning policy and development guidance recommendations, which may contribute to the evidence base that will inform the development of Section 28¹ (S28) planning guidance (or Departmental Circulars on planning practice) for Utility Scale Solar Photovoltaic (USSPV) developments in Ireland.

Over a hundred applications for utility scale solar PV have been lodged with planning authorities as of October 3rd 2016. The statistics below outlines the status of these applications to date:

- Granted (Local Authority): 20
- Granted (An Bord Pleanála): 3
- Refused (Local Authority): 7
- Further Information Requested: 36
- Decision Pending (Local Authority): 20
- Live Appeals (3rd Party vs. Grant): 3
- Live Appeals (1st Party vs. Refusal): 4
- Invalidated (Local Authority): 17
- Deemed Withdrawn: 3

As of the beginning of October 2016, applications have been granted planning permission, are under determination/or on appeal for an estimated 594 Megawatts (MW) of solar PV generation potential. The combined site area for these schemes is 1331.9 hectares. At present, no planning policy guidance exists for USSPV developments in an Irish context.

While there are existing elements of the Irish planning system that may be utilised in the assessment, and planning of utility scale solar PV schemes, a number of development impacts and procedural matters arising due to the characteristics of this form of renewable energy generation require exploration.

This research has identified the recommendation below, which could contribute, to informing any future planning and development guidance for utility scale ground mounted solar PV installations. The recommendations have been categorised under the following headings;

- Forward Planning recommendations;
- Development Management Recommendations; and
- Other Recommendations.

¹ Section 28 of the Planning and Development Act 2000 (as amended) empowers the Minister for Housing, Planning and Local Government to issue guidelines to planning authorities. Planning authorities and an Bord Pleanála are required to have regard to the guidelines in performance of their functions under the Planning Acts.

Forward Planning Recommendations

Recommendation No. 1

It is recommended that USSPV energy developments be explicitly referenced in the National Planning Framework as a potential key component of Ireland’s energy transition to a ‘low carbon’ society.

Recommendation No. 2

It is recommended that utility scale solar PV energy developments be explicitly referenced in the Regional Spatial and Economic Strategy for the regional assembly areas as a potential key component of Ireland’s energy transition to a ‘low carbon’ society.

Recommendation No. 3

It is recommended that county development plans set out policy and objectives to support utility scale solar PV energy development and put in place development management standards to control development in line with the recommendations below.

Recommendation No. 4

It is strongly recommended that county development plans do not adopt development policy objectives which unduly restrict USSPV energy development. It is, however, recommended that plans identify the type of location where such development is particularly suited, i.e.

- Rural Brownfield (e.g. cutaway bog);
- Urban Brownfield (e.g. former landfill sites);
- Topographically assimilative and screening rich landscapes;
- Agricultural Lands;
- Proximity to a 38kv or 110kv substation/line; and
- Areas of low biodiversity value.

Recommendation No. 5

It is recommended that planning authorities do not set out development policy that prioritises the delivery of development of utility scale solar PV on lands with lower agricultural value.

Recommendation No. 6

It is recommended that planning authorities maintain a GIS based database of all utility scale solar PV schemes, together with relevant other schemes, including wind farms to assist in identifying cumulative effects.

Development Management Recommendations

Recommendation No. 7

It is recommended that developers carry out community consultation in advance of the lodgement of a planning application to describe the benefits and impacts of the scheme and encourage greater understanding of the development in the community.

Recommendation No. 8

It is recommended that the impact on the landscape be addressed using the following key criteria:

- within a defined radius of the proposal under consideration, a plan showing cumulative 'zones of visual influence' .
- maps of cumulative zones of visual influence are used to identify appropriate locations for visual impact studies.
- examination of simultaneous visibility assessments ;
- sequential effects on visibility occur when an observer moves through a landscape and sees two or more schemes. Common routes through a landscape (e.g. major roads; long distance paths or cycle routes) can be identified as 'journey scenarios' and the proposals impact on them can be assessed;
- photomontages to show all existing and consented solar farms, and those for which planning applications have been submitted, in addition to the proposal under consideration.
- at the most detailed level, description and assessment of cumulative impacts may include the following landscape issues: scale of development in relation to landscape character or designations, sense of distance, existing focal points in the landscape, and sense of remoteness or wildness.
- If necessary to undertake a glint and glare assessment, including cumulative effectiveness of all existing and consented solar farms

Recommendation No. 9

It is recommended that a national standard for the undertaking and assessment of geometric glint and glare assessments is developed, in conjunction with the Department of Housing Planning and Local Government, the Department of Communications, Climate Action and Energy, the solar industry, technical experts and other key stakeholders including the community.

Recommendation No. 10

No specific additional recommendation for planning policy is proposed in relation to screening. Additional screening may be required in specific instances, such as proximity to sensitive visual receptors, such as those found in heritage landscapes or areas with scenic landscape qualities.

Recommendation No. 11

It is recommended that the deployment of utility scale solar PV shouldn't be prohibited in undulating landscapes.

Recommendation No. 12

It is recommended that geophysical assessment of proposed USSPV sites should only take place in areas of archaeological potential. Any application for a USSPV scheme should submit an archaeological assessment predicated on a site walk over and desk research of possible archaeological potential on a subject site.

Recommendation No. 13

It is recommended that no specific set back distances are applied from a utility scale solar PV scheme to particular receptor. However, schemes should be designed to ensure that impacts at boundaries and sensitive receptors is within acceptable environmental limits.

Recommendation No. 14

It is recommended that the potential impact on drainage patterns is assessed as part of each planning application for utility scale solar PV.

Recommendation No. 15

It is recommended that the details of the construction stage are sought as a condition of planning permission, other than where they may raise significant matters that influence the planning decision.

Recommendation No. 16

No specific additional recommendation for planning policy is proposed in relation to site management, operation and maintenance.

Recommendation No. 17

No specific additional recommendation for planning policy is proposed in relation to security.

Recommendation No. 18

It is recommended that a decommissioning statement be included as a standard component of a planning application for utility scale solar PV.

Recommendation No. 19

It is recommended that the planning permission includes a condition permitting the installation of higher efficiency panels (repowering) during the lifetime of a grant of planning permission, so long as the physical characteristics or the planning impacts of the development are not materially different from the original (i.e. reflectivity, sun path tracking etc).

Other Recommendations

Recommendation No. 20

It is recommended that the Planning and Development Acts and associated regulations should not be amended to include a separate category for mandatory EIA for utility scale solar PV development.

Consideration of the need for EIA should continue to be determined on a case-by-case basis with reference to the requirements of Annex III of the EIA Directive.

Recommendation No. 21

It is recommended that the potential role of utility scale solar PV in meeting Ireland’s renewable energy requirements is considered through a consideration of its appropriateness as a class of Strategic Infrastructure Development.

Recommendation No. 22

It is recommended that the Department of Housing, Planning and Local Government consider extending the exempted development threshold for roof mounted solar PV on commercial, office and industrial buildings up to 500kw systems.

1.0 Introduction

At the beginning of October 2016, planning applications for over 100 Utility Scale Solar PV (USSPV) developments have been submitted to planning authorities across the State. Excluding invalidated and refused applications (not under appeal), there is at least 594 megawatts (MW). This figure represents 19.7% of the 3+ gigawatts (GW)² of grid connection applications which have been lodged for this renewable energy generation. At present, no specific planning and development guidance exists for solar energy development in an Irish context. The absence of guidance is an issue for planning authorities and the development sector and local communities, as it introduces uncertainty into the manner in which solar energy schemes will be considered. This research project will deliver recommendations which will inform the delivery of Section 28 (Planning and Development Act 2000 [as amended]) planning guidance for solar energy development in urban and rural areas.

This research will be submitted to the Department of Housing, Planning and Local Government as well as the Department of Communications, Climate Change and Energy for consideration and potential application in the form of S28 planning guidance for commercial, USSPV developments. The delivery of planning guidance for this sector will contribute toward the unlocking of the potential of the solar energy sector to decarbonise Ireland's energy sources, especially in light of the State's obligations under binding international, European and national Green House Gas (GHG) emission reduction targets.

There is a significant divergence of opinions within international literature and industry publications as to the threshold of solar PV deployment which would constitute "utility scale". For the purposes of this research and having regard to the size and scale of solar PV schemes in the planning pipeline in Ireland, the US National Renewable Energy Laboratory's³ definition of "utility scale" as being upward of 5 megawatts (MW) has been adopted.

1.1 Solar Electricity Technology

There are three primary solar electricity technologies, which have been deployed in a wide variety of contexts around the globe. A brief description of each technology is outlined below.

Solar Photovoltaic (PV)

Solar PV generates electrical power by using solar cell to convert solar irradiance (sun light) into electricity. According to the SEAI⁴, the most common types of PV available are;

- Crystalline silicon – sliced from ingots or castings or grown from ribbons; and

² Figure based on Transmission Systems Operator (TSO) and Distribution Systems Operator (DSO) application disclosures as of September 2016.

³ NREL (2012) "Utility-Scale Concentrating Solar Power and Photovoltaics Projects: A Technology and Market Overview" Available via: <http://www.nrel.gov/docs/fy12osti/51137.pdf>

⁴ SEAI (undated) "Best Practice Guide: Photovoltaics" Available via: http://www.seai.ie/Publications/Renewables_Publications_/Solar_Power/Best_Practice_Guide_for_PV.pdf

- Thin film – photo-sensitive materials deposited in thin layers on a low cost backing, e.g. glass, stainless steel (produces lower efficiency cell than crystalline silicon). Typical photosensitive materials include amorphous silicon (a-Si), copper indium diselenide (CIS, CIGS) and cadmium telluride (CdTe).

Solar Thermal (STE)

Solar thermal power plants use the sun's rays to heat a fluid to high temperatures. The technology is applied in domestic settings (i.e. to heat water) and at a utility scale, where heated fluid can transfer to water in order to create steam to drive turbines⁵.

Concentrated Solar Power (CSP)

CSP systems utilise mirrors to reflect and concentrate sunlight onto receivers that collect solar energy and convert it to heat. Thermal energy can then be used to produce electricity via a turbine or heat engine driving a generator⁶.

1.2 Energy Policy Context

The purpose of this section is briefly outline the energy policy context which frames the impetus behind Ireland's energy transition as well as developer interest in USSPV energy development in an Irish context.

1.2.1 Energy White Paper: Ireland's Transition to a Low Carbon Energy Future 2015-2030

The Energy White Paper outlines a role for the deployment of USSPV development in an Irish context. The declining cost of the infrastructure, the relatively quick construction times (12-16 weeks) associated with this form development as well as the capacity of the sector to generate employment and other economic activity are cited as some of the reasons for the study of a possible support scheme to facilitate the deployment of USSPV in an Irish context.

1.2.2 "A Programme for a Partnership Government" (2016)

Solar energy is specified in the Programme for Government. The programme states the following [p. 124]:

⁵ Environmental Information Administration (2015) "Solar thermal power uses solar energy instead of combustion" Available via: http://www.eia.gov/energyexplained/?page=solar_thermal_power_plants

⁶ Office of Energy Efficiency & Renewable Energy (2016) "Concentrating Solar Power" Available via: <http://energy.gov/eere/sunshot/concentrating-solar-power>

“We will facilitate the development of solar energy projects. Solar has the potential to provide a community dividend. The Department of Agriculture shall endeavour to facilitate such development while maintaining basic payment schemes, subject to EU Commission approval.”

The White Paper sets out a commitment to develop a new Renewable Electricity Support Scheme, with Solar PV mentioned as one of the technologies under consideration. This interest is manifesting itself in the number of planning applications for solar energy development. A snapshot of this pipeline up to the end of September 2016 is contained in Appendix A.

1.2.3 Renewable Energy Feed-In Tariff (REFIT)

The influence of policy support on the USSPV market in an Irish context is critical of defining the commercial landscape (price certainty) for the sector. At present, there is no REFIT scheme to subsidise the generation of energy from USSPV sources. The launch of such a scheme is considered by many in the solar industry as a possibility in the short to medium term, as evidenced by the growth of the planning pipeline for the sector and the policy support outlined above on the consideration of such a scheme in the White Paper on Energy.

1.2.4 Directive 2009/28/EC of the European Parliament

Directive 2009/28/EC on the promotion of the use of energy from renewable sources establishes the basis for the achievement of the EU’s 20% renewable energy target by 2020. Under the terms of the Directive, each Member State is set an individually binding renewable energy target, which will contribute to the achievement of the overall EU goal.

Under the EU’s “20-20-20” Effort Sharing Decision, Ireland is required to meet the following targets by 2020;

- A 20% reduction in Final Energy Consumption (FEC), as compared to average energy use in the period 2001-2005;
- A 20% reduction in GHG emissions from 2005 levels in the Non-ETS sector; and
- An increase in the contribution of renewable energy to FEC to 16% by 2020 and an increase in the overall share of energy from renewable sources in transport to 10%.

At present, the State is at risk of not meeting its obligations under this directive. Consequently, the State is liable to incur fines as well as being obligated to acquire Emissions Trading Scheme (ETS) credits to make up the shortfall in emissions reductions. One study of the costs associated with non-compliance estimated the cost of not meeting the set targets at €610 million⁷. The risk which non-compliance poses is also outlined in the Department of Finance’s ‘Stability Programme Update’ (2016) which sets out the impetus for the creation of low carbon communities based on the State’s commitments to binding EU effort sharing in the area.

There are fiscal risks associated with a legally binding EU Effort Sharing Decision on climate change covering the 2013-2020 period. Ireland is obliged to achieve a 20 per cent Greenhouse Gas emissions reduction (compared to 2005 levels) in certain sectors. Current EPA projections estimate that Ireland

⁷ Burke-Kennedy, “Ireland could face €5.5bn climate bill by 2030, says expert” Irish Times [Dublin], 12/09/2016

will not achieve this reduction and failure to comply may incur costs of hundreds of millions through the purchase of carbon credits until such time as the target is complied with. Similarly, further new costs may arise in the context of a new EU climate and energy framework for the period 2020-2030, which will set new emissions reduction targets.

Department of Finance, 2016, p.28

In order to marshal an effective response and to guide the development of innovative approaches to the creation of sustainable low carbon communities, Irish planning and design practice needs to expand its capacity to deliver technically and economically viable energy efficient solutions. An expanded energy mix, potentially incorporating the solar market segments outlined in Section 1.3, below may contribute to the achievement of Ireland's emissions targets going forward.

1.2.5 2015 Paris Climate Conference (COP 21)

In 2015, COP21, also known as the 2015 Paris Climate Conference, created a legally binding and universal agreement on climate, with the aim of keeping global warming at 2°C above pre-industrial levels. The policy that will give effect to these targets in an Irish context is currently being devised by the European institutions. The *“Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 for a resilient Energy Union and to meet commitments under the Paris Agreement and amending Regulation No 525/2013 of the European Parliament and the Council on a mechanism for monitoring and reporting greenhouse gas emissions and other information relevant to climate change”*, which was published on the 20th of July 2016, outlines the scope of Ireland's emission reduction requirements going to 2030.

1.3 Potential Solar PV Markets in Ireland

Solar PV technology has the potential to offset energy related emissions through its deployment in a number of key market segments. While the primary focus of this research is directed toward the drafting of planning recommendations for USSPV planning schemes, it should be noted that there is a degree of transferability in this recommendations regarding the deployment of solar PV technology in the markets outlined below.

1.3.1 Utility Scale Ground Mounted

The primary focus of this suite of planning guidance recommendations will be focused on USSPV. In the short to medium term, this form of solar energy development is likely to attract a significant amount of interest from developers and investors due to the returns which are likely to accrue if a pricing structure is set down (either in the form of a REFIT scheme or a 'Contract for Difference' arrangement) at a future date. The recommendations for planning guidance proposed in this research will have a degree of overlap between the market segments outlined below.

1.3.2 Domestic

According to the SEAI, the residential sector accounted for 27% of all primary energy used in Ireland in 2011 and was the largest energy user after transport⁸. The energy efficiency of housing, particularly in the generation and storage of energy through domestic installations is therefore of critical importance to the attainment of national emissions targets. The deployment of solar electricity technologies on new residential buildings may facilitate developers in satisfying their obligations under Part L⁹ of the Irish Building Regulations.

In terms of planning considerations, Class 2(c) of the Planning and Development Regulations 2001 (as amended) specifies that the 'installation or erection of a solar panel on, or within the curtilage of a house, or any buildings within the curtilage of a house' qualify as being exempted development. There are certain conditions on this exemption i.e.

- if the residential unit is a protected structure or
- if the panels are mounted in a certain fashion.

Planning permission is required if the roof mounted installation is greater than 12 square metres (freestanding arrays require planning if they are larger than 50 square metres (Class 2 (d))). With improvements to battery storage technology and the increasing cost and energy efficiency of solar PV systems, it is recommended that any mooted S28 planning guidance for the solar energy sector explore the need to consider the thresholds, which have been applied to the exempted development provisions for existing solar PV technologies.

As solar energy technology costs decline further and the energy storage devices increase in efficiency, it may become economically viable to install solar energy technologies on a wide scale in domestic settings. Anecdotally, a number of developers are examining the feasibility of such measures. As such, any S28 planning guidance for solar energy should have regard to the possibility of the growth of this segment of the solar energy market. Key questions around this area relate to the cumulative impact of this form of renewable energy generation given the planning exemptions, which currently apply to the sector. Further research is required into the manner in which the planning and development system may facilitate such retrofitting while enabling the effective management of visual amenity and sustainable development in urban environments. As has been proven with the growth in activity in the USSPV sector, it may be possible that the commercial situation relating to domestic scale installations may ramp up should the cost elements further decline thereby generating a return for developers, suppliers and householders. The recognition of this by any S28 guidance for this sector would enable the creation of a coherent and 'derisked' planning process to enable and facilitate the sustainable growth of this market segment.

⁸ Dennehy, E and Howley, M (2013) *"Energy in the Residential Sector"* Sustainable Energy Authority of Ireland, Dublin.

⁹ Part L of the Irish Building Regulations deals with the conservation of fuel and energy. The regulation itself states that a building shall be designed and constructed so as to ensure that the energy performance of the building is such as to limit the amount of energy required for the operation of the building and the amount of carbon dioxide (CO₂) emissions associated with this energy use insofar as is reasonably practicable. Building regulations requirements for new dwellings also prescribe that a reasonable proportion of the energy consumption to meet the energy performance of a dwelling is provided by renewable energy sources.

1.3.3 Non Domestic

The deployment of solar PV systems on a variety of building types is being actively pursued in Ireland. Initiatives such as the Accelerated Capital Allowance¹⁰ (ACA) have served to generate interest in the deployment of solar PV in nondomestic settings given the incentive in place regarding the tax deductibility of renewable energy upgrades against corporation tax.

In June 2016, Dublin Airport Authority received planning permission for the erection of a solar array consisting of 718 square metres (generating capacity 106 kilowatt hours (kWh) on the north end of Terminal One. Other large-scale deployments of solar PV technology are taking place on commercial and industrial buildings. Kingspan ESB's installation of a 300kWh system on the Kingspan insulation plant in Castleblaney, County Monaghan¹¹ and the AIB Bankcentre roof mounted solar PV scheme are illustrative of the type of projects being actively considered by commercial operations who are seeking to maximise the potential of their assets particularly in the case of vacant roof space.

Local authorities are also deploying solar PV installations to offset their energy consumption. Tipperary County Council has installed solar PV on nine public buildings across the county, constituting the largest deployment of solar PV on public buildings in the State to date. The project is anticipated to result in an energy reduction of 171,000 kWh annually and repay the project costs within 7 years¹².

The development of this market for the deployment of solar energy technology should be explored in terms of any S28 guidance, which may be drafted particularly in line with the potential for the expansion of the exemptions covering the deployment of solar PV on commercial, industrial and public buildings. In the United Kingdom, planning exemptions were extended in mid-2016 to cover schemes of up to 1MW in scale. This initiative was considered an incentive to nondomestic building owners and occupiers to offset their energy costs through renewable means. The UK exemption is contingent on certain design, appearance and reflectivity conditions being met. In light of the need to promote nondomestic retrofit, considering a similar approach may be warranted in an Irish context. Any S28 guidance should examine the potential to facilitate this form of solar PV in this market with particular focus on the scope to amend exempted development classes.

1.4 Research Methodology

In order to draft evidence based and practice tested planning guidance recommendations for the solar energy sector, an adaptive multi stage methodology was employed. The first stage of this methodology consisted of a thorough review of planning practice in relation to the development impacts of USSPV developments. The jurisdictions which were selected based on a number of criteria, such as the level of technology installed in addition and the compatibility of planning practices in those areas for transposition into an Irish context. This analysis was undertaken by review planning

¹⁰ The ACA is a tax incentive for companies paying corporation tax and aims to encourage investment in energy efficient equipment. The ACA offers an attractive incentive whereby it allows companies to write off 100% of the purchase value of qualifying energy efficient equipment against their profit in the year of purchase.

¹¹ Kingspan (2016) "The Largest Solar PV project in the Republic of Ireland" Available via: <http://www.kingspaninsulation.ie/About-Us/News/Latest-News/The-Largest-Solar-PV-project-in-the-Republic-of-Ir.aspx>

¹² Tipperary Energy Agency (2014) "Tipperary County Council Solar PV 2014" Accessed: <http://tippenergy.ie/projects/tipperary-county-council-solar-pv-2014/>

practice and guidance documents from the selected jurisdictions. This analysis was supplemented through the interrogation of academic material sourced through the *'Science Direct'* ejournal database.

The second stage of the methodology consisted of a thorough evaluation of the planning pipeline of USSPV projects which have been lodged with planning authorities for consideration in an Irish context. The list of planning applications reviewed is appended to this report (Appendix A). Through the study of these planning applications, a range of recommendation areas were devised. These recommendation areas were key to the third stage of the methodology which involved consultation with identified key stakeholders. A range of key stakeholders from the public, private and 'third' sector was consulted with in order to explore the recommendation areas as well as their insights into the manner in which the planning system should engage with applications for USSPV. The final stage of this research methodology considered the outputs from the above stages and appropriate recommendations were drafted and structured in line with functions of the Irish planning and development system.

1.5 Summary

This section has introduced and framed the scope of the research contained in this report. In addition, it has set out the policy context which is currently framing the solar energy market in an Irish context. A high level overview of the planning pipeline is also discussed in this section. The planning pipeline and the issues arising from it will be explored in detail in Section 2.0.

2.0 Utility Scale Solar Planning Pipeline Assessment

The purpose of this section is to explore the emerging issues and opportunities which can be identified in the USSPV planning pipeline. The pipeline that this study is based on is available in Appendix A of this report. As stated in Section 1.0, there has been a significant jump in the number of planning applications that have been lodged to date for USSPV schemes in the Republic of Ireland. Over a hundred applications for utility scale solar PV have been lodged with planning authorities (as of October 3rd 2016). The statistics below outlines the status of these applications to date:

- Granted (Local Authority): 20
- Granted (An Bord Pleanála): 3
- Refused (Local Authority): 7
- Further Information Requested: 36
- Decision Pending (Local Authority): 20
- Live Appeals (3rd Party vs. Grant): 3
- Live Appeals (1st Party vs. Refusal): 4
- Invalidated (Local Authority): 17
- Deemed Withdrawn: 3

Counties in the south and east of the country have received the most interest from the market to date however; there is a growing number of USSPV schemes entering the pipeline across the State. A list of counties where permission for USSPV developments is provided below.

- | | |
|------------------------------------|-------------------------------------|
| • Carlow County Council | • Longford County Council |
| • Clare County Council | • Louth County Council |
| • Cork County Council | • Meath County Council |
| • Fingal County Council | • Offaly County Council |
| • Galway County Council | • Roscommon County Council |
| • Kerry County Council | • Tipperary County Council |
| • Kildare County Council | • Waterford City and County Council |
| • Kilkeny County Council | • Westmeath County Council |
| • Laois County Council | • Wexford County Council |
| • Limerick City and County Council | • Wicklow County Council |

As of the beginning of October 2016, planning applications are under determination/or on appeal for an estimated 594 Megawatts (MW) of solar PV generation potential. The combined site area for this potential capacity is 1331.9 hectares. The above figure excludes planning applications that have been refused by planning authorities and not appealed to An Bord Pleanála and invalidated permissions.

The sub sections below will explore the issues which have emerged in the planning pipeline to date. It is opportune to reflect at this juncture in order to devise recommendations for planning policy which may enable the evaluation of USSPV planning permissions in a coherent and comparable manner across planning authorities. In addition, studying the issues which have emerged to date in terms of the queries arising at 'Request for Further Information' (RFI) stage may eliminate the need for such requests to issue in the first place, thereby eliminating the expenditure of time and resources by planning authorities and applicants during the planning process.

This section has been categorised according to the stage in the planning system at which various development impacts and procedural matters associated with the evaluation of USSPV schemes may take place. The contents of this section have been categorised under three headings;

- Forward Planning
 - Planning Policy
 - Land Use Planning
- Development Management
 - Glint and Glare
 - Archaeological Surface/Subsurface Remains
 - Construction Phase
 - Noise
 - Setback Distances
 - Landscape and Visual Impact
 - Site Management and Maintenance
 - Drainage/Flood Risk
- Miscellaneous
 - Preplanning Consultation
 - Property Devaluation
 - Environmental Impact Assessment
 - Birds/Habitats Directive

2.1 Forward Planning

The forward planning function of the planning system facilitates the plan led and evidence based development of the State's terrestrial and maritime area. A hierarchy of plans and policies existing in an Irish context, running from national, regional, county and local in terms of spatial scale.

The county development plan is the primary instrument which governs the pattern and extent of development in a particular planning authority area. While the contents and zoning of the county development plan is a matter for locally elected councillors, whose responsibility it is to shape the contents of county development plans, these documents are also obligated to have regard to regional and national level planning policy and objectives¹³.

The areas of interest emerging from the accumulation of USSPV schemes to date in the planning pipeline with reference to the forward planning function of planning authorities are set out below.

2.1.1 Planning Policy

An absence of planning policy explicitly referencing the role that USSPV can play in Ireland's energy transition is emerging in third party objections on schemes currently in the process of seeking planning permission in an Irish context. The absence of appropriate planning policy has introduced an element of uncertainty regarding USSPV as a form of renewable energy generation as provision has not been generally made for it in existing iterations of county level development plans.

¹³ For a full description of the Irish planning systems processes and structure, please see the 'Spatial Planning and Energy for Communities in All Landscapes' (SPECIAL) project 'Knowledge Pool', available via: <http://www.special-eu.org/knowledge-pool/module-2-spatial-planning-frameworks/policies-and-objectives/irish-planning-system>

Submissions from An Taisce on a number of schemes within the planning pipeline outline the need for a “strategic National and Regional Strategy is required for solar array development on land with optimum location suitability, which at the same time protecting [sic] biodiversity and landscape sensitive areas and good tillage”.

The need to strike a balance between USSPV development and the use of agricultural lands also emerges in terms of the emphasis on which planning authorities may put on the agricultural and horticultural value of the lands within their functional area. Appropriate national and regional level has been cited within submissions on USSPV applications as being an aid to the sector in terms of ensuring that policy targets under government strategies (like *Food Harvest 2020*) can be achieved without impeding the deployment of USSPV on a wide scale.

2.1.2 Land Use Planning

In terms of land use policy, this area intersects with planning policy to a certain extent as both form constituent components of development plans enacted by planning authorities for application on a county or sub county level. Land use policy directly relates to decisions relating to the siting of development of different types in settlements and rural contexts. A variety of items relating to land use policy have arisen in the planning pipeline to date around the issue of appropriate locations for solar energy development.

A consistent ground for objection advanced by third parties relates to concern about the loss of ‘good quality’ agricultural land due to the installation of USSPV. In addition, concerns have been raised in a cross section of RFIs and third party objections as to the potential visual impact of proposed USSPV developments from areas designated with scenic values, as outlined in Section 2.2.6 below. Fingal County Council¹⁴ has requested that an applicant advance a rationale for the selection of a proposed site for development. No rationale has been advanced by the planning authority for requesting this information so the purpose of the request cannot be determined at this stage.

2.2 Development Management

The development management function of planning authorities relates to the evaluation, permitting and regulation of developments proposals put forward by applicants for consideration. Development management is guided by the principles of proper planning and sustainable development, which influences the manner in which development takes place within the functional area of a particular planning authority through a variety of means, such as development plan guidance, national and regional policy guidance in conjunction with a planner’s capacity to evaluate the site specific development impacts of a proposed development.

Due to the nature of the development management function and the manner with which it interfaces with third parties active in the planning system as well as applicants and statutorily prescribed bodies, a number of areas requiring consideration have arisen. These areas are set out in the subsections below.

¹⁴ Fingal County Council Planning Reference: F16A/0105

2.2.1 Glint and Glare

'Glint and glare' is not a new feature in the Irish landscape as buildings, cars and other reflective surfaces have been producing this phenomenon for some time. The assessment and quantification of the glint and glare implications of USSPV is a new issue however, as can be seen from the planning pipeline in terms of the number of applications which have received RFIs in order to clarify the possible impact of this phenomenon on sensitive receptors in the landscape.

A number of RFI's have been issued by planning authorities due to the limited nature of the information submitted with applications initially quantifying the potential of the glint and glare impact of a USSPV scheme. A broad range of assessment approaches is in evidence in the planning pipeline. These approaches range from simple technical notes explaining the concept and the factors resulting in its occurrence whereas other approaches entail the use of software systems to geometrically assess the likelihood of a specular reflection of any duration occurring. In addition, a substantial number of third party objections have been lodged against USSPV schemes citing glint and glare as an issue in terms of residential amenity.

There have been a number of refusals of planning permission for schemes citing the lack of information, assessment and/or the possible impact of this phenomenon as a ground. Four schemes out of the seven refused planning in an Irish context to date (October 2016) have had glint and glare concerns cited as a ground of refusal. The 'sensitive' receptors specified in RFI requests can be loosely categorised as being;

- Residential Dwellings;
- Historical Monuments/Heritage Landscapes;
- Road Networks; and
- Aviation Infrastructure.

A number of prescribed bodies have made submissions on applications within the planning pipeline where there is a likelihood of an impact on infrastructure which they have responsibility for. Irish Rail and Transport Infrastructure Ireland have requested glint and glare assessments from train driver, car and truck heights in order to screen out the potential for an impact associated with glint and glare.

In terms of aviation infrastructure, a recent application for a utility scale solar PV scheme in County Clare within 10km of Shannon Airport was requested to analyse the impact of glint and glare on the airport's approach routes as well as on aircraft circling the facility. In County Waterford, an RFI was sought to clarify the glint and glare impact of a proposed scheme on Waterford Airport. An application for a roof mounted solar PV scheme in Dublin Airport was granted planning in mid-2016. A comprehensive glint and glare assessment was submitted with the application.

2.2.2 Archaeological Surface/Subsurface Remains

At least 68% of RFIs issued by planning authorities (as of October 2016) have requested that archaeological assessments (up to and including geophysical surveys) to be undertaken on proposed sites. A number of requests from prescribed bodies, such as the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs are also present on planning files, indicating that geophysical surveys should be undertaken on certain proposed sites in order to determine the potential development impacts of a proposed scheme on known or unknown subsurface archaeological features. A typical RFI request for this type of assessment is outlined below:

“You are required to engage the services of a suitably qualified, licensed Archaeologist to carry out an Archaeological Impact Assessment (AIA), including geophysical survey and archaeological testing. No ground works should be undertaken in the absence of the archaeologist without his/her express consent. Please allow 5-6 weeks to facilitate the processing of an archaeological licence.

The archaeologist should inspect the proposed development site (PDS), detail the historical and archaeological background of the site and review all cartographic sources and aerial photographs for the area.

The archaeologist should then carry out a Geophysical Survey of the PDS in order to establish the location and extent of any subsurface archaeological features that may survive. This will then inform a program of archaeological test excavations on site.

The archaeologist should excavate test trenches at locations chosen by the archaeologist, having consulted the geophysical survey and site plans in liaison with the Licensing Section of Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs (DAHRRGA). Excavation is to take place to the uppermost archaeological horizons only, where they survive. Where archaeological material is shown to be present, the archaeologist should stop works pending further advice from the Local Authority archaeologist and Department of Arts, Heritage and the Gaeltacht. Please note that all features/archaeological surfaces within the test trenches are to be hand- cleaned and clearly visible for photographic purposes.

Having completed the work, the archaeologist should submit a written report to the Local Authority and to the DAHRRGA outlining the results of the geophysical survey and archaeological testing. The report should comment on the degree to which the extent, location and levels of all proposed foundations, service trenches and other sub- surface works required for the development will affect the archaeological remains. This should be illustrated with appropriate plans, sections, etc.

Where archaeological material is shown to be present, further mitigatory [sic] measures will be required; these may include redesign to allow for preservation in situ, archaeological excavation and/or monitoring.”

In other instances, planning authorities have requested that applicants undertake archaeological assessments through trenching. One examination of the site contexts of the proposed schemes, there is a variance in the level of potential archaeological features in the environs of the proposed schemes. In a number of cases, geophysical surveys of sites have been requested where there appears to be no evidence to the presence of archaeological or heritage features on sites or immediate environs.

2.2.3 Construction Phase

A number of RFIs have issued to applicants requesting clarification of matters relating to the construction phase of utility scale solar energy projects. Requests for information under this heading

largely relate to clarification of construction access routes and matters pertaining to the siting of site compounds and the storage of hazardous materials (i.e. fuels) during construction.

2.2.3.1 Roads

This grounds for RFI is frequently tied to requests for more information around the envisaged access routes and traffic flows which may arise during the construction stage. In addition, a number of objections cite the possible impact of increased traffic on the residential amenity of dwellings abutting the proposed site during construction phase. In the case of developments in rural areas where road infrastructure may be constrained (i.e. third class country roads), a number of planning authorities have requested details of passing bays be provided (along with letters of consent from owners) be submitted.

2.2.3.2 Construction Facilities

A number of RFI requests have requested details around the nature, type and location of construction relating facilities in addition to the manner in which materials (such as fuels) will be managed during the construction process. Details regarding the storage of earth and the mitigation of silt laden run off from sites during the construction phase have also be requested in a number of instances.

2.2.4 Noise

Third party objections and RFI requests have emerged querying the potential for noise emissions arising from the transformers and inverters serving the USSPV. Construction noise during the construction phase has also been requested under the category of noise related considerations. A specific RFI requested that an applicant investigate the possibility for wind tunnelling effects arising from installations of the solar arrays in rows over a large area. The response from the applicant's agent indicated that no issue arose due to the lattice like structure of the array's mountings.

2.2.5 Setback Distances

Set back distances emerge in a number of instances in the planning pipeline. In one particular instance, an applicant is requested to justify a proposed setback distance from a stream which is hydrologically connected to Special Area of Conservation (SAC). The planning authority in this case contended that the proposed distance (10m) was insufficient due 'positive field survey results' in relation to the Otter (a qualifying interest in relation to the SAC concerned) and that consequently, a larger set back distance should be considered. One RFI requested by a planning authority requests that an applicant consider implementing a 60 metre setback distance from a residential dwelling. On consideration of the above and other approaches which have been applied in developments which have been granted planning permission to date (i.e. 25metre setback at Coolroe, Co. Wexford), it is clear that a number of approaches to setting back USSPV from sensitive receptors have been considered, put forward, accepted or amended to date.

2.2.6 Landscape and Visual Impact

In comparison to other means of generating renewable energy (i.e. wind energy), USSPV has the capacity to be assimilated into a landscape with greater ease. Notwithstanding this however, a number of refusals have referenced landscape issues as a grounds for refusal. Notably, Wexford County Council's recent refusal of an 89.8-hectare solar farm at Ballyminaun, Grahormick, Hilltown, Jonastown, Newhouse, Gibboghstown, and Garryh, Co. Wexford¹⁵ cited that the development,

'due to its overall scale, siting and elevated nature of the site fails to have regard to its setting in the landscape and, therefore, would have an adverse effect on the visual amenity of the area'

The above decision included a number of other grounds and is currently under appeal (first party vs. refusal) to An Bord Pleanála. In another recent decision, Wicklow County Council refused a grant of planning permission for a 13.8-hectare solar farm¹⁶ on one grounds, which is set out below.

"Having regard to:

(a) the location of the site on elevated lands.

(b) The exposed nature of the site, particularly from parts of the L2180, L6171 and L6169 roads and surrounding areas.

(c) The industrial character of the development given the large area of free standing solar pv panels and associated infrastructure it is considered that the proposed development would be a prominent and obtrusive feature in the landscape which would alter the intrinsic rural character of the area which is designated as a landscape zone of Special Amenity in the County Development Plan 2010-2016. The proposed development would therefore be contrary to the proper planning and sustainable development of the area."

This case refusal was subsequently appealed (first party vs. refusal) to An Bord Pleanála which overturned the refusal¹⁷. The inspectors report stated the following in relation to the potential landscape impacts;

"The site does cover a large area and the proposed development is likely to entail a significant visual change to the character of the landscape. Notwithstanding such the solar panels themselves are low profile structures and the proposals entail retention of existing hedgerow boundaries and the creation of new hedgerow boundaries along the boundaries of the site that are not currently defined by any physical boundaries. Having regard to such and given the localised nature of the visual impact, which would not be unacceptable in the context of the adjoining local road and from existing dwellings in the vicinity, I would consider that the overall visual impact of the development would be acceptable."

An Bord Pleanála overturned the decision of Wicklow County Council and granted planning permission to the scheme. In terms of landscape impact assessment, the role of topography, screening and sensitive receptors in terms of designated areas of visual amenity are key considerations to the assessment of this form of development.

¹⁵ Wexford County Council Planning Ref: 20160690

¹⁶ Wicklow County Council Planning Ref: 16/176

¹⁷ An Bord Pleanála Case Reference: PL27 .246527

2.2.6.1 Screening

RFIs and third party objections relating to the suitability of proposed screening solutions for USSPV developments have been prevalent within the planning pipeline. RFIs typically request that screening of USSPV developments need to consider the use of native species and that native species should be used where possible.

2.2.7 Site Management and Maintenance

RFIs and third party objections have been raised in a number of instances regarding the location, orientation and control of Closed Circuit Television (CCTV) cameras positioned on site as security measures. Both objections and RFIs have sought to clarify if there is any potential impact on the residential amenity of residents living on properties abutting proposed development sites. In addition, RFIs have sought to clarify the need and possible impact to nocturnal creatures relating to the use of automatic lighting on sites.

2.2.8 Drainage/Flood Risk

The possible impact of USSPV developments on drainage is a consistent matter advanced in third party objections and submission in the pipeline to date. Elements of this relate to anecdotal information arising from members of the local areas as to the susceptibility of a proposed site to flooding during periods of inclement weather or to the proximity of a site to watercourses with flood risk potential. In terms of RFIs, a number have sought to clarify the potential impact of USSPV developments on environmentally sensitive areas which are hydrologically connected through watercourses in the environs of the proposed sites. Such a request constituted a component of an RFI to Highfield Solar Energy in relation to its application for a 150 hectare USSPV scheme in County Meath¹⁸.

“The subject site is situated in a location likely to impact on the proposed Natural Heritage Area (pNHA), Thomastown Bog, Site Code 001593. On the basis of the information provided, the Planning Authority is not satisfied that it has been demonstrated that there will be no hydrological impacts to this sensitive wetland site. Accordingly, you are requested to provide additional information in relation to an assessment to determine any hydrological effects to the adjacent pNHA Thomastown Bog.”

RFIs have also been issued to applicants in some instances requesting details around the potential changes in run off which may occur as a result of the deployment of USSPV on sites versus the undeveloped state of the site.

2.3 Miscellaneous

During the review of the planning pipeline, it became apparent that there was a need to establish a separate category of thematic areas which may need to be explored within S28 planning guidance for the USSPV sector. These thematic areas are set out below.

¹⁸ Meath County Council Planning Ref: LB160898

2.3.1 Preplanning Consultation

We were extremely upset to discover that this application had been lodged for the lands adjoining our property without any prior consultation or notification.”

The sentiments expressed in the extract taken from an objection to a utility scale solar scheme currently in planning succinctly outlines the effect of an absence of pre-planning consultation between residents in the receiving environment and applicants for planning permission. The absence of consultation with communities on the part of developers prior to the lodging of an application for planning permission is a recurring source of contention. While there is no obligation to undertake preplanning consultation with the community, a number of developers have submitted evidence of undertaking such activities prior to the lodging of an application for permission for a utility scale scheme (e.g. Lightsource Renewables ‘Statement of Community Involvement’, submitted in support of an application for a 19MW utility scale solar scheme in County Tipperary, Planning Ref: 16600565). In instances where such consultation takes place, there is a noticeably lower number of objections (or none at all) in comparison to a greater number of objections on schemes where no such consultation has taken place.

2.3.2 Property Devaluation

Property devaluation is consistently cited across a sample of planning applications studied during the production of this research. In instances where this objection arises, proximity to the proposed infrastructure is frequently offered as a reason justification for the contention that the price of the residential unit in which the objector resides would be impacted. Notwithstanding, no peer reviewed studies or evidence of property devaluation in established solar markets has been submitted in support of these objections.

2.3.3 Environmental Impact Assessment

EIA screening assessments have been submitted to date with the majority of applications. No application in the planning pipeline in Appendix A of this report has been requested to undertake a full EIA of the effects of a proposed USSPV scheme.

USSPV is not listed in either Annex I or Annex II of the EIA Directive 85/337/EEC, as amended. Schedule 5 of the Planning and Development Regulations 2001 (as amended) sets out the list of project types which require mandatory EIA. Part 2, Schedule 5 lists the types of projects which require EIA, subject to a defined threshold. Consideration afforded this form of development by applicants, planning authorities (at local and national level) contend that the closest types of development which USSPV may align with are the Annex II projects set out below.

- Projects for the restructuring of rural land holdings (transposed into effect in an Irish context by the Environmental Impact Assessment (EIA) (Agriculture) Regulations 2011.
- Industrial installations for the production of electricity, steam and hot water (projects not included in Annex I, which relates to such projects with a generating capacity of 30MW).

Notwithstanding the absence of a directly applicable class of the development, regard is being had to the provisions of the EIA Guidance for Consent Authorities regarding Subthreshold Development, 2003 guidance document which states;

“there is a requirement to carry EIA where competent/consent authority considers that a development would be likely to have significant effects on the environment”

In deciding whether or not the need for EIA arises, planning authorities are having regard to the provision of Annex III of the directive which specifies the characteristics and element of a development to which they should have regard in terms of assessing the potential requirement for EIA.

2.3.4 Habitats Directive

The Habitats Directive (92/43/EEC), “ensures the conservation of a wide range of rare, threatened or endemic animal and plant species”¹⁹ in tandem with the Birds Directive (2009/147/EC, which supersedes 79/409/EEC) introduce a requirement on competent authorities to evaluate and assess the impact of plans and projects on Natura sites and other sensitive species and habitat areas. The process of accomplishing this assessment is known as ‘appropriate assessment’ (AA), which is predicated on the obligations arising from Article 6(3) and 6(4) of the Habitats Directive. A number of RFI requests requiring applicants to undertake Stage 1 Natura Impact Assessments of proposed USSPV schemes have been issued by planning authorities to date. Screening for AA has also been undertaken in a number of instances in order to determine the possibility of adverse impacts on qualifying interests and designated sites within a defined radius of the proposed development. One such screening in Wicklow²⁰ considered the possible impact on Natura 2000 areas out to a distance of 10km and on a candidate SAC (cSAC) within 5.3km of the site. The screening concluded that no adverse development impacts would arise, thereby precluding the need for a Stage 2 AA.

2.3.5 Strategic Infrastructure Development (SID)

No USSPV scheme to date has triggered a need for its consideration under the SID process. One SID preapplication consultation to An Bord Pleanála has been lodged in relation to a build mounted solar PV array on the roof of Terminal 1 at Dublin Airport²¹. The proposed development for the purposes of the consultation is set out below.

- *Array will cover a footprint of c. 718 sq.m. within an application site of c. 2,300 sq.m.*
- *Maximum generating capacity of c. 106 kW*
- *Array consists of angled PV panels supported on metal frames in a back to back arrangement such that panels are facing northeast and southwest*

¹⁹ European Commission (2016) “The Habitats Directive” Available via: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm

²⁰ Wicklow County Council Planning Ref: 16/176

²¹ An Bord Pleanála Case No: 06F. PC0213. Available via: <http://www.pleanala.ie/documents/reports/PC0/RPC0213.pdf>

- *Max. height above roof level will be c. 0.9m.*
- *Ancillary elements include inverters (equipment converting Direct Current to Alternating Current), access walkways, ladders and cable trays*
- *Electricity generated by the panels will be used in the airport increasing its sustainability*

In terms of the nature of the development, the applicant submitted that the most applicable form of project to which it might relate under SID provisions was the Seventh Schedule provision for “An industrial installation for the production of electricity, steam or hot water with a heat output of 300megawatts or more’. In deciding on the case, the inspector concluded;

“I am not convinced however that the proposed development is of such scale, purpose, function and significance to be either ‘strategic’ or ‘substantial’ in the sense construed and required by Section 37A(2)(a) and (b) to justify SI status. Neither do I consider that Section 37A(2)(c) is applicable to this case. I consider that the proposed development as described in the submissions would not satisfy any of the conditions contained in section 37A (2) (a), (b) or (c) of the Act.”

No indication as to the possible extent (in terms of generating capacity or scale) is offered within the report. With regard to the TSO application list, it is clear that there are a number of large USSPV schemes proposed for deployment, which gives rise to the need to consider if there should be a move to introduce provision for an SID provision for USSPV of scale.

2.4 Summary

This section has outlined, at a high level, the emerging issues which are emerging from the planning pipeline. A wide variety of perspectives have been aired by third party submissions and objections to proposed USSPV schemes to date. While not all views have been expressly negative, there are clear areas of concern emerging in terms of the matter in which the development impacts of this form of development are assessed and evaluated. The items for clarification in the RFIs which have been issued to date are also illustrative of the matters which planning authorities are having regard to in terms of the assessment of proposed USSPV schemes in line with the principles of proper planning and sustainable development and the provisions of environmental, land use and planning policy.

3.0 Established Solar Markets Planning and Development Practice

The purpose of this section is to explore planning and development practices associated with USSPV developments in a number of jurisdictions, where a substantial deployment of this technology has taken place. The structure of this section has been derived along the lines of the development impacts associated with this form of renewable energy technology as explored in Section 2.0.

This section focuses on the following development impacts and procedural matters as they are dealt with in established solar energy markets.

- Glint and Glare.
- Property Devaluation.
- Visual and Landscape Impact.
- Other Planning Considerations.

3.1 Overview

According to the International Energy Agency Photovoltaic Power System Programme's (IEA PVPS) report, 'Snapshot of Global Photovoltaic Markets 2015', the total, global installed capacity of solar PV is 227GW²². This constitutes 1.3% of global electricity demand. As of April 2016, the total installed capacity of the solar PV sector in the UK was 9.79 gigawatts (GW) according to the Department for Business, Energy & Industrial Strategy; this is up from 12 megawatts (MW) in 2006²³. This figure illustrates the relatively short construction and deployment time of this form of renewable energy generation. The declining cost of the technology has meant that solar PV in other countries has improved beyond being economic feasible to being economically viable. Drawing on the development of the solar PV markets above, this research has selected a range of benchmark countries, whose practice in terms of the assessment of solar PV development may be applicable in an Irish context. Such application is subject to appropriate amendment and adaptation so as to align with existing Irish planning and development policy. The case study countries are:

- United States;
- United Kingdom; and
- Germany.

3.2 Planning Impacts

The deployment of renewable energy technology in any context results in a series of development impacts. The impacts of each renewable energy technology can be quite distinctive, tied in part to the nature of the technology concerned, the location in which it is sited as well as myriad of other contextual factors i.e. site specified, country specific etc. This section will explore some of the development impacts of USSPV in order to develop an appropriate framework around which guidelines for assessing solar PV schemes can be created.

²² IEA-PVPS (2015) "Snapshot of Global Photovoltaic Markets 2015" Available via: <http://www.iea-pvps.org/index.php?id=trends0>

²³ Department for Business, Energy & Industrial Strategy (2016) "Solar Photovoltaic Deployment Statistics" Available via: <https://www.gov.uk/government/statistics/solar-photovoltaics-deployment>

3.2.1 Glint and Glare

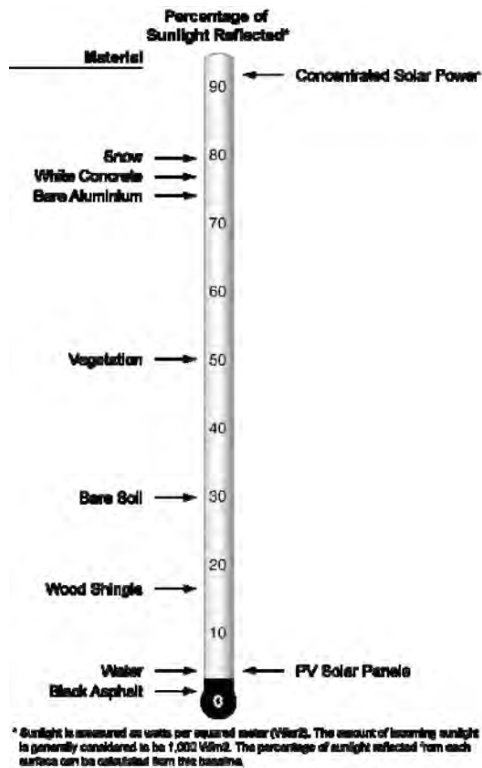


FIGURE 1 PERCENTAGES OF LIGHT REFLECTED (SOURCE: FAA, 2010)

Glint and glare is defined as²⁴:

- “Glint” gives out or reflects small flashes of light.
- “Glare” shine with a strong or dazzling light.

This phenomenon is linked to the characteristics of some solar energy technologies such as older solar PV panels or concentrated solar power (CSP). While newer iterations of solar panels are designed to absorb light, thereby enhancing the overall efficiency of the technology while diminishing reflectivity, glint and glare remains a planning consideration, especially in terms of the siting of USSPV schemes in proximity to sensitive receptors, such as aviation related infrastructure, residential dwellings, transportation links (road/rail) or in areas with landscape designations attached.

The cause of glint and glare is predicated on the amount of light which reflects off a solar panel surface as well as the reflective qualities of that surface. A range of site specific factors influence its potential prevalence, such as site location, season/time of year, angle of solar panels, reflectivity of the panels and cloud cover. It should be noted that numerous international studies categorise the nature of the glint and glare impacts associated with solar energy technology on the same scale as naturally occurring phenomenon such as bodies of standing water (as outlined in figure 1). Ruesch et al, 2016 aligns with the FAA,2000 as it specifies that PV modules with

anti-reflective coating typically reflect 1.5% of the sun light which that hits them. Reflected light falls into two categories, specular and diffuse reflections. FAA, 2010 [p.38] defines these two categories as follows:

“Specular reflection reflects a more concentrated type of light and occurs when the surface in question is smooth and polished. Examples of surfaces that produce specular reflection include mirrors and still water. Diffuse reflection produces a less concentrated light and occurs from rough surfaces such as pavement, vegetation, and choppy water.”

Quantifying specular reflections in the case of solar PV is important in terms of gauging the impact of solar PV infrastructure sited close to road networks. Specular reflections have the potential to cause ‘flash blindness’²⁵, which may cause an issue for road users. The subsections below outline the manner in which glint and glare is assessed in a number of jurisdictions.

²⁴ Oxford English Dictionary (2016)

²⁵ Paudel A, & Hirsch A (2015) “Potential Impacts of Solar Arrays on Highway Environment, Safety and Operations” Colorado Department of Transportation Available via: <https://www.codot.gov/programs/research/pdfs/2015-research-reports/solar-arrays>

3.2.1.1 United States

The Federal Aviation Administration's "Interim Policy, FAA Review of Solar Energy System Projects on Federally Obligated Airports" (2013) and 'Technical Guidance for Evaluating Selected Solar Technologies on Airports' (2010) contain a number of methodological approaches to the assessment of glint and glare in cases where solar PV in structure is proposed on or near airports or air traffic control towers. The document proposes the following methodologies for the assessment of glint and glare as a standardised means of presenting the potential glint and glare impact. There is a proviso attached to this guidance as the FAA published interim policy in 2013 as it is reviewing "multiple sections... based on new information and field experience, particularly with respect to compatibility and glare... the FAA cautions users against relying solely on this document at this time. Users should refer instead to the Interim Policy [p1]".

Solar Glare Hazard Analysis Plot

The interim FAA policy adopted the Solar Glare Hazard Analysis Plot. The Solar Glare Hazard Analysis Plot was adapted from Ho et.al.,2011. In order to measure solar glare, the FAA collaborated to develop the Solar Glare Hazard Analysis Tool (SGHAT). FAA, 2013 states the following;

"The SGHAT employs an interactive Google map where the user can quickly locate a site, draw an outline of the proposed solar energy system, and specify observer locations (Airport Traffic Control Tower cab) and final approach paths. Latitude, longitude, and elevation are automatically recorded through the Google interface, providing necessary information for sun position and vector calculations. Additional information regarding the orientation and tilt of the solar energy panels, reflectance, environment, and ocular factors are entered by the user. If glare is found, the tool calculates the retinal irradiance and subtended source angle (size/distance) of the glare source to predict potential ocular hazards ranging from temporary afterimage to retinal burn. The results are presented in a simple, easy-to-interpret plot that specifies when glare will occur throughout the year, with color codes indicating the potential ocular hazard. The tool can also predict relative energy production while evaluating alternative designs, layouts, and locations to identify configurations that maximize energy production while mitigating the impacts of glare." [p. 63278]²⁶

It should be noted that a number of glint and glare assessments submitted to date in an Irish context have utilised this tool in order to demonstrate the potential glint and glare potential of the proposed development.

Geometric Analysis

FAA, 2010 also put forward geometric studies as the most effective approach for determining the potential for reflectivity issues that are difficult to assess predevelopment by utilising the methodologies outlined above. The SGHAT tool is based on this methodology. Studies of glare can

²⁶ Federal Register (2013) "Interim Policy, FAA Review of Solar Energy System Projects on Federally Obligated Airports" Available via: <https://www.federalregister.gov/documents/2013/10/23/2013-24729/interim-policy-faa-review-of-solar-energy-system-projects-on-federally-obligated-airports>

employ geometry and the known sun path when sunlight will reflect off of a fixed surface (such as a solar panel) and contact a fixed receptor (e.g., a residential dwelling). At any given site, the sun not only moves across the sky every day, but its path in the sky changes during various times of year. This in turn alters the destination of the resultant reflections since the angle of reflection for the solar panels will be the same as the angle at which the sun hits the panels. The larger the reflective surface, the greater the likelihood of glare impacts. In the case of 'trackers'²⁷, the potential area for assessment increases in line with angles of traverse. A geometric analysis undertaken within a Geographic Information System (GIS) software package by a trained operator would be capable of indicating areas which may be impacted by glint and glare on consideration of the factors outlined above i.e. site location, climatic conditions and the characteristics of the technology being deployed on a particular subject site.

Assessing Baseline Reflectivity Conditions

Conditions in the receiving environment of a proposed development may be conducive to causing glare should be assessed in order to determine whether the location of the proposed solar PV installation may not unduly contribute additional glare to sensitive receptors at certain times of the year. FAA 2010, proposed this approach as a potential means of identifying existing sources of glare may come from glass windows, car parking, rooftops/skylights, and water bodies. This form of assessment could form part of an environmental assessment in terms of exploring the possibility of development impacts affecting avian populations, particularly if schemes are located near water bodies.

Tests in the Field

FAA, 2010 also put forward this form of assessment which contends that potential glare from solar panels can be assessed relatively quickly through a field test. In the US, a number of airports have coordinated such field tests with the FAA Air Traffic Control Personnel to assess the significance of glare impacts. The test consists of taking a solar panel out to the proposed location of the solar project and tilting the panel in different directions to generate various levels of glare onto the air traffic control tower. FAA, 2010 referenced two known cases where such a field test was conducted. In both instances the tower personnel determined that the effect of the glare produced by the solar panels was not significant however the capacity to scientifically recreate the test was found to be absent. Adopting this approach in an Irish context might entail the developer assessing the impact of glare from sensitive receptors in the landscape by orientating solar panels on the receiving site as they would be constructed if granted planning permission.

3.2.1.2 United Kingdom

A number of glint and glare assessments developed in the United Kingdom have regard to the methodological approaches outlined in the FAA material explored above, in addition to documentation produced by the Civil Aviation Authority in the form of *'Interim CAA Guidance - Solar Photovoltaic Systems'* (2010). This document outlines a number of recommendations, all of which

²⁷ A solar tracker is a device that orients a payload toward the Sun. Payloads are usually solar panels, parabolic troughs, fresnel reflectors, mirrors or lenses.

relate to the processes and steps required to be undertaken if a solar PV scheme is proposed for location close to an airport or aerodrome.

In addition to the above, advisory guidance produced by the Building Research Establishment (BRE)²⁸, states;

“...it may be necessary to seek a glint and glare assessment as part of a planning application. This may be particularly important if ‘tracking’ panels are proposed as these may cause differential diurnal and/or seasonal impacts. The potential for solar PV panels, frames and supports to have a combined reflective quality should be assessed. This assessment needs to consider the likely reflective capacity of all of the materials used in the construction of the solar PV farm [p17]”

In terms of glint and glare, changes to the Town and Country Planning Act in 2015, which increased permitted development rights (equivalent to Irish exempted development provisions) to cover schemes up to 1MW on nondomestic buildings, subject to the quantification of glare impacts.

3.2.1.3 Germany

In a German context, glare is considered an emission “in the same sense as noise, odor [sic] nuisance, vibrations”²⁹ which necessitates consideration in assessing the development implications of a solar PV development. The Federal Ministry of the Environment has produced a ‘Licht-Leitlinie’ or ‘light guideline’ which regulates and defines the limits for reflective solar glare.

The ‘Licht-Leitlinie’³⁰ identifies the areas that should be protected from solar glare, which include living spaces, bedrooms, classrooms and offices, as well as areas approved for development higher than two metres in addition to transport infrastructure. The guidelines also list potential measures to prevent or mitigate solar glare, such as the erection of walls or plants between the installation and any windows, the optimisation of facility orientation to limit direct glare on windows at peak solar hours and the use of less reflective solar panels. The guidance also regulates and defines indicative limits for reflective solar glare arising from building materials (including solar cells). In terms of glare, this guideline specifies that glare may be acceptable if it is “shorter than 30 minutes per day or 30 hours per annum”³¹.

3.2.2 Property Devaluation

A number of planning applications in Ireland have subject to objections on the grounds that the location of solar energy infrastructure in the vicinity of their dwellings will negatively impact on the value of the property concerned. **Having undertaken a comprehensive desk review, this research has identified no studies from the case study countries which indicate that proximity to USSPV negatively impacts on property prices.**

²⁸ BRE (2013) “Planning guidance for the development of large scale ground mounted solar PV systems” Available: <http://www.bre.co.uk/filelibrary/nsc/Documents%20Library/NSC%20Publications/NSC-publication-planning-guidance.pdf>

²⁹ Ruesch, F et al. “Quantification of glare from reflected sunlight of solar installations” Energy Procedia 91 (2016). pp 997 – 1004

³⁰ Leitlinie des Ministeriums für Umwelt, Gesundheit und Verbraucherschutz zur Messung und Beurteilung von Lichtimmissionen (Licht-Leitlinie), 2014 Available via: http://www.mlu.brandenburg.de/media_fast/4055/licht_leitlinie.pdf

³¹ Ruesch, F et al. “Quantification of glare from reflected sunlight of solar installations” Energy Procedia 91 (2016). pp 997 – 1004

3.2.3 Loss of Agricultural Lands

Considerations relating to the interaction of USSPV schemes and agricultural land frame a number of policies and approaches to the deployment of this technology in a number of established solar markets. This section contains a high level overview of this dynamic relationship and how it is considered in practice.

3.2.3.1 United States

Local planning authorities in the United States have a high degree of autonomy in terms of deciding upon the location of solar farms on agricultural land. Notwithstanding the potential for the continued use of lands with solar arrays located thereon for agricultural purposes, there is increasingly societal and political pressure being brought to bear on officials deciding on applications due to the perceived loss of agricultural lands³².

Many regulations relating to solar and agriculture are produced at a county government level, which tends to be most directly attuned to the specific economic needs of a given area. One example of these guidelines are those issued by Fresno County in California³³. Fresno County is situated in the San Joaquin Valley, one of richest and most productive agricultural regions in the world. While California has committed significantly towards the development of solar power in recent years, efforts are still made to preserve the valuable agricultural land. In order to minimise development on active farmland, solar projects must carry out a number of steps, including providing an agricultural history of the land over the past ten years, identifying the soil types present at the site, implementing measures to create a buffer between the proposed solar development and nearby agriculture, and providing information on alternative, non-agricultural locations for development.

3.2.3.2 United Kingdom

The United Kingdom's status as a net importer of foodstuffs has influenced the policy framework for the location of solar energy development. The United Kingdom operates a grading system for its agricultural land. There are 5 main categories of agricultural land, with category 1 being the best grade and category 5 being more marginal. There are two sub categories (3a and 3b). The UK National Planning Policy Framework (paragraph 112) expresses a preference for the development of solar PV to be directed to land outside of this classification (3b, 4 and 5), however there is scope for flexibility in the application of this provision if an applicant can demonstrate an absence of the preferred categories in proximity to a substation or an absence of lands with the aforementioned grade in the areas where the development is proposed to take place.

³² Belfiore, F et al (2013) "Risks and Opportunities in the Operation of Large Solar Plants" Available via: http://www.golder.com/ie/en/modules.php?name=Publication&op=showlivepdf&sp_id=300&lang_id=3

³³ Fresno County (2013) "Solar Facility Guidelines," available at: <http://www.co.fresno.ca.us/ViewDocument.aspx?id=53400>

3.2.3.2 Germany

USSPV schemes above 10MWs are no longer supported under German Renewable Energy Act 2000 (as amended)³⁴. While there is a combination of reasons for the withdrawal of subsidies for larger schemes, one of the rationales advanced by policy makers related to the need to balance the land use needs between forestry and agricultural as well as renewable energy development³⁵.

3.2.4 Visual Impact and Landscape Character Influence

The characteristics of USSPV are such that the assessment of its landscape and visual impact forms a key consideration in terms of assessing the propriety of its deployment in certain areas. This section provides a high level overview of planning and development practice in established solar markets.

3.2.4.1 United States

Because of the United States governmental structure, up to four levels of government have some say in regard to regulations in guidelines in relation to solar development.

The United States is home to a significant amount of federally-owned public land managed by the Bureau of Land Management (BLM), particularly in the western US. Direct ownership of the land by the federal government allows for a relatively streamlined process for solar development but also, as the BLM lands play a major role in natural amenity, the placement and construction of solar must be carefully considered for landscape character impacts.

The BLM's *Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities*³⁶ sets out a series of guidelines, directed at the various stages of the solar energy development and construction process. In the Siting and Design stage, the guide recommends a number of measures to reduce glare, such as additional considerations include colour treatment to ensure that all non-active surfaces are as non-reflective as possible and the maintenance of pre-existing vegetation beneath solar collectors.

Additionally, the guide lays out a number of principles that are applicable to all forms of renewable development. These include designing facilities to imitate the existing landscape, avoiding construction along ridgelines, skylines or centres of valley bottoms, and the construction of facilities in areas that have already be disturbed.

³⁴ Olson, S (2011) "IBC Solar completes grid connection for 13.8MW German solar park" PV-Tech.org, Available via: http://www.pv-tech.org/news/ibc_solar_completes_grid_connection_for_13.8mw_german_solar_park

³⁵ Stremke, S (2013) "Energy-landscape Nexus: Advancing a conceptual framework for the design of sustainable energy landscapes" Available via: <http://library.wur.nl/WebQuery/wurpubs/455008>

³⁶ Bureau of Land Management (2013), "Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities," Available at: http://www.blm.gov/style/medialib/blm/wo/MINERALS_REALTY_AND_RESOURCE_PROTECTION/_energy/renewable_references.Par.1568.File.dat/RenewableEnergyVisualImpacts_BMPs.pdf

3.2.4.2 United Kingdom

The Department of Communities and Local Government published a “*Planning practice guidance for renewable and low carbon energy*” document in 2013. This document intersects with a number of elements which relate to the development of USSPV development.

Visual and landscape impacts are explored in great detail in the document, with particular reference to onshore wind. Notwithstanding the document’s primary focus, elements of practice therein are applicable (in the documents own view) to solar energy development. In identifying impacts on landscape, considerations include that the guidance advances are:

- direct and indirect effects;
- cumulative impacts and temporary; and
- permanent impacts.

Specifically, then guidance states that’;

“The approach to assessing cumulative landscape and visual impact of large scale solar farms is likely to be the same as assessing the impact of wind turbines... However, in the case of ground-mounted solar panels it should be noted that with effective screening and appropriate land topography the area of a zone of visual influence could be zero.” [p 9]

The list of items below are advanced as being required in order to effectively assess the cumulative impact of solar (and wind) energy development in the United Kingdom³⁷;

- **a base plan of all existing solar farms and permitted developments³⁸** showing all schemes within a defined radius of the proposal under consideration;
- **for those existing or consented solar farms** within a defined radius of the proposal under consideration, **a plan showing cumulative ‘zones of visual influence’**. The aim of the plan should be to clearly identify the zone of visual influence of each solar farm, and those areas from where one or more solar farms are likely to be seen;
- the base plan and plan of cumulative zones of visual influence will need to **reflect local circumstances**, for example, the areas covered should take into account the extent to which **factors such as the topography and the likely visibility of proposals in prevailing meteorological conditions** may vary;
- maps of cumulative zones of visual influence are used to **identify appropriate locations for visual impact studies**. These include locations for simultaneous visibility assessments (i.e. **where two or more schemes are visible from a fixed viewpoint without the need for an observer to turn their head, and repetitive visibility assessments** (i.e. where the observer is able to see two or more schemes but only if they turn around);

³⁷ DCLG (2013) “*Planning practice guidance for renewable and low carbon energy*” Available via: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/225689/Planning_Practice_Guidance_for_Renewable_and_Low_Carbon_Energy.pdf

³⁸ In *Ratheniska v An Bord Pleanala* (January 2015), the judge stated that ““Cumulative assessment surely requires that the development be assessed in the light of existing and permitted development in the relevant area. It cannot involve deliberation on possible future development which may be at the concept, design or the early planning stage and which may not yet have been authorised.”

- sequential effects on visibility occur when an observer moves through a landscape and sees two or more schemes. Common routes through a landscape (e.g. major roads; long distance paths or cycle routes) can be identified as **'journey scenarios'** and the proposals impact on them can be assessed;
- **photomontages showing all existing and consented solar farms**, in addition to the proposal under consideration. The viewpoints used could be those identified using the maps of cumulative zones of visual influence. The **photomontages could be annotated to include the dimensions of the existing arrays**, the distance from the viewpoint to the different schemes, the arc of view and the format and focal length of the camera used; and
- at the most detailed level, description and assessment of cumulative impacts may include the following landscape issues: scale of development in relation to **landscape character or designations**, sense of distance, existing focal points in the landscape, and sense of remoteness or wildness.
- It may be necessary to undertake a **glint and glare assessment on all existing and consented solar farms**, and those for which planning applications have been submitted, in addition to the proposal under consideration in order to determine the cumulative impact of this form of development. [p. 13]

3.2.4.3 Germany

Germany's land use designation system permits the deployment of USSPV in line with the general development of energy supply. The zoning system for the state of Berlin allows energy supply schemes with "areas with industrial character."³⁹

The designation of areas which are appropriate for USSPV development has regard to landscape factors. The prioritisation of brownfield and previously industrialised landscape within German land use planning ordinances reflects the policy preference to efficiently use land as finite resource in the form of land, without requiring to development in greenfield locations. In terms of visual impacts and siting, there is a 110m set back distance applied to USSPV development close to motorways in some states in Germany. This is a consideration which relates to the potential visual impact of the technology on road users.

3.2.5 Other Planning Considerations

3.2.5.1 United States

The state of California is one of pioneers in planning for solar development. In 1979, the state passed the Solar Rights Act, which establishes and classifies the right of homeowners and businesses to

³⁹ Berlin Staatsverwaltung für Stadtentwicklung (2007), *Berlin Land Use Plan*, available at: http://www.stadtentwicklung.berlin.de/planen/fnp/pix/erlaeuterungen_fnp/Contents_and_Conventional_Signs_col.pdf

access sunlight for use in solar power and limits the ability for local governments and resident’s groups to prevent the installation of solar power.⁴⁰

In both private home and large-scale solar developments, a large number of planning considerations come into play. One of the chief considerations is access to solar irradiance. Since PV installations require direct sunlight to function properly, it is imperative that major solar developments are not blocked by future development. Rights of solar access are outlined in city and county codes across the United States, from Clackamas, Oregon to San Luis Obispo, California to Prairie du Sac, Wisconsin.

In some states, notably California, Arizona and Nevada, city codes include requirements for new homes to include the connections and links for potential solar installation, even if that installation is not included in the design. Likewise, many cities and counties have made special note of small solar installations as being permitted within any zoning code, or being permitted as an accessory to other permitted structures.⁴¹

The California Department of Forestry and Fire Protection highlights some of the issues relating to solar power and firefighting.⁴² Considerations for effective fire prevention and suppression around building-mounted solar installations include ensuring that installations are clearly marked, that access distances are appropriate for the style of building and roof and that DC conductor lines should be located in the best position to minimise tripping hazard and maximise ventilation. Other safety concerns that must be taken into consideration in the solar planning process include the effect of the panels’ weight on the roof structure and the ability of the installation to resist inclement weather.

Some local governments, such as Santa Clara County in California, have produced recommendations for how land use planning can better accommodate solar development.⁴³ Among the recommendations put forth by Santa Clara include;

- the creation of clear and concrete planning guidelines for solar power generation,
- assistance with site identification through county mapping services
- and improved the dissemination of design innovations in solar that would improve compatibility with agriculture and wildlife habitat.

3.2.5.2 United Kingdom

The Department for Communities and Local Government⁴⁴ published a set of indicative planning considerations which it outlines that planning authorities at a local level in the United Kingdom should have regard to. These considerations are outlined below.

- encouraging the effective use of previously developed land,

⁴⁰ Governor’s Office of Planning and Research (2012), “California Solar Permitting Guidebook,” available at: https://www.opr.ca.gov/docs/California_Solar_Permitting_Guidebook.pdf

⁴¹ American Planning Association (2011), “Planning and Zoning for Solar Energy,” available at: <http://nwsolarcommunities.org/wp-content/uploads/2013/05/PlanningandZoningforSolarEnergy.pdf>

⁴² CDFFP (2008) “Solar Photovoltaic Installation Guideline,” <http://osfm.fire.ca.gov/pdf/reports/solarphotovoltaicguideline.pdf>

⁴³ County of Santa Clara Planning Office (2010) “Solar Power in Santa Clara: Markets and Development Trends,” available at: https://www.sccgov.org/sites/dpd/DocsForms/Documents/SolarPower_LandUse.pdf

⁴⁴ DCLG (2013) “Planning practice guidance for renewable and low carbon energy” Available via: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/225689/Planning_Practice_Guidance_for_Renewable_and_Low_Carbon_Energy.pdf

- if a proposal does involve greenfield land, that it allows for continued agricultural use and/or encourages biodiversity improvements around arrays;
- solar farms are normally temporary structures and planning conditions can be used to ensure that the installations are removed when no longer in use and the land is restored to its previous use;
- the effect on landscape of glint and glare and on neighbouring uses and aircraft safety;
- the extent to which there may be additional impacts if solar arrays follow the daily movement of the sun;
- the need for, and impact of, security measures such as lights and fencing;
- ensure heritage assets are conserved in a manner appropriate to their significance, including the impact of proposals on views important to their setting. As the significance of a heritage asset derives not only from its physical presence, but also from its setting, careful consideration should be given to the impact of large scale solar farms on such assets. Depending on their scale, design and prominence, a large scale solar farm within the setting of a heritage asset may cause substantial harm to the significance of the asset; and
- the potential to mitigate landscape and visual impacts through, for example, screening with native hedges.

In addition, the BRE guidance which was published in 2013, comprehensively deals with a wide variety of planning matters relating to USSPV in England (with provisions which are applicable in the UK's other planning jurisdictions Scotland, Wales and Northern Ireland). The guidance in that document engages with a number of areas emerging from the planning pipeline in an Irish context. It has been cited in a number of planning applications by developers, third parties as well as planning authorities in terms of planning responses to issues arising from the deployment of USSPV schemes.

3.2.5.3 Germany

In the German planning system, the development of greenfield sites outside of towns is generally not permitted. However, uses that are deemed to be in the service of the public, or by their nature cannot be located in developed areas, are allowed to develop in outer zone areas are known as 'privileged' development. Among those uses that are considered 'privileged' development include facilities for energy supply, such as solar installations and wind farms.⁴⁵

At a regional/state level, only four of the 16 states include guidelines for solar planning in their regional plans, which deal with large installations at least 2 ha in Saxony, or only over 10 ha in Bavaria. In these states, the construction of ground-based solar requires the regional planning procedures, which works to manage the significant use of land among the various interests.

For smaller solar installations, or in states where solar is not considered under the regional planning remit, solar installations are under the authority of local municipalities. There are no special rules for ground solar, which therefore must follow the normal German permitting process. Typically, solar installations are applied for as either 'independent commercial plants.' *Außenbereich*, the outer zones of municipalities that are undeveloped, are the main area for large ground-based solar, though solar does not have the same development privileges afforded to wind installations.

⁴⁵ Academy for Spatial Research and Planning (2008), "The Planning System and Planning Terms in Germany," Available at: http://shop.arl-net.de/media/direct/pdf/ssd_7.pdf

3.3 Summary

This section has explored a number of responses to the development impacts and procedural matters associated with USSPV developments in established solar energy markets. The practices and approaches that have been applied to the issues set out in this section informed the development of a consultation/discussion document, in tandem with the outputs of the analysis of the planning pipeline in order to provoke a discussion with a cross section of key actors within the planning and development system. The details of the consultation process are set out in Section 4.0 of this report.

4.0 Consultation

Drawing on the insights arising from Section 2.0 in terms of the issues arising in the planning pipeline and the precedent and practice applied in established solar markets as explored in Section 3.0, a coherent set of thematic recommendation areas which required the consultative input of key stakeholders emerged. The recommendation areas were then expanded upon in a consultation/discussion document (outlined in Appendix B) which drew on examples of practice regarding their assessment in the case study countries. The consultation/discussion document did not put forward specific recommendations, it simply advanced possible questions and approaches which may be appropriate for application in an Irish context, subject to the perspectives and views of the consultees.

The purpose of this exercise was to enable an open consultation dialogue with representative of the developer sector, local authorities as well as key decision making bodies within the framework of national energy policy. The objective of this consultation process was to define the areas which the consultees believe require attention in terms of the development of S28 planning guidance for USSPV developments in an Irish context.

4.1 Consultation Methodology

A semi structured interview process was utilised, aided by the prior circulation of a consultation/discussion document. The purpose of the document was to facilitate the discussion of key topics from the perspective of applicants and decision making bodies. A representative sample of key stakeholders in terms of planning authorities, government departments, prescribed bodies and applicants was identified in order to give a representative sample of insights and inputs into the formation of a coherent, evidence based set of recommendations for planning practice and guidance for USSPV development. In addition to the single interview format, a workshop was held with senior planning personnel from four local authority areas. The local authorities who were represented at the workshop have had the most experience in processing applications for USSPV schemes.

4.2 Consultees

The organisations listed below were consulted with over the course of August/September 2016

- Amarenco Solar.
- An Bord Pleanála.
- An Taisce.
- Cork County Council.
- Department of Housing, Planning and Local Government.
- Department of Communications, Climate Action and Environment.
- Elgin Energy Services.
- Highfield Solar
- Irish Planning Institute.
- Irish Solar Energy Association.
- Kilkenny County Council.
- Limerick City and County Council.
- Neo Environmental.
- Power Capital.
- Sustainable Energy Authority of Ireland.
- Teagasc.
- Tipperary County Council.
- Wexford County Council.

4.3 Consultation Outputs

This subsection explores the views and perspectives of the consultees to the recommendation areas outlined in the consultation document. In addition, this section will explore additional areas which in the view of the consultees require consideration in terms of the development S28 guidance for the deployment of USSPV. The insights arising from the consultation process are categorised in the same manner as the issues arising from the planning pipeline as discussed in Section 2.0 of this report. This categorisation is set out below.

- Forward Planning
 - Planning Policy
 - Land Use Planning
- Development Management
 - Glint and Glare
 - Archaeological/ Heritage Considerations
 - Construction Phase
 - Noise
 - Setback Distances
 - Landscape and Visual Impact
 - Site Management and Maintenance
 - Drainage/Flood Risk
 - Environmental Impact Assessment
 - Strategic Infrastructure Development
- Miscellaneous
 - Preplanning Consultation
 - Property Devaluation

4.3.1 Forward Planning

4.3.1.1 Planning Policy

Public and private sector consultees outlined a strong need for effective planning policy in relation to this form of development. Planning policy should make reference to the role solar can play in Ireland's energy transition. A consistent approach across development plans in terms of planning policy would create certainty in the market and for planning authorities in relation to this form of development.

All consultees' envisaged difficulty in terms of setting targets for the deployment of USSPV on a county by county basis. Notwithstanding the above, it was considered that it may be appropriate to explore such an option as it may make it more difficult for some local authorities to take a less proactive role in the energy transition. In devising any planning policy, a number of developer consultees indicated that planning policy should minimise association with a form of development with distinct planning constraints and difficulties in community acceptance (i.e. wind).

One consultee outlined that;

"It would be useful for County Development Plans to contain policy and objectives in relation to solar PV deployment where considered necessary and relevant. This could be approached in a similar

manner to wind farms – i.e identification of areas that are considered suitable for solar PV given the characteristics and pattern of development in the area. This would facilitate integration with other areas of the development plan policy such as landscape designations, natural heritage areas such as SAC, SPA, NHA etc, and should avoid proposals coming forward in areas of outstanding natural beauty or environmental sensitivity. The policies and objectives would also be subject to the Strategic Environmental Assessment of the development plan. The zoning of individual parcels of land for solar PV may not be the best approach, particularly given the rural location of most developments. Care should be exercised in the encouraging solar PV on brownfield urban land given the significant land take of such installations and the need to ensure the most efficient use of serviced urban land for housing, industry etc.”

4.3.1.2 Land Use

A number of questions were posed to the consultees in respect of land use policy and USSPV development. These are outlined below:

- Should County Development Plans designate lands which are suitable of solar PV deployment within their functional areas?

The consultees broadly agreed that the deployment of USSPV on brownfield lands in urban and rural settings should be encouraged through land use policy as this would constitute the efficient use of a finite natural resource. Notwithstanding, that brownfield lands may make a proposal more attractive, consideration must be afforded to other issues such as proximity to grid and sensitive receptors. Consequently, in their view, it would be debatable in their view whether such lands should be promoted over a greenfield site with little or no visibility of the site outside of the project boundary. They therefore considered that brownfield sites should be promoted, but not at the expense of acceptable greenfield sites. Developers also outlined if any future guidance explicitly, or implicitly, states that solar farm development should be directed away from greenfield land, this will likely lead to unnecessary refusals of otherwise appropriately sited solar farms.

A consistent ground for objection to USSPV development in an Irish context relates to the perceived loss of ‘good quality’ agricultural land. In terms of implementing a ‘sequential test’ in terms of land quality, some consultees advised caution as it may not be practical. A scenario put forward outlining the basis of that caution is outlined below

“A developer may identify suitable ‘lower quality’ land closer to grid, but it requires the landowner to want to proceed with a project. Would the developer as part of a sequential test detail all the conversations he/she has had with prospective landowners to prove the lower quality land was not available?”

Developer sector representatives specified that exceptions should be allowed for the use of ‘good quality’ on the basis of a set of criteria and justification. If it is too rigid, only a certain amount of development that will be realised in their view. In addition, it was also stated that in the UK, the argument surrounding land quality was an emotive one, mainly because as a major net importer of foodstuffs, there was a perceived shortage of agricultural land and that the same cannot be said of the Irish market. Furthermore, if a solar farm takes up productive agricultural land, it needs to be recognised it’s not a permanent change of use (development lifetime of 25 years on average, during which the lands can still be used for agricultural purposes), the land can still have dual use and the need for renewable energy may trump the desire to retain high quality agricultural land in the short to medium term.

It was suggested that it may be useful to quantify the amount of perceived good agricultural land in the State and the percentage of this that might be occupied by solar farms as a part of an educational campaign around the technology which in turn may enhance societal acceptance and knowledge of the actual impact of USSPV on agricultural productivity.

In terms of zoning/designated lands for solar energy development, it was considered that as the development is compatible with most land uses in a rural (and brownfield urban) environments, a “not permitted”/ “open to consideration” approach to the designation of lands for this form of renewable energy generation should be taken.

From the perspective of the development sector, no formal grading system of agricultural land exists in Ireland and therefore the prioritisation of solar energy development on marginal lands would not be considered as a ‘workable’ scenario. To introduce this as a guideline for solar development proposals in Ireland without a formal system would run the risk of a solar proposal having an arbitrary effect on land prices in an area due to an informal assessment by a Local Authority in relation to land quality.

A developer outlined that diversification into renewable energy will increase farm income security, reducing the farm owner’s vulnerability to agricultural subsidy cuts and commodity price changes. Moreover, it can serve to protect the farming tradition by removing the incentive, seen increasingly often on farms, to sell parcels of land to maintain income for the benefit of the remainder of the holding.

4.3.2 Development Management

4.3.2.1 Glint and Glare

This phenomenon was cited by a cross section of consultees **as being a key consideration** in terms of the **perception of solar PV**. The question below was put to the consultees in relation to the assessment of glint and glare.

- What is the most appropriate model for glint and glare assessment in an Irish context?

Consultees generally felt that the most appropriate manner of determining if sensitive receptors in the environment are susceptible to glint and glare is **by undertaking a geometric assessment** of the proposed scheme. The glint and glare assessment should be submitted with an application for planning permission. It was put forward by some consultees that the assessment would need to consider seasonal and temporal variances in sun paths and the corresponding impact on the identified sensitive receptors. Sensitive receptors in an Irish context would be rural, one off houses, transport infrastructure and areas with landscape designations.

In addition, the landscape settings of national monuments and historic structures (i.e. country houses) were put forward as a potential sensitive receptor in terms of quantifying the visual impact of a USSPV scheme on the character of the monuments. This consideration emerged in tandem with considerations relating to landscape and visual impact. The quantification of glint and glare impacts on major road infrastructure and the rail network was emphasised as being particularly important, as prescribed bodies with responsibility for this infrastructure are requesting the potential glint and glare impact of a particular development to be assessed in order to ensure that there is no negative impact

on existing infrastructure. In terms of aviation infrastructure, there is a need to quantify the potential impact of this phenomenon on aviation infrastructure. Case studies of the location of solar energy infrastructure in airport settings was advanced by developers. These are set out below.

- Gatwick (50kW 150m from runway)
- Heathrow – floating solar PV array on Thames QEII reservoir (6.3MW under flightpath)
- Belfast International (4.8MW adjacent to airport)
- Stanstead Airport (2.5MW)
- Photon - Birmingham Airport (50kW on terminal)
- Southend Airport – (120kW on terminal and 5MW under landing flightpath)
- Birmingham Airport (50kW terminal roof)

A number of consultees recommended that there is a need for a national, technical standard for the production and evaluation of a glint and glare assessment. Tied to the above, a common point between the local government and developer consultees identified the need for training to be provided to local government personnel in the evaluation and assessment of glint and glare analyses (particularly in terms of being able to validate and conform the contents of the assessments as being accurate).

Consultees from the developer community outlined that the prospect for glint and glare arising from the deployment of solar PV at a USSPV would be low given the characteristics of the technology (i.e. anti-reflective coating on arrays and the design of the technology to absorb light in order to generate energy), mitigation measures such as screening and the influence of topography on the visual impact.

Notwithstanding the above, the prospect of the phenomenon occurring was recognised as being possible and both the public and private sector consultees indicated that accurate quantification of the phenomenon would be needed in order to facilitate the effective assessment of an application. Local government consultees outlined that to date, the assessments of glint and glare that have been submitted are quite generic in nature. This was reflected by some of the comments provided by the development community as some geometric assessments, when carried out, do not have regard to the potential screening effect of natural clutter (such as trees and hedgerows) in the landscape. The Irish Solar Energy Association Planning Working Group proposed the following structure for a glint and glare assessment arising from the practice in the United Kingdom;

- Description of solar proposal;
- Glint and glare assessment guidance;
- Overview of relevant studies
 - Evan Riley and Scott Olson, "A Study of the Hazardous Glare Potential to Aviators from Utility-Scale Flat-Plate Photovoltaic Systems,"
 - Federal Aviation Administration, 10.5402/2011/651857FAA, November (2010): Technical
 - Guidance for Evaluating Selected Solar Technologies on Airports.
 - Technical Support, 2009. SunPower Technical Notification- Solar Module Glare and Reflectance;
- Sun position and reflection overview;
- Glint and Glare assessment methodology;
 - Identify the receptors of concern. In this instance the concern is reflections of the sun from the solar panels toward road users and dwellings;

- Choose appropriate receptor locations along the assessed roads and for dwelling locations;
 - Define the proposed solar development area and choose an appropriate assessment resolution;
 - Undertake geometric calculations to determine whether a solar reflection may occur, and if so, when it will occur;
 - If a reflection can occur, determine whether the reflecting panels will be visible from the identified receptor locations. If the panels are not visible from the receptor, then no reflection can occur;
 - If it is calculated that a reflection will occur, consider the location of the solar reflection with respect to the location of the sun in the sky, its angle above the horizontal and the time of day at which a reflection could occur;
 - Consider both the solar reflection from the proposed solar development and the location of the direct sun light with respect to the receptor's position;
 - Consider the solar reflection with respect to the published studies;
 - Determine whether the solar reflection is likely to be a significant nuisance or a hazard to safety;
 - Consider mitigation.
- Identification of the road and residential dwelling receptors;
 - Glint and glare assessment for the identified receptors;
 - Summary of Results

Developers indicated that they consider that glint and glare will usually present a negligible risk. Glint and glare assessments should be required only on a case by case basis where there is a site or area specific need for such an assessment.

4.3.2.2 Archaeological/Heritage Considerations

The potential impact of this form of development on archaeological and heritage assets is a matter of interest to planning authorities, prescribed bodies and developers. There was a wide variety of opinions in relation to this subject amongst the consultees.

Almost all of the consultees agreed that the undertaking of a geophysical survey is appropriate if there is evidence of archaeological features on a proposed site. Requiring a geophysical survey where there is no evidence of archaeological activity on a site is seen as an undue burden on the applicant by developers. Developer consultees contented that an archaeological report arising from desk research and a site walkover by a qualified archaeologist should be sufficient in terms of determining if archaeological remains are present on a site or not. In areas where there is high archaeological potential, a geophysical would be appropriate in order to ensure that any remains present on site would not be negatively impacted.

A number of developers were of the view that some local authorities maybe requesting geophysical surveys in locations where they may be appropriate. Proportionality, in terms of the assessment of archaeological and heritage potential was advanced by both local authorities and developers in terms of weighting up options different types of archaeological potential.

In terms of trenching, a number of developer consultees cited opinions put forwards by their archaeological agents which contend that trenching to uncover archaeological remains would

potentially do more damage than the deployment of the ground works needed to put the solar array in place. The developers also cited interventions to the design of a scheme which may mitigate any potential impacts on archaeological features, such as mounting cabling on the back of solar arrays and the use of ballast mounting as foundations for the mountings. Some developers suggested applying setbacks of between 30-40 metres between solar arrays and heritage assets as a possible response to the presence of an archaeological/heritage feature within the environs of a particular site. If archaeological remains are present in the site, then siting of arrays may be influenced by a geophysical survey if appropriate.

A matter raised by a number of consultee overlaps with the landscape element outlined above in terms of the need to consider the landscape setting of a national monument or important heritage feature as an integral part of the feature itself. As such, the visual impact of a proposed USSPV scheme should be considered in light of the potential impacts which it may have on the aesthetics associated with the setting of the feature in question.

4.3.2.3 Construction Phase

Measures relating to the construction phase of USSPV projects were outlined in some detail by consultees. In terms of managing the construction phase, a number of local planning authority consultees indicated that insufficient information for details around the management of the construction phase. Main areas not being addressed include;

- Vehicle movements;
- Construction Compound; and
 - Waste Water Treatment
 - Storage of environmentally deleterious liquids (i.e. diesel)
- Intended site access roads.

In addition to the above, it was recommended by both developers and local planning authority consultees that existing site infrastructure such as tracks and/or gaps in hedgerows should be utilised in order to limit the impact on the receiving environment. In addition, a developer indicated that the use of temporary tracks during the construction phase would reduce the need to add additional infrastructure onto a particular site and would, in the longer run would aid the reinstatement of a particular site to its previous use.

4.3.2.4 Noise

Developers indicated that the only elements of USSPV development which generate any noise are inverters and transformers. Any noise emissions from these features are inaudible beyond a limited distance. It was suggested that an appropriate qualified engineer could demonstrate that the siting of the aforementioned infrastructure away from sensitive receptors could be achieved in manner which would result in no impact on the amenity of the receptor (i.e. a residential unit).

4.3.2.5 Setback Distances

Public and private sector consultees agreed that set back distances needed to be considered on a site by site basis. Some developers are of the view that an overly prescriptive set back distance would be inappropriate.

Consultees from the public and private sector articulated the view that noise generating elements such as inverters and transformers should be set back from site boundaries in order to ensure that any low level noise emissions arising from the operation of this infrastructure is mitigated against (see S4.3.2.4, above). Setting inverters and transformer a sufficient distance away from sensitive receptors was put forward as the most effective means of mitigating the impact of noise from this infrastructure.

Average set back distances applied by some developers is approximately 25m. This aligns with a number of recent decisions which held 22m as being an appropriate set back distance (the source of which is cited in Section 2.0). A number of consultees indicated that a relationship between visual and landscape impact and set back distances was appropriate. In addition, incorporating beyond the above, a setback from sensitive heritage or archaeological assets was also considered rational by public and private sector consultees. This is tied to preplanning consultation with residents close to the proposed development as some developers have negotiated setbacks with individual residents with properties abutting proposed schemes.

Ultimately, a cross section of consultees concluded that if a setback is distance is proposed, the guidance needs to be very clear as to where it is from. Careful consideration needs to be given to the issue of distance and where exactly the distance is measured from if it is being introduced. If it is the curtilage of the property, this needs to be defined as there may be some distance between the property boundary and the location of the sensitive receptor (i.e. a residential dwelling) on the abutting site. Any guidance would also need to include the potential for a reduction in setback distances where a residential dwelling is adequately screened as a result of existing structures and/or vegetation.

A number of consultees also commented on the fact that if solar PV installations on roofs in domestic settings do not require set back distances, then the question that follows is, why should ground mounted solar PV, which is the same technology, albeit deployed on a larger scale, have a setback imposed. In terms of set backs and site maintenance, it was recommended by one consultee that sufficient distance is allowed for at site boundaries in order allow a tractor and mower to complete a turn during any maintenance.

4.3.2.6 Landscape and Visual Impact

Public and private consultees recognised that the deployment of solar energy technology at USSPV has the potential to impact on the landscape. Correspondingly, there is a need to ensure that the impact of the proposed development is minimised. Consultees were posed questions relating to the subheadings below in order to frame the discussion around the potential impacts of USSPV schemes.

A national landscape capacity map was put forward as a resource which local government consultees indicated may be useful in terms of the assessment at a strategic level of the landscape impacts of USSPV schemes within their functional area.

Topography

The question below was posed to the consultees in relation to topography.

- Should the location of solar PV schemes in landscapes with undulating characteristics be discouraged if insufficient screening potential exists to mitigate the visual impact of the development?

A number of consultees from public and private sector indicated that the topographical features of a proposed site may work to screen the visual impact of a scheme proposed for location in a particular area. On balance however, the mitigating effect of a site's topography may only be effective from certain view points within the ZVI of a particular scheme. The assessment of the appropriateness of the development of a large solar PV scheme on an undulating site would need to be considered by the planning authority. In terms of site selection, some developers indicated a preference to avoid sites with insufficient screening as they may constitute a slightly higher risk in terms of the acquisition of a planning permission. On the whole, both public and private sector consultees indicated that the assessment of topography should be considered on a site by site basis.

Cumulative Assessment

The following items were put forward to consultees as some of the possible items which may be required information which could be used to demonstrate the potential for cumulative assessment of USSPV schemes within a particular area. A zone of visual influence is the area from which a development or other structure is theoretically visible. The following information was taken from the UK's Planning practice guidance for renewable and low carbon energy;

- **a base plan of all existing solar farms and permitted developments** showing all schemes within a defined radius of the proposal under consideration;
- **for those existing or consented solar farms** within a defined radius of the proposal under consideration, **a plan showing cumulative 'zones of visual influence'**. The aim of the plan should be to clearly identify the zone of visual influence of each solar farm, and those areas from where one or more solar farms are likely to be seen;
- the base plan and plan of cumulative zones of visual influence will need to **reflect local circumstances**, for example, the areas covered should take into account the extent to which **factors such as the topography and the likely visibility of proposals in prevailing meteorological conditions** may vary;
- maps of cumulative zones of visual influence are used to **identify appropriate locations for visual impact studies**. These include locations for simultaneous visibility assessments (i.e. **where two or more schemes are visible from a fixed viewpoint without the need for an observer to turn their head, and repetitive visibility assessments** (i.e. where the observer is able to see two or more schemes but only if they turn around));
- sequential effects on visibility occur when an observer moves through a landscape and sees two or more schemes. Common routes through a landscape (e.g. major roads; long distance paths or cycle routes) can be identified as **'journey scenarios'** and the proposals impact on them can be assessed;
- **photomontages showing all existing and consented solar farms**, in addition to the proposal under consideration. The viewpoints used could be those identified using the maps of cumulative zones of visual influence. The **photomontages could be annotated to include the dimensions of the existing arrays**, the distance from the viewpoint to the different schemes, the arc of view and the format and focal length of the camera used; and
- at the most detailed level, description and assessment of cumulative impacts may include the following landscape issues: scale of development in relation to **landscape character or designations**, sense of distance, existing focal points in the landscape, and sense of remoteness or wildness.
- It may be necessary to undertake a **glint and glare assessment on all existing and consented solar farms**, and those for which planning applications have been submitted, in

addition to the proposal under consideration in order to determine the cumulative impact of this form of development.

The above recommendations were found to be appropriate, in addition to elements of existing practice in the cumulative assessment of wind energy schemes. In terms of assessing cumulative assessment of solar energy infrastructure, both public and private sector consultees outlined that the development of solar PV schemes within a particular area may be supported if screening is effectively deployed and maintained within the receiving environment. A defined radius for the undertaking of a Landscape and Visual Impact Assessment (LVIA) was recommended as being between 3-5km was put forward by a number of public and private sector consultees. In addition, most consultees proposed that the most appropriate means of deriving a ZVI for the purposes of cumulative assessment would be through the use of digital terrain mapping.

A common comment throughout the consultation process amongst both public and private sector consultees related to the need to acknowledge that solar energy development will gravitate toward areas where a resource is prevalent (such as 38-110kv substations). In such areas, it was considered by all consultees that there will be considerable interest in the deployment of USSPV. In such areas, a moderate allowance should be made toward the location of a number of developments within a particular area. This allowance would be contingent on the capacity of the landscape to assimilate the visual impact of the proposed developments. Differentiating between a bona fide development with a strong likelihood of being developed out and a speculative scheme which would not be developed was a question which was consistently raised by public and private sector consultees in terms of undertaking cumulative assessments for development in areas where a resource, such as grid access exists.

Screening

All of the consultees indicated that appropriate screening would be key to enabling the deployment of solar energy technology. In terms facilitating screening, all agreed that the use of native species hedgerow and trees should be prioritised. Any existing hedgerows should be retained and that in places, additional screening should be employed to reduce any potential visual impact/glint and glare associated with the development.

Further to the above, the local planning authority consultees outline that, it is current practice (in terms of the schemes submitted to date) that any screening measures that involve the planting of additional elements (such as trees), are orientated in a manner which mitigates the potential impact of glint and glare. Existing hedges and established vegetation, including mature trees, should be retained wherever possible. Trees and hedges should be protected during construction. The impact of the proposed development on established trees and hedges can be informed by a tree survey.

In some instances, the scale of a particular development may be an issue. In such instances, screening may be useful in enhancing the assimilative capacity of the receiving environment. Some developers and public sector consultees believe that there is nothing aesthetically ugly about the deployment of ground mounted solar in comparison to other activities in rural environments.

4.3.2.7 Site Management and Maintenance

Site management and maintenance was considered to be an important phase by public and private sector consultees. Questions around the control of weeds on the developed sites were raised by the

public sector consultees. It was considered that if more sensitive means of regulating plant growth on a site then it should be explored as an alternative. Conditioning against the use of pesticides on a site was outlined as a potential means of ensuring that a site could be managed in a more holistic and sustainable manner.

The manner in which site security is managed was a key consideration of planning authorities, prescribed bodies and developers. Local planning authorities outlined that applicant are frequently not submitting sufficient information relating to the siting of CCTV cameras, the nature and extent of perimeter fencing as well as the details of any lighting which may be applied on a site. If sufficient detail around these items is included with planning applications in the first instance, then there will be a corresponding decrease in the volume of RFIs for this information.

In relation to fencing, an innovative solution proposed by one local planning authority consultee relates to the use of deer fencing along perimeters which do not abut public roads or access tracks. The idea underpinning the approach is that this form of fencing is more in keeping with rural character than the deployment of more industrial fencing types i.e. paladin fencing. The fencing types such as paladin should be constrained to the area in the immediate vicinity of road access to the site.

Developers stressed that the deployment of CCTV on sites would be undertaken in a manner which would not interfere with the amenity of adjoining residential properties. This was a key concern of local planning authorities who are keen to ensure that any camera deployed on sites are sited in an appropriate manner.

In terms of decommissioning, developers outlined that the components of a solar PV arrays are largely recyclable and that the value of materials would be sufficient to cover the costs of decommissioning. Planning authorities disagreed, citing the preferred method of instituting a 'bond' in order to set aside sufficient funds in order to reinstate the site to its predevelopment state.

Where a developer demonstrates a need for the use of an additive to water for the purposes of cleaning, such use be considered during the development assessment phase in terms of the potential for such an additive to have a cumulative environmental impact on the subject site and any nearby environmentally sensitive sites over the life time of the development.

In addition, all farmers are obliged to maintain their land in "good agricultural and environmental condition" (GAEC) under the Common Agricultural Policy rules of 'cross compliance', so it is important to demonstrate GAEC of the land for the lifetime of a solar farm project, from initial design to eventual remediation. A maintenance statement detailing how Pasture management interventions such as 'topping' (mowing) may be required occasionally or in certain areas, in order to avoid grass getting into unsuitable condition for the sheep (e.g. too long, or starting to set seed). Between 4 and 8 sheep/hectare may be achievable (or 2-3 sheep/ha on newly-established pasture), similar to stocking rates on conventional grassland, i.e. between about March and November. The most common practice is likely to be the use of solar farms as part of a grazing plan for fattening/finishing of young hill-bred 'store' lambs for sale to market. Store lambs are those newly-weaned animals that have not yet put on enough weight for slaughter, often sold by hill farmers in the Autumn for finishing in the lowlands. Some hardier breeds of sheep may be able to produce and rear lambs successfully under the shelter of solar farms. Broiler (meat) chickens, laying hens and geese will all keep the grass down, and flocks may need to be rotated to allow recovery of vegetation. Stocking density of up to 2000 birds per hectare is allowed, so a 5 megawatt solar farm on 12 hectares would provide ranging for 24,000 birds.

If chickens are placed on sites, then appropriate measures to prevent attack by foxes should be implemented. It is desirable that the terms of a solar farm agreement should include a grazing plan that ensures the continuation of access to the land by the farmer, ideally in a form that enables the claiming of Basic Payment Scheme agricultural support.

4.3.2.8 Drainage/Flood Risk

The local authority consultation workshop that applicants are not submitting sufficiently detailed drainage information. The identification of watercourses which may drain into Natura Sites should be identified as a matter of priority in order accurately assess if a development may have an environmental impact on a designated area. Such identification is also important in terms of influencing the site management and maintenance regimes which may be applied to the site (in terms of prohibition of any additives used for the cleaning of solar PV panels).

In terms of flooding, sites with a risk associated may be acceptable to develop, so long as inverters and transformers are sited outside the flood risk area. Cables servicing arrays in areas where there is a flood risk may be mounted on the rear of the panel or may be buried. Due to the increasing frequency of weather events beyond climatic norms (most often associated with climate change), it is necessary to explore measures which can be put in place to facilitate the effective management of drainage on the proposed site. In terms of drainage, the soil condition of the subject site should be considered in terms of calculating predevelopment run off volumes. Public and private consultees both emphasised the need to consider matters relating to soil, watercourses in proximity to the site in terms of assessing the drainage dynamics of the subject site.

Construction Phase

Preventing silt laden run off from the sites during construction phase was identified by the local authority consultees as being a priority. The developer community indicated that they had received a number of requests for further information have been sought requesting further elaboration on the mitigation of construction related run off. A common measure proposed by consultees from both the public and private sector involved in installation of the infrastructure when the field is in a grassed state as opposed to being ploughed or fallow after a cereal crop harvest. Planting on a grassed field is preferred in order to militate against silt laden run off and soil damage on the proposed site.

The ISEA recommended the following measures be adopted in terms of drainage management measures;

- Maintain a buffer (c.5m) between any drainage ditches present and the construction activities;
- Movement of material should be minimised in order to reduce degradation of soil structure and generation of dust.
- All excavated materials should be visually assessed for signs of possible contamination such as staining or strong odours.
- Stockpiles of material should not be located in the vicinity of watercourses. Where this is unavoidable, a buffer strip should be established c.5m to avoid pollution risk.
- Where required, temporary silt fences can be installed during the construction phase to intercept silt laden runoff if construction traffic or adverse weather is likely to cause damage to the topsoil.
- Monitoring of water quality during the construction phase.

Operational Phase

The local government consultees, considered that the effect of drip lines during the operational stage of developments should be assessed by applicants in drainage reports/assessments. The consultees from the developer sector have yet to encounter requests for this type of information during the planning process. An example of a swale system within a scheme in Southampton which addresses this phenomenon was outlined during the consultation process.

A number of consultees indicated that the prevalence of driplines and kinetic compaction underneath an array is predicated on the context of each site. As such, drainage measures on a particular site will need to be assessed by a suitably qualified engineer. Where the likelihood of an effect is demonstrated, local SUDs measures should be employed in order to address the preferential flow paths of runoff from the arrays. In addition, the measures below were put forward by developer consultees in terms of additional measures which may effectively manage outflows from a particular site.

- Solar panels: reinstate grass cover adjacent to and under panels in order to maximise bio-retention. No further formalised drainage required.
- Access Tracks: unpaved and constructed from local stone. Temporary swales (or similar drainage strategies) can be utilised to collect run-off from access tracks with discharge to ground through percolation areas. Where swales are utilised, a maintenance plan should be incorporated including mowing to eliminate competition from weeds, periodic litter removal and sediment clean-up and regular checks for the formation of any channels or gullies.
- Transformer / Inverters (and similar hardstands): the scale of these type of structures is unlikely to warrant a formalised drainage system. Runoff from this infrastructure and any associated hard standing should be directed to a percolation area for discharge to ground.
- Stream maintenance: Site green space for landscaping adjacent to mapped drains and watercourses and ensure ongoing access for maintenance. No built development, fixed barrier or other impediment to access should be placed within 10-15m of mapped drains and watercourses on site.

Decommissioning

No decommissioning related drainage impacts were anticipated by the consultees. There is a need to ensure that sufficient space is provided for the granting of access to machinery to ensure that drains around the perimeter of the site can be maintained and kept clear of clutter so as to maintain the capacity of the wider drainage catchment in which a particular site may be situated.

4.3.2.9 Environmental Impact Assessment (EIA)

The absence of guidance in terms of the applicability of environmental impact assessment to USSPV energy development was considered by consultees to be one of the greatest risk areas to the sector by many of the consultees. To explore the relationship USSPV and EIA, the questions below were posed to the consultees in order to frame the discussion are outlined below;

- What should a mandatory threshold be? e.g. Beyond a certain size/maximum generating/export capacity?
- A common interpretation of the EIA Directive states that the closest attributable category which USSPV schemes align with is set out below;

Annex II “Industrial installations for the production of electricity, steam and hot water (projects not included in Annex I)”⁴⁶. For comparability, the Hellisheidarvirkjun (or Hellisheidi) combined heat and power plant (CHP) in Iceland produces 303MW in power and has an estimated site area of 20 hectares.

- Does an interrogation of the elements below indicate where thresholds could/should be applied in terms of triggering the requirement for EIA?
- What are the important considerations for devising a triggering threshold for solar PV scheme and EIA?

A number of consultees outlined that USSPV does not neatly fit into an existing project category currently listed in the EIA directive. These categories are set out below;

- “Industrial installations for the production of electricity, steam and hot water (projects not included in Annex I).
- “Projects for the restructuring of rural land holdings”.

The reasoning advanced was that the first project category relates to combined heat and power installations more so than USSPV energy generation and that consequently, the need for EIA could be excluded. The second project category mentioned by developers cited ABP inspector reports relate to project for the restructuring of rural land holdings. This latter category does not appear in Schedule 5 of the Planning and Development Act 2000 (as amended) as it was transposed into law in an Irish context through the European Communities (Environmental Impact Assessment) (Agriculture) Regulations 2011 (SI 456 of 2011), which obligations the Department of Agricultural, Food and Marine to undertake EIA. The threshold for screening for development under that statutory instrument is set out below in table 1.

TABLE 1: EUROPEAN COMMUNITIES (ENVIRONMENTAL IMPACT ASSESSMENT) (AGRICULTURE) REGULATIONS 2011 SCREENING THRESHOLDS

Thresholds for screening applications		
Type of on-farm activity:		Screening Requirement
Restructuring of rural land holdings:	Length of field boundary removed	Above 500 metres
	Re-contouring (within farm-holding)	Above 2 hectares
	Area of lands to be restructured by removal of field boundaries"	Above 5 hectares
Commencing to use uncultivated land or semi-natural areas for intensive agriculture:		Above 5 hectares
Land drainage works on lands used for agriculture:		Above 15 hectares

The applicability of the above may not be relevant to solar energy development, however site works to enable the installation of a USSPV scheme may trigger the need for EIA screening by the DAFM.

Developers are keen to stress that as a land use, the deployment of USSPV is entirely reversible and that the impacts of the development are limited. A viability issue is related to the undertaking of EIA for smaller schemes (10ha+, 5MW) as the returns from that scale of scheme are mooted to “be in the single digits”. In addition, without sight of a subsidy, the undertaking of an EIA is seen as an additional

⁴⁶ <http://www.pleanala.ie/casenum/244351.htm>

costly risk by developers, to the extent that a number of developers are pursuing models which mitigate against the need for EIA, in terms selecting appropriate sites and scaling around the 10ha+, 5MW configuration of USSPV.

One consultee stated that ;

“the threshold for wind power is 5 turbines or having a total output greater than 5 MW. A combination of area and output would appear to be the equivalent in the context of solar PV. If a class is introduced into legislation for solar pv then any development of this nature would be considered sub-threshold, and would be subject to the provisions of article 103 and 109 of the Planning and Development Regulations (requirement to submit an EIS with sub-threshold development). In relation to the setting of thresholds, Article 11 of the EIA Directive couples the setting of thresholds with the determination of sub-threshold projects. The criteria set out in the paper reflects the criteria for sub-threshold determinations (as per Schedule 7 of the Planning and Development Regulations) and would appear to be consistent with the directive and established practice.”

In addition to the above, a great deal of emphasis was placed on the potential implication of the O’Grianna decision on the development of the sector. The lack of knowledge available to developers around the route which a grid connection may take is a key impediment in this regard. This state of affairs exists beyond the solar energy sector as it remains an issue for all renewable energy developers. This matter is currently before the courts and there is considerable potential for a judgement which may require a reconsideration of the manner in which the grid connection process is undertaken and assessed for existing and planned renewable energy infrastructure.

In terms of development, a number of public and private sector consultees contended that the onus should be on the applicant to screen for EIA. The outputs of that exercise would then be submitted to the planning authority for consideration with an application for development. This is the approach that Lightsource outlined during the consultation process. A description of the process they undertake is outlined below;

“Lightsource formally submits requests to Local Planning Authorities to assess and screen proposed solar farms to determine whether they constitute EIA development, and whether they will require an Environmental Impact Statement (EIS) or not. This request is submitted at the pre-application stage and comprises of an indicative layout with supporting information relating to the following:

- Site Development Characteristics*
- Location of the Development*
- Characteristics of Potential Impacts*
- Solar Farm Components*
- Site Selection Criteria*
- Example EIA screening determinations*

In the UK of the 165 screening requests submitted by Lightsource just 12 were deemed to constitute EIA due to site specific circumstances.”

The ‘broad scope and purpose’ of the EIA Directive has framed the consultees cautious approach to engagement with this issue to date.

4.3.2.10 Strategic Infrastructure Development (SID)

The questions outlined below were posed to the consultees in respect of determining an SID threshold for solar PV development. What is an appropriate mechanism to trigger this planning process?

- Size on its own merits?
- Capacity on its own merits?
- Some combination of both of the above?
- Does it become a strategic development by virtue of its role in Ireland’s energy transition?

A number of public and private sector consultees outlined that it was hard to foresee a scale of project which would be suitable for consideration under the SID process. a number of the consultees contended that it might be best in order to bring certainty to the development consent process, especially in light of the possibility of further, larger schemes being developed going forward (as per the Proposed Transmission Connected Generators Disclosures⁴⁷).

The current SID threshold for wind energy development is 50MW. A number of consultees indicated that this could serve as the rationale for the threshold for USSPV ground mounted solar PV. However due to the nature of the technology (capacity factor, efficiency etc.), this may not be an appropriate benchmark to apply as 50 MW of wind is not the same as 50MW of solar energy. Based on an assessment of site areas to generating capacity in the planning pipeline to date, 50MW of solar would correspond roughly to a USSPV scheme with a site area of 115ha.

4.3.3 Miscellaneous Recommendations

Over the course of the consultation process, a number of additional recommendation areas were posited by consultees. These recommendation areas are set out and discussed below. In addition, a number of areas considered to be worthy of exploration were set out in the consultation/discussion document in order to determine the views of the consultees in relation to them.

4.3.3.1 Community Gain

Exploring the deployment of solar energy schemes with an element of community ownership arose in a number of consultation sessions. A number of models of community ownership were outlined by developers who have applied them in the past in other jurisdictions. The potential of applying such a

⁴⁷ Eirgrid (2016) “TSO Connection Offer Disclosure of Applications as published on 2 September 2016” Available via: <http://www.eirgridgroup.com/customer-and-industry/general-customer-information/connections-and-contracts/>

model in an Irish context was raised with a view to exploring the manner in which it may facilitate the enhancement of societal acceptance and community engagement.

4.3.3.2 Planning Exemptions (Building Mounted)

While not within the defined scope of this research, a number of consultees mooted the benefits of Lifting/extending 'exempted' development rights for roof mounted solar energy development was advanced as a measure which was proposed as a measure which would aid the deployment of building level energy interventions which in turn would make inroads into Ireland's emission reductions targets.

4.3.3.2 Rates

It was stressed that the calculation of rates due on USSPV energy development should be taken into account the efficiency of the technology in comparison to wind energy (14% vs. 33%). The application of wind energy rates to solar energy development may significantly erode the viability of a solar energy scheme.

4.3.3.3 Educational Awareness/Training

It was recommended that a campaign with an educational focus should be employed in order to address the knowledge deficit exists within the public arena as regards the deployment of solar energy technology at USSPV. It was also recommended that training be provided to planning authority personnel in the undertaking and evaluation of geometric glint and glare assessment. The consultee who raised this recommendation area indicated that in terms of perception and optics, the initiative should not be lead by the sector. Instead a 'trusted intermediary' should be charged with leading the campaign.

4.3.3.4 Development Contributions

A number of developers outlined that a high level balance needs to be adopted between the recognition that this form of development is contributing toward the attainment of binding national renewable energy targets and emissions reductions, the missing of which will cost the State hundreds of millions of euros (Department of Finance along with others have identified this risk area to the public finances) and the generation of development contributions. Some local authorities are requesting 'bonds' be put in place to ensure the upkeep of roads during the construction phase and undertaking pre and post surveys in order to ensure that any damage which occurs is identified and rectified. Beyond that, the panels sit in a field for 25 years, with periodic visits to the site being generated due to cleaning and/or general maintenance.

In relation to roof mounted schemes for the generation energy to offset dependency on the grid for commercial, office and industrial uses, it was recommended that development contributions should

be waived for this form of generation. One developer argued that there is no case for the application of development contributions on large (2-500kw) systems on the roofs/within the curtilage of existing nondomestic developments. The goal of deploying solar PV/ thermal in this context is to enhance energy efficiency, a goal in itself which is recognised as being important within multiple government policy documents as well as within our national targets on emissions reduction.

A recent example of ambiguity in this matter can be seen in the AIB Bankcentre proposal (DCC planning ref: 2963/15) to put solar PV on the roof of their headquarters in Ballsbridge. The grant of permission came with a development contributions request of almost €24,000. On the other hand, Kingspan Insulation (Monaghan planning ref:15304) sought and was granted planning permission for a 300kw system in Monaghan. No development contributions were levied for this. Given the variance in approaches, it may be necessary to explicitly state in guidance that systems up to 500kw in nondomestic setting should be exempt from development contributions (and possibly from planning entirely, subject to some caveats).

4.3.3.5 Co-Location of Wind and Solar Energy Technologies

The co-location wind and solar energy developments received a mixed reaction from consultees across the spectrum. A number of consultees considered that the colocation of wind and solar energy development would be a beneficial exercise as it would effectively enable operators to ‘sweat’ (extract the most efficiency from) grid connection assets. In addition, research from a number of sources⁴⁸ indicates that solar PV and wind energy generation complement each other. Due to climatic factors, high wind speeds and peak solar irradiance seldom occur at the same time.

A number of issues were outlined however in relation to wind farm siting, technical, contractual, market (SEM/I-SEM) and legal matters associated with colocation. A number of consultees outlined that the location of many wind farms was in upland locations and that this may be an issue in relation in terms of visual impact. However, notwithstanding the above, the concept was found to be of interest.

4.3.3.6 Preplanning Consultation

A number of developers indicated that preplanning consultation is something which is seen as an important component of building social acceptance and community trust in an area. While a number indicated reluctance to engage in the traditional ‘town hall’ meeting format, a number indicated that house to house visits, letter drops and public exhibitions were preferred and in some instances more effective than the aforementioned approach.

4.4 Consultation Summary

Significant insights were gained through the consultation process on a broad range of issues a broad range of issues related to USSPV. The outputs of the consultation process were considered in detail in

⁴⁸ Fraunhofer ISE (2016) “Recent Facts about Photovoltaics in Germany” Available via: <https://www.ise.fraunhofer.de/en/publications/veroeffentlichungen-pdf-dateien-en/studien-und-konzeptpapiere/recent-facts-about-photovoltaics-in-germany.pdf>

line with the insights arising from the planning pipeline and planning and development practice in established solar markets in order to produce the planning recommendations contained in Section 5.0.

5.0 Recommendations for S28 Planning Guidance for Utility Scale Solar Energy Development

Arising from the findings developed through the review of the pipeline of planning applications, consultation with key stakeholders and additional national and international research, a series of recommendations have been developed to assist in the planning and management of utility scale solar PV developments in an Irish context. The recommendations are set out in three sections, relating to distinct aspects of the planning system, as follows

- Forward Planning recommendations;
- Development Management Recommendations; and
- Other Recommendations.

In terms of operationalising the recommendations below, alternative means to S28 guidance were considered. The recommendations for planning guidance in this section could be applied by the relevant authorities, if thought appropriate, via planning circulars issued to planning authorities on the assessment of the development impacts of USSPV. Acting in this way would enable a response to specific issues to be implemented far quicker than would be the case with fully undertaking the process to devise and consult upon s28 guidance for the sector. As can be seen from the planning pipeline explored in Section 2.0 of this report, the existing provisions and methodological approaches in the planning system are delivering decisions on USSPV schemes of all scales.

In addition, if the opportunity arises to couple the development of guidance for USSPV schemes with the revision or development of planning guidance for other renewable energy technologies then that opportunity should be pursued.

5.1 Forward Planning

Forward planning relates to the drafting and enacting of plans and policies governing spatial and land use management. Such plans can be applied at a range of spatial scales, from national, through a regional tier, local authority level and local plans for smaller areas.

Its role is fundamental to achieving Ireland's proper planning and sustainable development, through setting a framework to support development of an appropriate type and scale in appropriate locations. Forward planning has a growing role in achieving Ireland's energy transition in a viable, sustainable and plan led manner.

This section outlines a series of recommendations as they relate to planning frameworks, development plans and the support strategies which frame and guide the operation of the development management function of the Irish planning system.

5.1.1 Planning Policy

The development of coherent national, regional and local planning policy is a key prerequisite for a sustainable solar energy sector in Ireland. The absence of specific planning policy relating to the deployment of utility scale solar PV has been identified as a source of concern in objections and observations made to date on planning applications. As Ellis, (2012) identifies⁴⁹, consistency in the application of planning policy is a key contributing element toward the realisation of community acceptance. By creating consistent planning policy approaches to the identification and assessment of utility scale solar PV proposals, greater certainty and comfort can be delivered to the communities in which such schemes are proposed and greater comfort for developers of schemes as to how their proposals fit within the policy framework and what matters are required to be addressed. The development of a consistent approach to considering solar PV schemes across the various planning authorities, for example similar to SEAI's Local Authority Renewable Energy Strategies (LARES), would also provide benefits to communities and the industry.

5.1.1.1 National

Recommendation No. 1

It is recommended that USSPV energy developments be explicitly referenced in the National Planning Framework as a potential key component of Ireland's energy transition to a 'low carbon' society.

Defining a role for solar energy technology (a building mounted and utility scale) should be placed on a solid footing within Irish planning and development policy. This would establish this form of renewable energy generation on a solid policy foundation within Irish planning policy. It would also ensure consideration of this renewable energy type at lower spatial scales.

A national planning policy commitment would need to reflect an 'all of government' approach. Consequently, if a strong emphasis is placed on the role of solar energy as a component of Ireland's energy transition to a 'low carbon society'; this policy ambition needs to be reflected in policy arising from other government departments. If solar energy is emphasised in the National Planning Framework then it follows that it should be acknowledged within the forthcoming '*Renewable Electricity Policy and Development Framework*'.

5.1.1.2 Regional

Recommendation No. 2

It is recommended that utility scale solar PV energy developments be explicitly referenced in the Regional Spatial and Economic Strategy for the regional assembly areas as a potential key component of Ireland's energy transition to a 'low carbon' society.

⁴⁹ Consulting, S.L.R., G. Ellis, and P. Devine-Wright, Wind Energy: "*The Challenge of Community Engagement and Social Acceptance in Ireland*". 2014: National Economic and Social Council, Ireland

The focus of the policy at this spatial stage should be high level, identifying that the sector can contribute to regional energy needs.

5.1.1.3 Local

Recommendation No. 3

It is recommended that county development plans set out policy and objectives to support utility scale solar PV energy development and put in place development management standards to control development in line with the recommendations below (in Section 5.2).

Recommendation No. 4

It is strongly recommended that county development plans do not adopt development policy objectives which unduly restrict USSPV energy development. It is, however, recommended that plans identify the type of location where such development is particularly suited, i.e.

- Rural Brownfield (e.g. cutaway bog);
- Urban Brownfield (e.g. former landfill sites);
- Topographically assimilative landscapes.
- Industrial/Brownfield sites (in urban/rural areas)
- Agricultural Lands;
- Proximity to a 38kv or 110kv substation/line; and
- Areas of low biodiversity value.

Recommendation No. 5

It is recommended that planning authorities do not set out development policy that prioritises the delivery of development of utility scale solar PV on lands with lower agricultural value.

Recommendation No. 6

It is recommended that planning authorities maintain a GIS based database of all utility scale solar PV schemes, together with relevant other schemes, including wind farms to assist in identifying cumulative effects.

County Development Plans (CDPs) set out the guiding principles of development policy for planning authority areas. The provision of clear relevant objectives and policies to address the potential specific impacts of USSPV development will assist in the determination of planning applications in a consistent

way and address those areas that are emerging in current planning applications as areas of potential delay or confusion.

As a development class, utility scale solar PV is suited to a range of types of environment and locations. It is considered, subject to adequate design and mitigation of potential impacts, that utility scale solar PV can be accommodated in a wide range of locations subject to the standard development management considerations for other classes of development.

Where plans set out uses that are 'Permitted in Principle' or 'Open for Consideration' in land use zoning categories, consideration should be given to including utility scale solar PV for each zoning. It is noted that such schemes will not be a preferred land use suited to all types of site location. Locations where development may not be optimal may include

- Environmentally sensitive lands,
- Proximity to residentially zoned lands in settlements,
- Heritage landscapes, and
- Upland areas,
- Where adequate screening cannot be achieved, sites proximate to key infrastructure such as
 - Motorways;
 - National Primary Routes;
 - National Secondary Routes;
 - Strategic Regional Roads; and
 - Airports;
- Areas of flood risk;
- Areas with high cumulative impacts.

The installation of utility scale solar on agricultural land does not constitute a risk to the productivity of the wider agricultural sector. While there may be some concerns on the part of members of the community in receiving environments about the perceived loss of agricultural lands, this is unlikely to be a significant concern in practice. The land area available for agricultural use is vastly in excess of the area of land needed to support utility scale solar PV and a comparison of the areas clearly indicates that there is no threat to the integrity of the agricultural sector arising from the creation and expansion of a solar energy sector⁵⁰.

Planning authorities, as a component of the forward planning function should maintain details of the following in order to effectively manage and assess the cumulative impact of utility scale solar PV

⁵⁰ As of June 2016, the Department of Agriculture, Food and the Marine estimates that 4.4 million hectare of land are employed in agricultural use. Up to 81% (3.6 million hectares) of this land area is utilised as pasture, hay and grass silage, 11% (0.5 million hectares) is being used as rough grazing and 8% (0.36 million hectares) is being used to grow crops, including cereals. (Department of Agriculture, Food and the Marine, 'Fact Sheet on Irish Agriculture – June 2016')

By utilising the site area to generating capacity of utility scale solar energy schemes in the planning pipeline to date, if the 3GW of solar energy development contained therein were to be developed, this would only result in the use of approximately 4,500 hectares of land or 0.1125% of the total area available for agriculture, notwithstanding the possible continued use of these lands for agricultural use. As of the beginning of October 2016, planning applications have been lodged or are under consideration/appeal for an estimated 594 Megawatts (MW) of solar PV capacity. The combined site area for this potential capacity is 1,331 hectares. An area of objection which has emerged consistently to date on these applications has been the perceived loss of agricultural land arising from the deployment of utility scale solar. The combined site area for the 594MW cited above constitutes 0.030% of the area of land available for agricultural use in the State.

development within their functional area, both operating and permitted, together with development in the functional area of adjacent planning authorities (within 5km).

Planning authorities also collate the distribution system operator(DSO)/transmission system operator (TSO) applications which have been lodged for consideration within their functional areas in order to undertake an assessment of the likely patterns of development which may emerge over the period of their county development plans. Having regard to the SEAls Local Authority Renewable Energy Strategy (LARES) methodology, key land use interactions as they relate to the deployment of utility scale solar energy development is outlined in Table 2 . Development Management standards in relation to these factors is set out in Section 5.2.

TABLE 2 INDICATIVE LARES UTILITY SCALE SOLAR LAND USE INTERACTIONS TABLE

Utility Scale Solar Energy	
Location and Land Use	Proximity to the following requires consideration:
	Environmentally designated lands
	Road access
	Brownfield lands
	Agricultural lands
	Aviation flight paths
	Dwellings
	Watercourses
	Archaeology/Heritage Assets
	Other arrays (Cumulative Impact)
	Habitats
Site Conditions	Solar irradiance
	Flora and fauna
	Screening from sensitive receptors
	Security
	Topography
	Mitigation until plantings mature
	Glint and Glare
Landscape and Visual Impact	Cumulative Assessment
	Screening Measures
	Substation (38/110kv)
Infrastructure	Availability of water for panel cleaning
	Access Tracks
	Capacity of Local Roads
	HGV Access (Construction/Decommissioning)

5.2 Development Management Recommendations

The following series of recommendations relate to the process of administering and making a decision in relation to utility scale solar PV development. Development management is a key function of the Irish planning system. The provisions of this process regulate the manner in which development is delivered in line with the principles of proper planning and sustainable development. This section outlines a series of recommendations in relation to practice of development management in relation to utility scale solar energy development.

5.2.1 Consultation

Recommendation No. 7

It is recommended that developers carry out community consultation in advance of the lodgement of a planning application to describe the benefits and impacts of the scheme and encourage greater understanding of the development in the community.

The period prior to the lodging of a planning application for development is an important stage in the process of development.

During this phase, developers locate their preferred sites and have the opportunity to consultation in order to explain the rationale and benefits of the scheme and to identify any potential difficulties or concerns that will need to be addressed and overcome.

This consultation can take place with a number of stakeholders, most notably the community affected by the proposed development and the planning authority.

Building community trust in the merits of a scheme is crucial in terms of advancing the wider energy transition. As has been seen with the deployment of wind energy technology and the wider controversy around the development of distribution and transmission infrastructure, societal acceptance is a vital commodity in the process of delivering energy infrastructure.

There is no obligation under planning legislation which mandates that an applicant must undertake consultation with the public prior to the lodgement of an application for planning permission.

Work by Ellis, 2012⁵¹ indicates that social acceptance of renewable energy technology is driven by 'values' as opposed to 'facts'. It follows therefore that meaningful engagement with the community in the receiving environment should be undertaken as it has the capacity to engender community and wider societal acceptance of the deployment of utility scale solar PV. National acceptance of climate change and the need for renewable energy technology cannot be relied upon at a local level (as indicated by Bertsch et al. 2016⁵²) to engender acceptance of a specific development. While engaging in this activity may constitute a cost on the developer, such consultation is imperative for the wider sector and the energy transition as a whole as it facilitates societal acceptance of the deployment of this form of renewable energy generation

⁵¹Consulting, S.L.R., G. Ellis, and P. Devine-Wright, Wind Energy: "The Challenge of Community Engagement and Social Acceptance in Ireland". 2014: National Economic and Social Council, Ireland

⁵² Bertsch V, Hall M, Weinhardt C & Fichtner W (2016) "Public Acceptance and Preferences Related to Renewable Energy and Grid Expansion Policy: Empirical insights for Germany" Energy, Vol. 114, No. 1, November, 2016, pp. 465-477

The scope of consultation can be broad and may include those within theoretical ‘zone of visual impact’ (ZVI) of the proposed scheme. Other means of defining a catchment for consultation might entail utilising pre-existing community understood definitions of catchments such as townlands or parishes.

Models of consultation applied in the wind energy sector and by some solar energy developers with schemes in the planning pipeline currently include;

- Targeted letter drops (ZVI identified dwellings);
- Advertisement in the local press (separate to newspaper notice for the purposes of planning);
- Public Exhibition/Open Evenings; and
- Project Website; School Visits.

While public meetings are a useful means of consulting with the public, there are other means by which consultation may be effectively undertaken. An exhibition on the development in local civic buildings may be as effective as a large scale public meeting.

5.2.2 Landscape

Recommendation No. 8

It is recommended that the impact on the landscape be addressed using the following key criteria:

- within a defined radius of the proposal under consideration, **a plan showing cumulative ‘zones of visual influence’⁵³.**
- maps of cumulative zones of visual influence are used to **identify appropriate locations for visual impact studies.**
- examination of simultaneous visibility assessments⁵⁴;
- sequential effects on visibility occur when an observer moves through a landscape and sees two or more schemes. Common routes through a landscape (e.g. major roads; long distance paths or cycle routes) can be identified as **‘journey scenarios’** and the proposals impact on them can be assessed;
- **photomontages to show all existing and consented solar farms, and those for which planning applications have been submitted**, in addition to the proposal under consideration.
- at the most detailed level, description and assessment of cumulative impacts may include the following landscape issues: scale of development in relation to **landscape character or designations**, sense of distance, existing focal points in the landscape, and sense of remoteness or wildness.
- If necessary to undertake a **glint and glare assessment, including cumulative effectiveness of all existing and consented solar farms**

⁵³ A zone of visual influence is the area from which a development or other structure is theoretically visible.

⁵⁴ i.e. **where two or more schemes are visible from a fixed viewpoint without the need for an observer to turn their head, and repetitive visibility assessments** (i.e. where the observer is able to see two or more schemes but only if they turn around)

The aim of the plan is to clearly identify the zone of visual influence of each solar farm, and those areas from where one or more solar farms are likely to be seen. The base plan and plan of cumulative zones of visual influence will need to reflect local circumstances, taking into account the topography and the likely visibility of proposals in prevailing meteorological conditions and seasons may vary.

In addition, the potential visual impact of proposed USSPV schemes on heritage landscapes should be considered in instances where a proposed development has the capacity to influence the landscape setting of historic features (such as national monuments or historic demenses). In circumstances where an impact possibly arises on such landscape features, the assimilative capacity of the landscape in terms of topography and screening potential should be considered as factors which may mitigate any potential impact.

5.2.3 Glint and Glare Assessment

Recommendation No. 9

It is recommended that a national standard for the undertaking and assessment of **geometric glint and glare assessments** is developed, in conjunction with the Department of Housing Planning and Local Government, the Department of Communications, Climate Action and Energy, the solar industry, technical experts and other key stakeholders including the community.

The purpose of the standard recommended for implementation would be to introduce a national benchmark against which local and national planning authorities may consistently assess the potential impact of this phenomenon on sensitive receptors in the landscape, such as

- Residential Dwellings;
- Roads (local, regional, national & motorway);
- Railways;
- Aviation Infrastructure; and
- National Monuments/Historic Landscapes.

While no specific standard is set out in this report, the following considerations will form key elements of assessment, in line with practice internationally⁵⁵:

- Description of proposed scheme;
- Sun position and reflection overview;
- Glint and Glare assessment;
 - Identify the receptors of concern;
 - Choose appropriate receptor locations, e.g. dwelling or from a public road;
 - Define the proposed solar development area and choose an appropriate assessment resolution;
 - Undertake geometric calculations to determine whether a solar reflection may occur, and if so, when;

⁵⁵ In developing the standard above, regard should be had to established practice internationally, such as Germany 'Licht Lintinie' which specifies that the impact of glint and glare in some settings may be constituted as a nuisance if it lasts for more than 30 minutes per day or 30 hours per annum

- If a reflection can occur, determine whether the reflecting panels will be visible from the identified receptor locations. If the panels are not visible from the receptor, then no reflection can occur;
- If it is calculated that a reflection will occur, consider the location of the solar reflection with respect to the location of the sun in the sky, its angle above the horizontal and the time of day at which a reflection could occur;
- Consider both the solar reflection from the proposed solar development and the location of the direct sun light with respect to the receptor's position;
- Consider the solar reflection with respect to the published studies;
- Determine whether the solar reflection is likely to be a significant nuisance or a hazard to safety;
- Consider mitigation.
- Glint and glare assessment for the identified receptors;
- Summary of Results

5.2.3 Screening

Recommendation No. 10

No specific additional recommendation for planning policy is proposed in relation to screening. Additional screening may be required in specific instances, such as proximity to sensitive visual receptors, such as those found in heritage landscapes or areas with scenic landscape qualities.

The need for screening for utility scale solar PV development is a site specific consideration. Glint and glare mitigation will often relate to the delivery of appropriate screening of the solar array from sensitive receptors. Additional screening may be required in specific instances, such as proximity to sensitive visual receptors, such as those found in heritage landscapes or areas with scenic landscape qualities, as may be designated in development plans. Preserving heritage landscapes and the landscape setting of archaeological monuments is a consideration which should be taken into account by applicants who are planning to develop USSPV schemes in proximity to such areas.

In common with other development classes in rural locations, such as extractive industry or roads, native species of trees and vegetation can be utilised to screen utility scale solar PV development. If native species are being relied upon to provide additional screening to a site, then the impact of seasonality will need consideration. Existing hedges and established vegetation, including mature trees, should be retained wherever possible. Trees and hedges should be protected during construction. The impact of the proposed development on established trees and hedges could be informed by a tree survey if there is a need to remove elements due to shading considerations etc.

5.2.4 Topography

Recommendation No. 11

It is recommended that the deployment of utility scale solar PV shouldn't be prohibited in undulating landscapes.

Topography is a site specific consideration which may aid the screening USSPV development or lead to a position of visual prominence within the landscape. Assessing potential visual impact can be

addressed based on the merits of site-specific characteristics, including screening from hedgerows and mature vegetation.

5.3.5 Archaeology and Cultural Heritage

Recommendation No. 12

It is recommended that geophysical assessment of proposed USSPV sites should only take place in areas of archaeological potential. Any application for a USSPV scheme should submit an archaeological assessment predicated on a site walk over and desk research of possible archaeological potential on a subject site.

The planning pipeline study has identified an increasing incidence in volume of RFIs seeking geophysical surveys of entire sites of proposed utility scale solar PV schemes. Proportionality should be applied regarding the requesting of geophysical assessments in circumstances where the likely presence of archaeological remains is low. It is considered that current practice in relation to other extensive rural-based types of development (i.e quarrying) is not necessarily appropriate in guiding the approach toward the assessment of the archaeological impacts of USSPV as this form of development has a relatively limited impact on the site upon which it is erected. Notwithstanding the above, where a USSPV scheme is being proposed for development in an area of archaeological potential, a geophysical survey at RFI stage would be proportionate.

5.2.6 Set Backs

Recommendation No. 13

It is recommended that no specific set back distances are applied from a utility scale solar PV scheme to particular receptor. However, schemes should be located to ensure that impacts at boundaries and sensitive receptors is within acceptable environmental limits.

The rationale for fixed setback distances is to ensure that impacts at boundaries and at sensitive receptors is within acceptable environmental limits. As a result of site-specific characteristics, such as topography or boundary planting, the distance from the boundary that arrays should be set to maintain current environmental conditions will differ.

The imposition of a fixed mandatory set back distance could limit the efficiency of sites proposed for development (if excessive distances were prescribed). Where fixed setback distances are set out as a condition of a planning permission, this should relate to the characteristics of the scheme and its environment, and not to fixed setback distances derived from other sources.

The position of inverters and transformers may require some additional consideration in light of the potential noise emissions and their siting should be carefully considered to ensure that noise levels do not exceed normal ambient background noise levels. In terms of site management, the layout of solar

PV panel rows should anticipate future maintenance costs, taking into account the size, reach and turning circle of machinery and equipment needed for maintenance⁵⁶.

5.2.7 Drainage

Recommendation No. 14

It is recommended that the potential impact on drainage patterns is assessed as part of each planning application for utility scale solar PV.

Potential impact on drainage can come from a variety of sources. The installation of solar PV infrastructure on lands which have recently been used for the production of cereals or have been ploughed may give rise to significant soil disturbance and run off during periods of inclement weather. In some instances, it may be necessary to consider the impact of topography, drainage and the angle of orientation of solar PV arrays on some sites. Driplines may emerge over time and establish a preferential flow pattern which deviates from the predevelopment pattern. Where the issue is identified, it may be rectified through the use of a swale system. In hotter climates, raised temperatures resulting from operation can affect the watertable and groundwater conditions. In an Irish context this may be applicable in certain locations with a high water table. The location of utility scale solar PV should conform to the terms of 'The Planning System and on Flood Risk Management – Guidelines for Planning Authorities'⁵⁷.

5.2.8 Construction

Recommendation No. 15

It is recommended that the details of the construction stage are sought as a condition of planning permission, other than where they may raise significant matters that influence the planning decision.

The detailed construction management plan will be likely to address the (non-exhaustive) matters below. Local authorities should actively promote the use of temporary tracks during the construction phase as an alternative to the development of permanent site tracks. This would aid the restoration of the site to its previous use in the longer term. A draft Construction and Environment Management Plan (CEMP) may have reference to the following areas

- Site Office/Workers' Hut Siting.
 - Means of water provision (toilets, washing facilities & kitchens).
 - Wastewater Removal.
- Road Cleaning (in line with CIRIA Control of water pollution from Construction Sites, Good Practice Guidelines)

⁵⁶ Such as that might be used for 'topping' (mowing), collecting forage grass, cleaning drains if necessary, control of noxious weeds such as ragwort, thistles, or the clearing out of drains if they become overgrown with vegetation.

⁵⁷ 'The Planning System and on Flood Risk Management – Guidelines for Planning Authorities', Department of the Environment, Community and Local Government (2009)

- Storage Compound Siting.
 - Bunded Areas
- Fuel Tank Siting & Spin Control Measures.
- Temporary Earth Storage Areas.
- Construction Traffic Movements.
- Waste Management.

5.2.9 Site Management, Operation and Maintenance

Recommendation No. 16

No specific additional recommendation for planning policy is proposed in relation to site management, operation and maintenance.

It is best practice in cleaning solar arrays to use water only and not other cleaning agents. In an Irish context environmental factors (such as sand and dust) will not be expected to be prevalent. In terms of sourcing the requisite volume of water required for cleaning, mains water, ground water, rainwater storage or a mobile water tank may be appropriate options for the site (contingent on the availability of one or other on the site). The method and manner of cleaning should be stated in the planning application.

5.2.10 Security

Recommendation No. 17

No specific additional recommendation for planning policy is proposed in relation to security.

Site security will be an important factor given the need to protect the infrastructure. The treatment of site security in planning permission will be subject to the similar considerations as the protection of other extensive rural development such as extractive industry. Where mammal movement across the site is likely, perimeter fencing can incorporate a gap of at least 100mm at the bottom, with scope for larger gaps at regular intervals in order to enable mammal movements. The form of protection should take account of potential agricultural use of the site during its operation, such as a need to protect any poultry use.

The use of fencing solutions which are sensitive to the rural landscape should be prioritised. Paladin security fencing should be considered at site entrances and in the immediate vicinity of access points where thieves may try to remove stolen materials. Deer fencing or other similar solutions may be more appropriate to secure the perimeter of the site in other locations to minimise impacts on the rural landscape character.

The installation of perimeter lighting should generally not be required. It is also unnecessary in light of the availability of infrared CCTV cameras. Some limited lighting at transformer building(s) may be appropriate to enable maintenance or repair.

5.2.11 Decommissioning and Reinstatement

Recommendation No. 18

It is recommended that a decommissioning statement be included as a standard component of a planning application for utility scale solar PV.

The contents of the statement should include (but not be constrained to) a high level description of the decommissioning principles associated with the following removal items;

- Foundations
- Cabling
- Solar Panels
- Transformers/Inverters
- Fencing

The decommissioning statement should not be overly prescriptive in terms of defining precise methodologies for the decommissioning of a site as the associated technologies/methodologies may mature or develop over the lifetime of the development's existence. The characteristics of a solar PV systems' components are such that up to 90% of the materials may be recycled. The statement should have particular regard to the disposal of the **non-recyclable elements** of the decommissioned developments components. If a development utilises solar cells containing hazardous materials (i.e. Cadmium telluride), reference should be made to the manner in which these materials will be disposed of with reference to the requisite environmental standard in force for the disposal of that material at the time of decommissioning⁵⁸.

5.2.12 Upgrading/Repowering

Recommendation No. 19

It is recommended that the planning permission includes a condition permitting the installation of higher efficiency panels so long as the physical characteristics of the planning impacts of the development are no materially different from the original (i.e. reflectivity, sun path tracking etc.

5.3 Other Recommendations

5.3.1 Legislative Changes

The purpose of this section is to explore areas which have the potential to require legislative change in order to give effect to the administrative and policy provisions which have been devised for the assessment and processing of applications over a certain size/scale. The recommendations contained in this section should be read in conjunction with Section 4.0. The relationship between the deployment of utility scale solar energy development and Environmental Impact Assessment (EIA) was consistently cited by consultees as a possible risk to the sector. The risk which is envisaged primarily relates to the possible consequences of reasoning or precedent arising from court proceedings on matters relating to policy and procedure tied to the application of EIA.

⁵⁸ In relation to the standard which should be applied to the decommissioning of solar energy infrastructure, it is recommended that solar developers and planning authorities have regard to the IEA-PVPS task 12 programme on PV Environmental, Health and Safety Activities for appropriate insights involving the sustainable disposal of decommissioned solar energy infrastructure

5.3.1.1 Environmental Impact Assessment

Recommendation No. 20

It is recommended that the Planning and Development Acts and associated regulations should not be amended to include a separate category for mandatory EIA for utility scale solar PV development.

Consideration of the need for EIA should continue to be determined on a case-by-case basis with reference to the requirements of Annex III of the EIA Directive.

Planning permissions granted for utility scale PV development in Ireland to date have considered the need for EIA. To date, no application has been determined to have significant effects on the environment and no EIA has been deemed necessary. This may reflect site selection matters, where less sensitive sites have been selected, and typical sizes of development where the scale of development has not generated significant effects.

Practice to date in Ireland does not identify at what scale, in terms of physical size or generating capacity, that utility scale solar PV development would be likely to generate significant effects. Solar energy development is not cited within Annex I of the EIA Directive as requiring mandatory EIA. Reasoning set out in a number of recent decisions taken by An Bord Pleanála⁵⁹ outline that the most applicable form of development which aligns with the characteristics of solar energy development is contained in Annex II, namely,

“Industrial installations for carrying gas, steam and hot water; transmission of electrical energy by overhead cables (projects not included in Annex I)”.

In addition, should the nature of the site works trigger it, the screening for EIA thresholds established under the Environmental Impact Assessment (Agriculture) Regulations 2011 may become relevant as the Annex II of the EIA Directive also makes reference to;

“Projects for the restructuring of rural land holdings”,

which may be of relevance to utility scale solar deployment, predicated on the site works required to facilitate installation of the infrastructure. As with all development, it is necessary to consider the nature, characteristics, setting and scale of proposed development in order to determine if any potential environmental impacts may arise from the development. The provisions of Annex III of the EIA Directive set out the matters which need to be examined to assess if Environmental Impact Assessment is required. The relevant considerations are set out below;

Characteristics of projects

The characteristics of projects must be considered, with particular regard to:

- (a) the size and design of the whole project;*
- (b) cumulation with other existing and/or approved projects;*
- (c) the use of natural resources, in particular land, soil, water and biodiversity;*
- (d) the production of waste;*
- (e) pollution and nuisances;*
- (f) the risk of major accidents and/ or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge;*

⁵⁹ PL26 .244351

(g) the risks to human health (for example due to water contamination or air pollution).

Location of projects

The environmental sensitivity of geographical areas likely to be affected by projects must be considered, with particular regard to:

- (a) the existing and approved land use;
- (b) the relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and its underground;
- (c) the absorption capacity of the natural environment, paying particular attention to the following areas:
 - (i) wetlands, riparian areas, river mouths;
 - (ii) coastal zones and the marine environment;
 - (iii) mountain and forest areas;
 - (iv) nature reserves and parks;
 - (v) areas classified or protected under national legislation; Natura 2000 areas designated by Member States pursuant to Directive 92/43/EEC and Directive 2009/147/EC;
 - (vi) areas in which there has already been a failure to meet the environmental quality standards, laid down in Union legislation and relevant to the project, or in which it is considered that there is such a failure;
 - (vii) densely populated areas;
 - (viii) landscapes and sites of historical, cultural or archaeological significance.

Type and characteristics of the potential impact

The likely significant effects of projects on the environment must be considered in relation to criteria set out in points 1 and 2 of Annex III, with regard to the impact of the project on the factors specified in Article 3(1), taking into account:

- (a) the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);
- (b) the nature of the impact;
- (c) the transboundary nature of the impact;
- (d) the intensity and complexity of the impact;
- (e) the probability of the impact;
- (f) the expected onset, duration, frequency and reversibility of the impact;
- (g) the cumulation of the impact with the impact of other existing and/or approved projects;
- (h) the possibility of effectively reducing the impact.

The consideration of the need for EIA for utility scale solar PV development will need to take the decision of relevant legal cases in to account. In terms of specific recommendations of the mitigate the risk associated with EIA, the work of Spense et al, 2016 in relation to EIA and the wind energy sector may be applicable to informing decision making by applicants and planning authorities. A number of these actions have been outlined below;

1. "Where possible, choose land that is at least 15km from a European site.
2. Where possible, choose land which is not in multiple-ownership.
3. Where some private land is to be included in a planning application, ensure that the best form of written consent is obtained from the landowner(s).
4. Ensure that all relevant seasonal habitat surveys are undertaken at the relevant times of year and for at least two years prior to submitting your planning application.

5. *Determine whether your proposed development would bring about a permanent and irreparable loss of a European site / protected habitat. If so, prepare an 'IROPI' planning application, as opposed to a 'standard' application.*
6. *Ensure that your technical experts are using the best science available in the field (particularly where protected habitats are involved) when compiling the EIS / NIS.*
7. *Ensure that the legal tests set out in legislation and European and Irish case law for EIA and AA are considered by your technical experts when preparing the EIS / NIS and that the correct language is used by them in their conclusions drawn in the EIS / NIS.*
8. *Ensure that your technical experts prepare an NIS if there is any possibility that the proposed development could have significant effects on a European site, in light of its site conservation objectives.*
9. *Ensure that the NIS is a standalone document, separate to both the EIS and the Natura Impact Screening Statement.*
10. *Ensure that there are no conflicts, contradictions or inconsistencies between the EIS and NIS, and that they reference each other.*
11. *Ensure that the description of your development is correct and includes information on haul routes, internal roads, sub-station and grid connection location and form in your planning application.*
12. *Ensure that the EIS / NIS include in their assessment all built and consented plans and projects for the purposes of the assessment of the overall cumulative effect of your project, in combination with these plans and projects on the environment. Before submission of the EIS / NIS, ensure that any projects which have been consented since the initial preparation of the EIS are either captured or, if that is not feasible, ensure that the relevant planning authority is made aware of the relevant consented development, so that its impact can be cumulatively assessed with your development.*
13. *Ensure that the mitigation measures proposed to avoid or reduce a likely significant effect on the environment (EIA) or to entirely avoid an adverse impact on the integrity of a European site, having regard to its site conservation objectives (AA), are specifically referenced and factored into the initial project description and are detailed, precise and proven.*
14. *Ensure that the EIS / NIS does not propose that certain mitigation matters be left over for agreement with the relevant planning authority post-grant of permission. Both the EIA and Habitats Directive require planning authorities / An Bord Pleanála to determine in advance of granting permission, whether the proposed development is likely to have significant effect on the environment and / or a European site in light of its conservation objectives. Permission may still be granted even if a proposed project will have significant effects on the environment. However, there is an absolute prohibition on permission being granted under Article 6(3), where a proposed project will adversely affect the integrity of a European site, in light of its site conservation objectives. Instead, an IROPI application must be made under Article 6(4).*
15. *Where you wish to make modifications to your consented project, consider whether they require additional approval and what form of approval is appropriate.⁶⁰*

5.3.1.1 Grid Connection/O'Grianna Issue

A number of planning applications for utility scale solar PV have been subject to a Request for Further Information requesting details of the grid connection route. This reflects the ongoing impact of the decision in *O'Grianna v An Bord Pleanála*⁶¹ (December 2014) continue to resonate within the Irish

⁶⁰ Spense, D, Scannell, Y, Conaghan, D, Rafferty, L (2015) "Legal Update: Environmental and Planning Challenges for the Wind Energy Sector" Available via: <http://www.arthurcox.com/wp-content/uploads/2015/03/Legal-Update-Environmental-and-Planning-Challenges-for-the-Wind-Energy-Sector.pdf>

⁶¹ O Grianna & ors -v- An Bord Pleanala [2015] IEHC 248.

renewable energy sector and through the planning system. While this information is important on foot of the legal decision and the requirements of the EIA Directive, applicants are generally unable to provide accurate details as to the eventual route a grid connection may follow. This issue relates beyond the solar energy sector to the wider renewable energy sector and to wind energy in particular.

5.3.2 Strategic Infrastructure Development (SID)

Recommendation No. 21

It is recommended that the potential role of utility scale solar PV in meeting Ireland's renewable energy requirements is considered through a consideration of its appropriateness as a class of Strategic Infrastructure Development.

In general, the consultation process did not identify a need to encourage the development of utility scale solar PV through a fast track planning process. Strategic Infrastructure Development seeks to provide for development that;

- *is of strategic economic or social importance to the State or the region in which it would be situated,*
- *would contribute substantially to the fulfilment of any of the objectives of the National Spatial Strategy or in any regional spatial and economic strategy in respect of the area or areas in which the development would be situated,*
- *would have a significant effect on the area of more than one planning authority*

Should Government determine that utility scale solar PV can contribute strongly to achieving Ireland's renewable energy targets, then it may be appropriate for the Department of Housing, Planning and Local Government and the Department of Communications, Climate Action and Environment to consider whether such development is appropriate for consideration as Strategic Infrastructure Development. The existing Strategic Infrastructure threshold for wind energy development is 50MW (or 25 turbines). A 50 MW USSPV scheme would require an estimate site area of 115 ha based on 2.3 hectare per MW. Benchmarking solar energy development to wind energy in terms of establishing an SID threshold may not be appropriate however given the distinctive characteristics of the technology in terms of comparable capacity factor and generating efficiency.

5.3.3 Exempted Development

Recommendation No. 22

It is recommended that the Department of Housing, Planning and Local Government consider extending the exempted development threshold for roof mounted solar PV on commercial, office and industrial buildings up to systems 500kw.

Throughout the research review and the consultation process, the potential of roof-mounted solar PV development to contribute to the renewable energy sector was cited as having a significant role. The developer should be required to submit a glint and glare assessment of the proposed scheme if it is likely to be visible to national road or rail infrastructure, is adjacent (within 5-20km) of an airport or in instances where the rooftop is overlooked by residential units (apartments).

5.4 Summary

The recommendations advanced in this section deal with the pressing development impacts and procedural impacts associated with the development of the USSPV sector in an Irish context. Regard to the issues in the planning pipeline and the insights provided by a representative sample of the key stakeholders interacting within the planning system has led to the drafting of the recommendations outlined above. There is scope for these planning guidance recommendations to inform the drafting of S28 planning guidance should the need for this guidance arise.

As the existing processes and procedures of the planning system is returning decisions on proposed USSPV schemes, the recommendations arising from this research could be considered in terms of a Departmental Circular on planning practice if this mechanism were found to be more appropriate for the dissemination of practice in respect of the assessment of this form of development by planning authorities.

6.0 Conclusion

The purpose of this research is to devise evidence based and consultation tested recommendations which may inform the development of S28 guidance for USSPV schemes. As this research progressed, it became clear that the existing planning system can be returning decisions which accord with the assessment of USSPV schemes in line with the concept of proper planning and the principles of sustainable development. Notwithstanding the above however, there is evidence to suggest that specific guidance is required in a number of areas in order to bring certainty and consistency to the planning process.

The planning pipeline which has built up between October 2015 and October 2016 indicates that there is significant interest in this emerging area of renewable energy generation. By analysing the planning pipeline, a sense of the key issues relating to the assessment of USSPV schemes becomes clear. A number of these issues are applicable to other forms of renewable energy development, such as the implications of the O’Grianna judgement or the role of societal acceptance on the perception of solar energy technology deployed in schemes of scale. Other areas relate to the characteristics and perception of the technology, such as the quantification of glint and glare. This research codified a comprehensive list of these matters, thematically categorised them and then considered the planning and development approaches to these issues in established solar energy markets.

Once that process had been completed, a representative sample of the solar energy sector, technical experts and planning professionals was consulted in order to determine their perspectives on the emerging issues associated with the sector in an Irish context. The outputs of this consultation process indicated that public and private as well as NGO’s considered the same issues to be of importance to the sector. A largely common view of the key strategic issues for the USSPV sector were advanced. While some differences did exist in terms of devising responses to the assessment, quantification or prominence of certain issues, all envisaged a role for USSPV as a component of Ireland’s transition to low carbon energy sources.

The planning and development recommendations contained in this research are categorised under the headings set out below;

- Forward Planning Recommendations;
- Development Management Recommendations; And
- Legislative and Other Recommendations.

The specific recommendations are outlined below.

6.1 Forward Planning Recommendations

Recommendation No. 1

It is recommended that USSPV energy developments be explicitly referenced in the National Planning Framework as a potential key component of Ireland’s energy transition to a ‘low carbon’ society.

Recommendation No. 2

It is recommended that utility scale solar PV energy developments be explicitly referenced in the Regional Spatial and Economic Strategy for the regional assembly areas as a potential key component of Ireland’s energy transition to a ‘low carbon’ society.

Recommendation No. 3

It is recommended that county development plans set out policy and objectives to support utility scale solar PV energy development and put in place development management standards to control development in line with the recommendations below.

Recommendation No. 4

It is strongly recommended that county development plans do not adopt development policy objectives which unduly restrict USSPV energy development. It is, however, recommended that plans identify the type of location where such development is particularly suited, i.e.

- Rural Brownfield (e.g. cutaway bog);
- Urban Brownfield (e.g. former landfill sites);
- Topographically assimilative landscapes.
- Industrial/Brownfield sites (in urban/rural areas)
- Agricultural Lands;
- Proximity to a 38kv or 110kv substation/line; and
- Areas of low biodiversity value.

Recommendation No. 5

It is recommended that planning authorities do not set out development policy that prioritises the delivery of development of utility scale solar PV on lands with lower agricultural value.

Recommendation No. 6

It is recommended that planning authorities maintain a GIS based database of all utility scale solar PV schemes, together with relevant other schemes, including wind farms to assist in identifying cumulative effects.

6.2 Development Management Recommendations

Recommendation No. 7

It is recommended that developers carry out community consultation in advance of the lodgement of a planning application to describe the benefits and impacts of the scheme and encourage greater understanding of the development in the community.

Recommendation No. 8

It is recommended that the impact on the landscape be addressed using the following key criteria:

- within a defined radius of the proposal under consideration, a plan showing cumulative ‘zones of visual influence’ .
- maps of cumulative zones of visual influence are used to identify appropriate locations for visual impact studies.
- examination of simultaneous visibility assessments ;
- sequential effects on visibility occur when an observer moves through a landscape and sees two or more schemes. Common routes through a landscape (e.g. major roads; long distance paths or cycle routes) can be identified as ‘journey scenarios’ and the proposals impact on them can be assessed;
- photomontages to show all existing and consented solar farms, and those for which planning applications have been submitted, in addition to the proposal under consideration.

- at the most detailed level, description and assessment of cumulative impacts may include the following landscape issues: scale of development in relation to landscape character or designations, sense of distance, existing focal points in the landscape, and sense of remoteness or wildness.
- If necessary to undertake a glint and glare assessment, including cumulative effectiveness of all existing and consented solar farms

Recommendation No. 9

It is recommended that a national standard for the undertaking and assessment of geometric glint and glare assessments is developed, in conjunction with the Department of Housing Planning and Local Government, the Department of Communications, Climate Action and Energy, the solar industry, technical experts and other key stakeholders including the community.

Recommendation No. 10

No specific additional recommendation for planning policy is proposed in relation to screening. Additional screening may be required in specific instances, such as proximity to sensitive visual receptors, such as those found in heritage landscapes or areas with scenic landscape qualities.

Recommendation No. 11

It is recommended that the deployment of utility scale solar PV shouldn't be prohibited in undulating landscapes.

Recommendation No. 12

It is recommended that geophysical assessment of proposed USSPV sites should only take place in areas of archaeological potential. Any application for a USSPV scheme should submit an archaeological assessment predicated on a site walk over and desk research of possible archaeological potential on a subject site.

Recommendation No. 13

It is recommended that no specific set back distances are applied from a utility scale solar PV scheme to particular receptor. However, schemes should be located to ensure that impacts at boundaries and sensitive receptors is within acceptable environmental limits.

Recommendation No. 14

It is recommended that the potential impact on drainage patterns is assessed as part of each planning application for utility scale solar PV.

Recommendation No. 15

It is recommended that the details of the construction stage are sought as a condition of planning permission, other than where they may raise significant matters that influence the planning decision.

Recommendation No. 16

No specific additional recommendation for planning policy is proposed in relation to site management, operation and maintenance.

Recommendation No. 17

No specific additional recommendation for planning policy is proposed in relation to security.

Recommendation No. 18

It is recommended that a decommissioning statement be included as a standard component of a planning application for utility scale solar PV.

Recommendation No. 19

It is recommended that the planning permission includes a condition permitting the installation of higher efficiency panels (repowering) during the lifetime of a grant of planning permission, so long as the physical characteristics or the planning impacts of the development are not materially different from the original (i.e. reflectivity, sun path tracking etc).

6.3 Other Recommendations**Recommendation No. 20**

It is recommended that the Planning and Development Acts and associated regulations should not be amended to include a separate category for mandatory EIA for utility scale solar PV development.

Consideration of the need for EIA should continue to be determined on a case-by-case basis with reference to the requirements of Annex III of the EIA Directive.

Recommendation No. 21

It is recommended that the potential role of utility scale solar PV in meeting Ireland's renewable energy requirements is considered through a consideration of its appropriateness as a class of Strategic Infrastructure Development.

Recommendation No. 22

It is recommended that the Department of Housing, Planning and Local Government consider extending the exempted development threshold for roof mounted solar PV on commercial, office and industrial buildings up to 500kw systems.

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Appendix A: Planning Pipeline

Planning Ref	Local Authority	Applicant	Development Address	Application Date	Site Area (Hectares)	Capacity of Scheme (MW)	Estimated Generating Capacity (MW)	Planning Status	Comment
16289	Carlow County Council	Elgin Energy Services	Kilcarrig, Bagenalstown, Co Carlow	26/9/2016	14.0	-	6.1	Decision Pending	
15314	Carlow County Council	Farm Power Generation	Coppenagh, Tullow, Co. Carlow	21/10/2015	12.1	-	5.3	Deemed Withdrawn	FI requested in December 2015, time elapsed for response.
15315	Carlow County Council	Nolan PV Ltd.	Friarstown, Tullow, Co Carlow	21/10/2015	12.6	-	5.5	Deemed Withdrawn	FI requested in December 2015, time elapsed for response.
16708	Clare County Council	ReeveWave Limited	Dough, Lisdeen, Termon west, Killkee, Co. Clare	12/9/2016	15.9	-	6.9	Decision Pending	
16654	Clare County Council	ReeveWave Limited	Knockanulty, Ennistymon, Co. Clare	22/8/2016	15.4	-	6.7	Decision Pending	43,500m2 of solar panels.
16368	Clare County Council	Terra Solar Limited	Ballymorris, Co. Clare	9/5/2016	12.2	-	5.3	Further Information (FI)	
166302	Cork County Council	Temporis Ltd	Tead More, Ballynacorra, Middleton, Co. Cork	16/6/2016	10.3	-	4.5	Decision Pending	
164290	Cork County Council	Amarenco Solar Ballinvarrig Limited	Ballinvarrig East, Castletyons, Co. Cork	12/2/2016	8.6	5.0	-	Refused (Local Authority)	Refused by local authority on ground of access (road) (06/04/2016).
156625	Cork County Council	Amarenco Solar Inniscarra Limited	Curraleigh, Inniscarra, Co. Cork	20/11/2015	10.5	5.0	-	Granted (Local Authority)	Granted (01/04/2016)
156675	Cork County Council	Amarenco Solar Kilmoney Limited	Shanagraigue, Carrigaline, Co. Cork	25/11/2015	10.2	5.0	-	Granted (Local Authority)	Granted (04/03/2016)
164570	Cork County Council	Amarenco Solar Rathcormac Limited	Carrin/Kill-Saint-Anne-North, Castletyons, Fermoy, County Cork	11/3/2016	8.7	5.0	-	Further Information (FI)	
156968	Cork County Council	Amarenco Solar Timoleague Limited	Kilshinahan, Timoleague, Co. Cork	23/12/2015	8.6	5.0	-	Granted (Local Authority)	Granted (03/05/2016)
164185	Cork County Council	Amarenco Solar Whitechurch Limited	Diomgarraff South, Whitechurch, Co. Cork	3/2/2016	10.2	5.0	-	Further Information (FI)	
165284	Cork County Council	Amarenco Solar Ballinvarrig Limited	Ballinvarrig East, Castletyons, Co. Cork	27/5/2016	8.9	5.0	-	Invalidated	
165414	Cork County Council	Amarenco Solar Ballinvarrig Limited	Ballinvarrig East, Castletyons, Co. Cork	10/6/2016	8.9	5.0	-	Further Information (FI)	New application on site where application ref. 164290 was refused.
164783	Cork County Council	Amarenco Solar Beal na mBlath	Curraheha, Crookstown, Co. Cork	8/4/2016	8.5	5.0	-	Further Information (FI)	
156768	Cork County Council	Amarenco Solar Cloyne Limited	Commons East, Cloyne, Middleton, Co. Cork	8/12/2015	11.8	5.0	-	Further Information (FI)	
156814	Cork County Council	Amarenco Solar Cobh Limited	Ballynacrusa, Cobh, Co. Cork	11/12/2015	9.5	5.0	-	Further Information (FI)	
164601	Cork County Council	Amarenco Solar Kanturk Limited	Diomalour, Coolcloagh, Kanturk, County Cork	16/3/2016	12.2	5.0	-	Further Information (FI)	
157003	Cork County Council	Amarenco Solar Mallow Limited	Gortnagross, Mallow, Co. Cork	23/12/2015	15.4	5.0	-	Granted (Local Authority)	Granted (07/06/2016)
164204	Cork County Council	Green Mills Energy Ltd.	Farrangalway, Knocknahilan, Mullandunmy, Kinsale, Co.Cork	5/2/2016	13.0	5.0	-	Further Information (FI)	20,000 solar panels
165269	Cork County Council	IQ Solar Limited	Crocane Windfarm, Crocane, Cloyne, Co. Cork	25/5/2016	13.9	5.7	-	Further Information (FI)	
164578	Cork County Council	Meridlem Renewables Mohera	Mohera, Castletyons, Fermoy, County Cork	14/3/2016	11.0	5.0	-	Further Information (FI)	
164411	Cork County Council	Premier Solar Ltd	Derrycloagh Upper and Lahanaght, Drinagh, Co. Cork	7/7/2016	14.1	5.0	-	Further Information (FI)	
16363	Cork County Council	Premier Solar Ltd	Derrycloagh Upper and Lahanaght, Drinagh, Co. Cork	9/6/2016	14.1	5.0	-	Invalidated	
165455	Cork County Council	ReeveWave Limited	Carragraigue, Tathcool, Co. Cork	15/6/2016	15.3	-	6.7	Further Information (FI)	
155424	Cork County Council	Trainman Ltd	Knockglass & Kilberriert, Coachford, County Cork	30/6/2015	11.2	5.0	-	Granted (An Bord Pleanála)	Appealed to ABP on 07/12/2016. Case was due to be decided by 17/05/2016. Decision to grant made on 16/06/2016.
F16A/0369	Fingal County Council	Solas Éireann Development Ltd.	Matt, Balbriggan, Co. Dublin	26/8/2016	10.8	6.0	-	Decision Pending	
F16A/0105	Fingal County Council	Solerricity Ballykea Ltd.	Featherbed Lane, Ballykea, Loughshinny, Co. Dublin.	16/3/2016	10.1	5.0	-	Further Information (FI)	
16259	Galway County Council	Templederry Energy Resources Limited	Barnaderg, Co. Galway	4/3/2016	11.8	-	5.1	Further Information (FI)	40,000 square metres of solar photovoltaic panels.

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16201	Kerry County Council	Noel & Mary Doyle	Rnague, Kilorglin, Co. Kerry	3/3/2016	10.2	5.0	-	Granted (Local Authority)	Granted (22/08/2016)
16689	Kerry County Council	Terra Solar Limited	Coolcorcoran and Coolgarriv, Killarney, Co. Kerry	14/7/2016	12.8	-	5.6	Invalidated	
16576	Kerry County Council	Terra Solar Limited	Coolcorcoran and Coolgarriv, Killarney, Co. Kerry	28/6/2016	12.8	-	5.6	Invalidated	36,000 square metres of solar panels.
16629	Kerry County Council	Terra Solar Limited	Trienearagh, Duagh, Co. Kerry	14/6/2016	8.8	-	3.8	Further Information (FI)	20,113 square metres of solar panels.
18866	Kerry County Council	Terra Solar Limited	Ballygrenane, Co. Kerry	12/9/2016	12.1	-	5.3	Decision Pending	
151172	Kildare County Council	Robert Wildon Wright	Coolcarrigan, Timahoe West, Co. Kildare	22/12/2015	17.8	10.0	-	Granted (Local Authority)	Granted (28/07/2014)
16848	Kildare County Council	Solas Eireann Development Limited	Confey, Leixlip, Co. Kildare	11/8/2016	16.9	10.0	-	Decision Pending	
16809	Kildare County Council	Solas Eireann Development Limited	North of the L1015 Road, Confey, Leixlip, Co. Kildare	2/8/2016	16.9	10.0	-	Invalidated	
16777	Kildare County Council	Solas Eireann Development Limited	North of the L1015 Road, Confey, Leixlip, Co. Kildare	20/7/2016	12.1	7.8	-	Decision Pending	
16634	Kilkenny County Council	Elgin Energy Services	Keatingstown, Co. Kilkenny	26/9/2016	14.0	-	6.1	Decision Pending	
15795	Kilkenny County Council	Elgin Energy Services	Grange Lower, Goresbridge, Co. Kilkenny	18/12/2015	11.3	4.0	-	Invalidated	
161	Kilkenny County Council	Elgin Energy Services	Grange Lower, Goresbridge, Co. Kilkenny	5/3/2016	11.3	4.0	-	Granted (Local Authority)	Decision made 14/04/2016
16310	Kilkenny County Council	Elgin Energy Services	Kiltorcan and Ballyhale, Co. Kilkenny	16/5/2016	10.0	4.2	-	Granted (Local Authority)	Decision made 15/09/2016
16419	Kilkenny County Council	Highfield Solar Limited	Derrynahinch, Knocktopher, Co. Kilkenny	29/6/2016	10.6	-	4.6	Invalidated	
16445	Kilkenny County Council	Highfield Solar Limited	Derrynahinch, Knocktopher, Co. Kilkenny	6/7/2016	10.6	-	4.6	Further Information (FI)	
16228	Kilkenny County Council	Highfield Solar Limited	Gorteens, Belview, Co. Kilkenny	19/04/2016	21.9	-	9.5	Refused (Local Authority)	First party vs refusal lodged to An Bord Pleanala, 07/07/2016.
16276	Kilkenny County Council	Power Capital Renewable Energy	Loan, Castlecomer, Co. Kilkenny	5/6/2016	13.5	5.0	-	Further Information (FI)	
16411	Kilkenny County Council	Power Capital Renewable Energy	Grange Lower, Goresbridge, Co. Kilkenny	24/6/2016	17.2	-	7.5	Further Information (FI)	Site area estimate developed through GIS
16193	Kilkenny County Council	Wexford Solar Power	Curraghmartin, Carrigeen, Co. Kilkenny	1/4/2016	8.1	4.0	-	Further Information (FI)	
16217	Laois County Council	Elgin Energy Services	Derry More, Mountrath, Co. Laois	11/5/2016	12.5	4.2	-	Further Information (FI)	Natura Impact Statement Requested
16619	Limerick City and County Council	JBM Solar Developments Ltd	Dungeeha, Newcastle West, Co. Limerick	8/7/2016	26.6	11.5	-	Further Information (FI)	
16900	Limerick City and County Council	Rengen Technologies Ltd	Grange Upper, Annacotty, Co. Limerick	26/9/2016	12.1	-	5.3	Decision Pending	
16805	Limerick City and County Council	Rengen Technologies Ltd	Ballyvarra, Lisnagry, Co. Limerick	2/9/2016	12.1	-	5.3	Invalidated	
1681	Longford County Council	Elgin Energy Services	Lisnageeragh, Edgeworthstown, Co. Longford	15/04/2016	14.6	4.2	-	Granted (Local Authority)	Decision made 09/06/2016. 3rd Party vs. Grant Appeal to An Bord Pleanala 05/07/2016
16524	Louth County Council	Wexford Solar	Willville, Dundalk, Co. Louth	29/7/2016	10.1	4.0	-	Further Information (FI)	
LB161046	Meath County Council	Renewable Energy Systems (RES Ltd.)	Dardistown, Julianstown, Co. Meath	26/9/2016	10.3	-	4.5	Decision Pending	
LB160998	Meath County Council	Solar Farmers Ltd	Julianstown East, Julianstown West and, Ninch, Co. Meath	13/9/2016	42.6	20.0	-	Decision Pending	
AA160553	Meath County Council	Bullstown Solar Limited	Bullstown, Donaghmore, Ashbourne, Co. Meath	1/6/2016	17.5	-	7.6	Further information (FI)	
KA160625	Meath County Council	Elgin Energy Services Limited	Oldtully, Oldcastle, Co. Meath	15/6/2016	12.4	-	5.4	Decision Pending	
LB160898	Meath County Council	Highfield Solar Limited	Garballagh, Thomastown, Gillinstown and Downestown, Duleek, Co. Meath	16/8/2016	150.3	-	65.3	Decision Pending	Expected MEC is projected to be between 60-75MW
LB160927	Meath County Council	JBM Solar Developments Limited	Grangegeeth, Slane, Co. Meath	25/8/2016	11.0	-	4.8	Decision Pending	

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L8160889	Meath County Council	Renewable Energy Systems (RES Ltd.)	Dardistown, Julianstown, Co. Meath	15/8/2016	10.3	-	4.5	Invalidated	
AA160519	Meath County Council	Wexford Solar Limited	Kilbreckstown, Stamullen, Co. Meath	25/5/2016	9.9	4.0		Granted (Local Authority)	
16246	Offaly County Council	Highfield Solar Limited	Clonin, Rhode, Co. Offaly	9/8/2016	96.6	-	42.0	Decision Pending	
16199	Offaly County Council	Highfield Solar Limited	Clonin, Rhode, Co. Offaly	20/6/2016	96.6	-	42.0	Invalidated	
16176	Offaly County Council	Highfield Solar Limited	Clonin, Rhode, Co. Offaly	8/6/2016	96.6	-	42.0	Invalidated	
16113	Offaly County Council	HTS Source Renewable Partners Ltd.	Lehinch, Clara, Co. Offaly	25/04/2016	15.0	5.0	-	Further Information (FI)	
16277	Roscommon County Council	Elgin Energy Services	Rathleg, Castlereagh, Co. Roscommon	4/7/2016	N/A	4.2	-	Decision Pending	
16600359	Tipperary County Council	Elgin Energy Services	Ballynillard, Tipperary, Co. Tipperary	22/04/2016	10.8	4.2	-	Further Information (FI)	
16600484	Tipperary County Council	Elgin Energy Services	Lisnagonoge & Commons, Thurles	26/05/2016	11.2	4.2	-	Further Information (FI)	
15601002	Tipperary County Council	John Fogarty	Lisbrien, Nenagh, Co. Tipperary	27/11/2015	10.0	5.0	-	Deemed Withdrawn	FI requested in January 2016, time elapsed for response.
16600565	Tipperary County Council	Lightsource Renewable Energy Ireland Limited	Monaraha, Cahir, Co. Tipperary	20/6/2016	33.3	19.1	-	Further Information (FI)	
16600642	Tipperary County Council	ReeveWave Limited	Monroe East, Ardfinnan, Clonmel, Co. Tipperary	6/7/2016	14.6	5.9	-	Further Information (FI)	
16600465	Tipperary County Council	Solar Sense Ltd	Loughloher, Cahir, Co. Tipperary	20/5/2016	13.3	-	5.8	Granted (Local Authority)	Decision granted (26/09/2016)
16600640	Tipperary County Council	Solar Sense Ltd	Ballynagrana and Deeparklodge, Carrick-on-Suir, Co. Tipperary	7/7/2016	13.4	-	5.8	Further Information (FI)	
16600170	Tipperary County Council	Templederry Energy Resources Limited	Moyneard, Moyne, Co. Tipperary	4/3/2016	9.6	-	4.2	Further Information (FI)	10 Year Planning Permission.
16600136	Tipperary County Council	Trevor Armitage	Lacka, Carrig, Birr, Co Offaly	24/2/2016	9.6	4.0	-	Granted (Local Authority)	Decision made 19/07/2016
15614	Waterford City and County Council	Amarengo Solar Kilcannon Ltd.	Kilcannon, Cappagh, Dungarvan, Co. Waterford	30/10/2015	10.9	5.0	-	Granted (Local Authority)	
16309	Waterford City and County Council	Highfield Solar Limited	Amberhill, Kilmeaden, Co. Waterford	10/5/2016	11.5	5.4	-	Further Information (FI)	10 Year Planning Permission.
16126	Waterford City and County Council	Highfield Solar Limited	Drumroe, Cappaquin, Co. Waterford	1/3/2016	28.8	-	12.5	Granted (Local Authority)	Decision made (05/06/2016). 3rd Party vs Grant Appeal to An Bord Pleanala on the 12/07/2016
16548	Waterford City and County Council	Highfield Solar Limited	Clashganny and Coolroe, Portlaoise, Co. Waterford	19/8/2016	26.5	-	10.0	Decision Pending	
16371	Waterford City and County Council	Highfield Solar Limited	Ballymoodranagh, Lismore, Co. Waterford	3/6/2016	12.6	-	5.5	Further Information (FI)	10 Year Planning Permission.
15770	Waterford City and County Council	Tornado Electric Ltd	Pickardstown, Tramore, Co. Waterford	30/12/2015	12.0	5.0	-	Granted (Local Authority)	3rd party vs. Grant Appeal to ABP on the 26/09/2016 (Ref: PL93 247310)
166184	Westmeath County Council	Thomas Flynn	Newdown, The Downs, Mullingar, Co. Westmeath	26/7/2016	9.3	5.0	-	Further Information (FI)	
20160644	Wexford County Council	Arena Capital Partners	Ballykieren, Rosslare, Co. Wexford	10/6/2016	22.8	11.0	-	Granted (Local Authority)	Granted (22/07/2016)
20160487	Wexford County Council	Davidstown Renewables Limited	Davidstown, The Leap, Co. Wexford	10/5/2016	10.3	5.0	-	Granted (Local Authority)	Granted (29/06/2016)
20160793	Wexford County Council	Harmony Solar Ralphtown Limited	Newtown Big & Ralphtown & Muchtown, Kilcowan, Co. Wexford	12/7/2016	31.3	-	13.6	Invalidated	88,600 m2 of solar panels
20160811	Wexford County Council	Harmony Solar Ralphtown Limited	Newtown Big & Ralphtown & Muchtown, Kilcowan, Co. Wexford	15/7/2016	31.3	-	13.6	Refused (Local Authority)	Decision to refuse development made on 07/09/2016. Reasons for refusal: 1. Glint and Glare (Residential), 2. Glint and Glare (Roads)
20160690	Wexford County Council	Highfield Solar Limited	Ballyminaun, Grahormick, Hilltown, Jonastown, Newhouse, Gibboghstown, and Garryh, Co. Wexford	17/6/2016	89.5	-	38.9	Refused (Local Authority)	First Party VS. Refusal appeal to An Bord Pleanala (Ref: PL 26.247217)
20160207	Wexford County Council	Highfield Solar Limited	Sweetsfarm & St. Johns, Enniscorthy, Co. Wexford	3/3/2016	7.5	-	3.3	Granted (Local Authority)	Granted (20/07/2016)
20160717	Wexford County Council	Highfield Solar Limited	Tomfarney, Clonroche, Co. Wexford	24/6/2016	19.9	12.0	-	Refused (Local Authority)	First Party VS. Refusal appeal to An Bord Pleanala (Ref: PL 26.247179)
20160689	Wexford County Council	Highfield Solar Limited	Monfin, Enniscorthy, Co. Wexford	17/6/2016	12.7	-	5.5	Refused (Local Authority)	First Party VS. Refusal appeal to An Bord Pleanala (Ref: PL 26.247176)

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20160443	Wexford County Council	Highfield Solar Limited	Crosstown, Gibboghstown, Garryhack, Newhouse, Hilltown, Jonastown, Grahormick and Ballymaunum Big, Killnick, Co. Wexford.	29/4/2016	89.8	-	39.1	Invalidated	
20160442	Wexford County Council	Highfield Solar Limited	Ballymackesy, Clonroche, Co. Wexford	29/4/2016	12.7	-	5.5	Granted (Local Authority)	Granted (22/06/2016)
20160009	Wexford County Council	John Hore	Ballycarran, Rosslare, Co. Wexford	8/3/2016	10.0	4.0	-	Granted (Local Authority)	Granted (26/02/2016)
20160424	Wexford County Council	Power Capital	Ballygoman, Carrick, Co. Wexford	27/4/2016	11.7	5.0	-	Invalidated	
20160594	Wexford County Council	Power Capital	Ballycarney, Ballycarney, Co. Wexford	31/5/2016	12.9	5.0	-	Granted (Local Authority)	Granted (20/07/2016)
20160596	Wexford County Council	Power Capital	Ballygoman, Carrick, Co. Wexford	31/5/2016	11.7	5.0	-	Refused (Local Authority)	Refused (23/07/2016)
20160424	Wexford County Council	Power Capital	Ballygoman, Carrick, Co. Wexford	27/4/2016	11.7	5.0	-	Invalidated	
20160595	Wexford County Council	Power Capital	Ballycarney, Ballycarney, Co. Wexford	31/5/2016	10.8	5.0	-	Granted (Local Authority)	Granted (20/07/2016)
20140392	Wexford County Council	Sarah O'Flaherty	Coolroe, Tintern, Co. Wexford	28/8/2015	10.0	5.0	-	Granted (An Bord Pleanala)	Local Authority grant of permission was appealed by a Third Party
20160520	Wexford County Council	Wexford Solar Power	Ballycarran, Rosslare, Co. Wexford	17/5/2016	10.0	4.0	-	Granted (Local Authority)	Granted (16/08/2016)
16664	Wicklow County Council	Ashley Bourne	Golden Fort, Baltinglass, Co. Wicklow	14/6/2016	0.4	0.5	-	Further Information (FI)	
16176	Wicklow County Council	Highfield Solar Ltd	Ballycooleen, Avoca, Co. Wicklow	19/2/2016	13.8	-	6.0	Granted (An Bord Pleanala)	Refused local authority (06/04/2016). Appealed to An Bord Pleanala on 03/05/2016. Permission was granted on 18/08/2016.
16847	Wicklow County Council	Solas Eireann Development Limited	(lands south of N81), Threecastles, Talbotstown Lower, Blessington, Co. Wicklow	28/7/2016	30.1	19.0	-	Invalidated	
16887	Wicklow County Council	Solas Eireann Development Limited	(land south of the N81 road) at Threecastles, Talbotstown Lower, Blessington, Co. Wicklow	10/8/2016	30.1	19.0	-	Invalidated	
16307	Wicklow County Council	Today's Generation Ltd	Kiltimon, Newtownmount-kennedy, Co. Wicklow	24/3/2016	1.9	-	0.8	Further Information (FI)	3,041 m2 of solar panels
161082	Wicklow County Council	Liam Shanahan	Grange North, Newcastle, Co. Wicklow	30/09/2016	14.3	-	6.2	Decision Pending	
161060	Wicklow County Council	Solas Eireann Development Ltd	Threecastles, Talbotstown Lower, Blessington, Co. Wicklow	23/09/2016	30.1	19.0	-	Decision Pending	
				Total Valid	1313.9	315.1	278.6		
				Total Invalid/Withdrawn/Refused	716	99	231		
				Total (All)	2029.9	414.1	509.5		

Appendix B: Project Consultation/Discussion Document



Document Information	
Title:	Planning and Development Guidance Recommendations for Utility Scale Solar Photovoltaic Schemes in Ireland: Consultation Document
Prepared by:	Stephen Walsh
Reviewed by:	William Hynes, Stephen Purcell
Release*:	RE
Due date:	07/09/2016



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Introduction

At present, there is no specific planning policy guidance for utility scale solar energy development in an Irish context. A lack of specific planning policy for this sector constitutes a risk to planning authorities, the development sector. Planning policy for the assessment of large solar energy schemes in urban and rural environments may “*de-risk*” the planning process for developers and enable planning authorities to assess the merits of development proposals submitted.

This research project will deliver one key deliverable:

- Recommendations which will hopefully inform the basis of Section 28 (Planning and Development Act 2000 [as amended]) planning guidance for solar energy development in urban and rural areas.

The absence of guidance is an issue for planning authorities and the development sector and local communities, as it introduces uncertainty into the manner in which solar energy schemes will be considered with reference to a number of emerging areas of concern as identified in Walsh, 2016¹. These [non-exhaustive] areas are:

- Glint and Glare;
- Perceived Property Devaluation;
- Planning Implications of Co-locating solar with other Renewable Energy Technologies (i.e. wind energy);
- Perceived Loss of Agricultural Land;
- Visual Impact and Landscape Character Influence; and
- Planning Authority Conditions.

The draft recommendations and discussion points contained herein are structured around two key areas. The **development impacts and procedural matters** associated with the deployment of utility scale ground mounted solar PV. Notwithstanding the aforementioned categorisation, it is acknowledged from the outset that there may be a degree of overlap between the recommendations for planning practice. Where overlap occurs, the final set of recommendations for guidance will strive to ensure that any potential overlaps will contribute to the creation of an integrated and holistic set of planning guidance recommendations which will facilitate the growth of the utility scale solar energy sector in an Irish context

There is a significant divergence of opinions within international literature and industry publications as to the threshold of solar PV deployment which would constitute “utility scale”. For the purposes of this research and having regard to the size and scale of solar PV schemes in the planning pipeline in Ireland, the US National Renewable Energy Laboratory’s² definition of “utility scale” as being upward of 5 megawatts (MW) has been adopted.

¹ Walsh, S (2016) “Emerging Issues in Planning: Objections to Solar PV schemes of scale in Ireland” Available via: https://thewonk.eu/reports/planning-objections-to-solar-pv-schemes-of-scale-in-ireland_r1147.html

² NREL (2012) “Utility-Scale Concentrating Solar Power and Photovoltaics Projects: A Technology and Market Overview” Available via: <http://www.nrel.gov/docs/fy12osti/51137.pdf>

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Development Impacts

The deployment of renewable energy technology in any context results in a series of development impacts. The impacts of each renewable energy technology can be quite distinctive, tied in part to the nature of the technology concerned, the location in which it is sited as well as myriad of other contextual factors.

This section will explore some of the development impacts of utility scale ground mounted solar in order to provoke a discussion around the manner in which both the developer sector and planning practitioners can work towards the creation of schemes which align with the concepts of proper planning and sustainable development.

Recommendation Area: Glint and Glare Assessment

It is clear from the support documentation that there is a broad spectrum of approaches being taken toward the assessment of Glint and Glare from utility scale solar energy projects. It is also clear that a significant number of Requests for Further Information (RFI) are being issued by Planning Authorities seeking further information on sensitive receptors (residential units/roads) within proximity of the proposed development.

Responding to the above and in line with international research on the quantification of this development impact (most notably by the aviation sector), the following methodologies for the assessment of glint and glare are being put forward as a standardised means of presenting the potential glint and glare impact of a solar energy scheme.

Assessing Baseline Reflectivity Conditions

Existing sources of glare come from glass windows, car parking, rooftops/skylights, and water bodies. Conditions in the receiving environment of a proposed development may create conditions conducive to causing glare should be assessed in order to determine that the location of the proposed solar PV installation may not unduly contribute additional glare to sensitive receptors at certain times of the year. This form of assessment could form part of an environmental assessment in terms of exploring the possibility of development impacts affecting avian populations, particularly if schemes are located near water bodies.

Tests in the Field

Potential glare from solar panels can be assessed relatively quickly through a field test. In the US, a number of airports have coordinated such field tests with the FAA Air Traffic Control Personnel to assess the significance of glare impacts. The test consists of taking a solar panel out to the proposed location of the solar project and tilting the panel in different directions to generate various levels of glare onto the air traffic control tower. For the two known cases where such a field test was conducted, the tower personnel determined that the effect of the glare produced by the solar panels was not significant. Adopting this approach in an Irish context might entail the developer assessing the impact of glare from sensitive receptors in the landscape by orientating solar panels on the receiving site as they would be constructed if granted planning permission.

Geometric Analysis

Geometric studies are the most technical (and effective) approach for reflectivity issues that are difficult to assess. Studies of glare can employ geometry and the known path of the sun to predict when sunlight will reflect off of a fixed surface (like a solar panel) and contact a fixed receptor (e.g., a residential dwelling). At any given site, the sun not only moves across the sky every day, but its path in the sky

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changes during various times of year. This in turn alters the destination of the resultant reflections since the angle of reflection for the solar panels will be the same as the angle at which the sun hits the panels. The larger the reflective surface, the greater the likelihood of glare impacts. In the case of 'trackers', the area liable for assessment increases in line with angles of traverse.

- Which is the most appropriate model for glint and glare assessment in an Irish context?

Recommendation Area: Drainage

Due to the increasing frequency of weather events beyond climatic norms (most often associated with climate change), it is necessary to explore measures which can be put in place to facilitate the effective management of drainage on the proposed site. In terms of drainage, soil condition of the subject site should be considered in terms of calculating predevelopment run off volumes.

Construction Phase

What mitigation measures are envisaged as being necessary to preclude silt laden run off from the site (as illustrated by examples figure 1 below)



Figure 1 Construction Related Soil Impact

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Operational Phase



Figure 2. Ploughing & Run Off Experiment

Research presented to the British Hydrological Society in 2014 indicated that *chisel ploughing* the site on construction would be the most effective means for reducing run off volumes³. The research was undertaken by the United Kingdom Environment Agency. The run off volumes outlined below were calculated on the basis of 25mm of rain in 24 hours on a plot size of 10 x 4.5m. Should this method of land management be utilised in order to facilitate the enhancement of the retention of rainfall within a proposed site?

Unlike the rainfall pattern in many other countries, especially in the tropics, average hourly rainfall amounts in Ireland are quite low, ranging from 1 to 2mm. Short-term rates can of course be much higher: for example, an hourly total of 10mm is not uncommon and totals of 15 to 20mm in an hour may be expected to occur once in 5 years. Precise rainfall returns on a site specific basis can be acquired from Met Éireann. Some research has been undertaken into the effects of run off from solar arrays to ground. Kinetic compaction and the formation of rivulets in the soil beneath solar arrays. Figure 3, right, illustrates this phenomenon.



Figure 3 Kinetic Compaction & Rivulets

Does this require mitigation measures to counteract such drainage patterns?

It is also proposed that existing field tracks in the site be utilised to service the development. Is it necessary for local drainage/SUDS measures to be employed to service this infrastructure?

Decommissioning

Are there any post decommissioning drainage implications arising from the return of a former solar scheme to its previous use?

Recommendation Area: Landscape

The deployment of solar energy technology at utility scale has the potential to impact the landscape. Correspondingly, there is a need to ensure that the impact of the proposed development is minimised. The following items below outline some of the measures which may be employed in order to facilitate the above.

³ Burch et al (2014) "Impact of solar parks on runoff generation and associated land drainage/flood risk consequences" Available via: www.hydrology.org.uk/dms-files.php?id=929&action=doc

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Topography

Should the location of solar PV schemes in landscapes with undulating characteristics be discouraged if insufficient screening potential exists to mitigate the visual impact of the development?

Cumulative Assessment

Potential information required for cumulative assessment;

- **a base plan of all existing solar farms, consented developments and applications received**, showing all schemes within a defined radius of the centre of the proposal under consideration;
- **for those existing or proposed solar farms** within a defined radius of the proposal under consideration, **a plan showing cumulative 'zones of visual influence'**. (A zone of visual influence is the area from which a development or other structure is theoretically visible). The aim of the plan should be to clearly identify the zone of visual influence of each solar farm, and those areas from where one or more solar farms are likely to be seen;
- the base plan and plan of cumulative zones of visual influence will need to **reflect local circumstances**, for example, the areas covered should take into account the extent to which **factors such as the topography and the likely visibility of proposals in prevailing meteorological conditions** may vary;
- maps of cumulative zones of visual influence are used to **identify appropriate locations for visual impact studies**. These include locations for simultaneous visibility assessments (i.e. **where two or more schemes are visible from a fixed viewpoint without the need for an observer to turn their head, and repetitive visibility assessments** (i.e. where the observer is able to see two or more schemes but only if they turn around));
- sequential effects on visibility occur when an observer moves through a landscape and sees two or more schemes. Common routes through a landscape (e.g. major roads; long distance paths or cycle routes) can be identified as **'journey scenarios'** and the proposals impact on them can be assessed;
- **photomontages showing all existing and consented solar farms, and those for which planning applications have been submitted**, in addition to the proposal under consideration. The viewpoints used could be those identified using the maps of cumulative zones of visual influence. The **photomontages could be annotated to include the dimensions of the existing arrays**, the distance from the viewpoint to the different schemes, the arc of view and the format and focal length of the camera used; and
- at the most detailed level, description and assessment of cumulative impacts may include the following landscape issues: scale of development in relation to **landscape character or designations**, sense of distance, existing focal points in the landscape, and sense of remoteness or wildness.
- It may be necessary to undertake a **glint and glare assessment on all existing and consented solar farms**, and those for which planning applications have been submitted, in addition to the proposal under consideration in order to determine the cumulative impact of this form of development.

Is there anything in addition to the above that should be considered in assessing the cumulative impact of solar energy development?

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Screening

In addition to the above, it is considered that the characteristics of this technology enable it to be effectively screened to a certain degree, predicated on the nature of the proposed site. It is current practice that any screening measures that involve the planting of additional elements (such as trees), are orientated in a manner which mitigates the potential impact of glint and glare. Existing hedges and established vegetation, including mature trees, should be retained wherever possible. Trees and hedges should be protected during construction. The impact of the proposed development on established trees and hedges could be informed by a tree survey.

When planting additional vegetation, prioritisation should be afforded to the use of native species of vegetation.

Recommendation Area: Heritage/Archaeological Impacts

At preplanning stage, the planning authority should identify if there is a need to undertake an archaeological assessment based on known areas of archaeological potential.

Applicants should clearly indicate the layout of ground works in circumstances where the subject site is in proximity to areas of archaeological interest. This approach will enable decision makers at local authority and An Bord Pleanála level to determine if the foundation structure have the potential to negatively impact subsurface archaeological remains.

Exploratory works to determine if there are archaeological remains present should be conditioned in a grant of permission for the scheme. Where necessary, by virtue of the proximity of a proposed development to national monuments, the undertaking of a geophysical survey should be considered as grounds for the issuing of an RFI.

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Procedural Matters

This section will explore a number of the procedural implications associated with the deployment of utility scale solar PV schemes.

Recommendation Area: Planning Policy

Should national, regional & county level plans and renewable energy strategies policy make explicit reference to the role which solar energy technology will play in the powering Ireland's energy transition? At present, a lack of planning policy recognition is being reflected in a sample of objections to solar PV schemes currently in the Irish planning pipeline.

Recommendation Area: Land Use Policy

Should County Development Plans designate lands which are suitable of solar PV deployment within their functional areas?

Avoidance of areas of outstanding natural beauty and environmental sensitivity should be prioritised. The location of solar PV development on vacant brownfield lands in urban, peri-rural and rural areas should be actively encouraged as this would constitute the efficient use of a finite natural resource. In addition, a common ground for objection to solar PV infrastructure in an Irish context at present relates to the perceived loss of "good quality" agricultural land to this form of development. In other jurisdictions, a number of development constraints are placed on the development of solar PV on "high quality" agricultural lands.

Should a similar prohibition be introduced in an Irish context?

An indicative model could possibly entail the application of a sequential test illustrating that the applicant has made efforts to acquire more marginal lands in areas in proximity to grid connections etc.

Recommendation Area: Co Location of Wind and Solar Energy Technologies

Research from a number of sources indicates that solar PV and wind energy generation complement each other. Due to climatic factors, high wind speeds and peak solar irradiance seldom occur at the same time. Should planning policy and practice promote the colocation of wind and solar energy infrastructure?

Are there constraints associated with the colocation of wind and solar PV technologies?

Recommendation Area: Set Back Distances

With regard to set back distances applied by planning authorities to date, it is considered that there is a need to establish a minimum set back distance which is grounded within an evidence based consideration of the practical effects associated with the deployment of utility scale ground mounted solar PV.

What are the reasons needed to apply a setback distance for this form of development?

Should a larger distance be implemented if a residential property adjoins a solar PV scheme?

Recommendation Area: Decommissioning

The components of a solar PV arrays are largely recyclable. A number of planning permissions granted to date in an Irish context specify a fixed lifespan for the operation of the development. With reference to international research and given the nature of the components, is it appropriate for planning

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conditions in relation to the decommissioning of solar PV arrays to specify that the recycling of all components capable of being reused is undertaken by the operator⁴.

Recommendation Area: Environmental Impact Assessment

Consultation Questions

- What should a mandatory threshold be? e.g. Beyond a certain size/maximum generating/export capacity?
- A common interpretation of the EIA Directive states that the closest attributable category which utility scale solar PV schemes align with is set out below;
*Annex 1 "Thermal power stations and other combustion installations with a heat output of 300 megawatts or more"*⁵. For comparability, the Hellisheidarvirkjun (or Hellisheidi) combined heat and power plant (CHP) in Iceland produces 303MW in power and has an estimated site area of 20 hectares.
- Does an interrogation of the elements below indicate where thresholds could/should be applied in terms of triggering the requirement for EIA?
- What are the important considerations for devising a triggering threshold for solar PV scheme and EIA?

Characteristics of projects

The characteristics of projects must be considered, with particular regard to:

- (a) the size and design of the whole project;*
- (b) cumulation with other existing and/or approved projects;*
- (c) the use of natural resources, in particular land, soil, water and biodiversity;*
- (d) the production of waste;*
- (e) pollution and nuisances;*
- (f) the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge; and*
- (g) the risks to human health (for example due to water contamination or air pollution).*

Location of projects The environmental sensitivity of geographical areas likely to be affected by projects must be considered, with particular regard to:

- (a) the existing and approved land use;*
- (b) the relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and its underground;*

⁴ According to Sniderman 2012, more than 90 percent of a PV module can be recycled at the end of its productive life. Where a solar panels contain components which are hazardous, disposal of the decommissioned panel should take place in line with the pertinent environmental standards.

⁵ <http://www.pleanala.ie/casenum/244351.htm>

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(c) the absorption capacity of the natural environment, paying particular attention to the following areas:

- (i) wetlands, riparian areas, river mouths;*
- (ii) coastal zones and the marine environment;*
- (iii) mountain and forest areas;*
- (iv) nature reserves and parks;*
- (v) areas classified or protected under national legislation; Natura 2000 areas designated by Member States pursuant to Directive 92/43/EEC and Directive 2009/147/EC;*
- (vi) areas in which there has already been a failure to meet the environmental quality standards, laid down in Union legislation and relevant to the project, or in which it is considered that there is such a failure;*
- (vii) densely populated areas;*
- (viii) landscapes and sites of historical, cultural or archaeological significance.*

3. Type and characteristics of the potential impact The likely significant effects of projects on the environment must be considered in relation to criteria set out in points 1 and 2 of this Annex, with regard to the impact of the project on the factors specified in Article 3(1), taking into account:

- (a) the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);*
- (b) the nature of the impact;*
- (c) the transboundary nature of the impact;*
- (d) the intensity and complexity of the impact;*
- (e) the probability of the impact;*
- (f) the expected onset, duration, frequency and reversibility of the impact;*
- (g) the cumulation of the impact with the impact of other existing and/or approved projects;*
- (h) the possibility of effectively reducing the impact.*

Site levelling works should be discussed with the local authority and regard should be had to the provisions of the Environmental Impact Assessment (Agriculture) Regulations in terms of the thresholds which trigger the Department of Agriculture Food and Marine's screening process for EIA.

Recommendation Area: Strategic Infrastructure Development (SID) Threshold

The current SID threshold for wind energy development is 50MW. This could serve as the rationale for the threshold for utility scale ground mounted solar PV. Due to the nature of the technology this may not be an appropriate benchmark. Based on an assessment of site areas to generating capacity in the planning pipeline to date, this would correspond roughly to developments with a site area of 115ha. What is an appropriate mechanism to trigger this planning process?

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- Size on its own merits?
- Capacity on its own merits?
- Or some combination of both of the above?
- Does it become a strategic development by virtue of its role in Ireland's energy transition?

Section 37(1) of the Planning and Development (Strategic Infrastructure Development) Act 2006

37A.

(1) An application for permission for any development specified in the Seventh Schedule (inserted by the Planning and Development (Strategic Infrastructure) Act 2006) shall, if the following condition is satisfied, be made to the Board under section 37E and not to a planning authority.

(2) That condition is that, following consultations under section 37B, the Board serves on the prospective applicant a notice in writing under that section stating that, in the opinion of the Board, the proposed development would, if carried out, fall within one or more of the following paragraphs, namely—

(a) the development would be of strategic economic or social importance to the State or the region in which it would be situated,

(b) the development would contribute substantially to the fulfilment of any of the objectives in the National Spatial Strategy or in any regional planning guidelines in force in respect of the area or areas in which it would be situated,

(c) the development would have a significant effect on the area of more than one planning authority.

Recommendation Area: Development Contributions

The characteristics of solar PV development entail reduced consumption of services and amenities provided by local authorities. At the construction phase, practice in some local authorities necessitates the lodging of a bond to cover road maintenance should any be required arising from wear and tear associated with vehicle movements.

With regard to the above, is it appropriate that solar PV schemes should have a reduced level of development contribution attached?

Recommendation Area: Construction Phase

In line with "Recommendation Area: Drainage" above, measures should be put in place to ensure that silt laden run off from the site is curtailed. Existing farm tracks within the development area should be utilised in so far as practicable in order to mitigate against the construction of new routes.

Construction compounds, the manner in which they are sited and serviced with waste water and pollution resistant measures (fuel spills) should be clearly set out within the application documents. A number of RFI issued by planning authorities request over the course of 2016 have incorporated requests for this level of detail. In addition, the number of vehicle movements associated with the movement of materials and manpower to and from the site should be provided to the local authority in the planning documents.

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In line with environmental practice, existing gaps and gateways in hedgerows could be utilised in order to service the development.

Is there anything in nature utility scale ground mounted solar which necessitates additional construction information beyond that typically sought for other large developments?

Recommendation Area: Site Security

Site lighting should be directed toward the site's interior. The deployment of security lighting should be undertaken in a manner which will not disturb bats or other nocturnal creatures such as badgers. Due to the value of the components of a solar PV installation, existing practice is that CCTV systems are deployed to cover the entire site, without injuring the amenity and privacy of residential units in adjoining properties.

Recommendation Area: Site Management and Maintenance

Solar PV schemes have the potential to enhance the biodiversity characteristics of a site if the land was previously intensively utilised for agricultural purposes. Could a planning condition that requires the reinstatement of a decommissioned solar farm site to its previous use cause an issue if the biodiversity of the site has been greatly enhanced over the intervening period?

Summary

The draft recommendation areas and commentary above are preliminary and do not constitute an exhaustive list of planning and development matters relating to this form of renewable energy development. Arising from the consultation and the desk research carried out, the collated outputs of this consultation exercise will be developed into recommendations for planning policy and guidance for this form of renewable energy development. As the consultation process progresses, additional recommendation areas may emerge.

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