



# Solar in the UK – General and Strategy

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Investing in Your Future  
European Regional  
Development Fund 2007-13



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## Developed from Space

- Solar PV generates electricity from light, has no moving parts, produces no emissions and has a very long life
- The fuel is free and everlasting – the Sun
- Generation can take place anywhere and anytime there is light – City centres or Rural
- UK needs to replace its existing generation which relies primarily on Coal, Nuclear & Gas
- We need a mix of cleaner generation technologies?



## Solar in the UK pre April 2010

- Past Governments never thought Solar could be a significant part of the UK energy mix and it was dismissed and Wind became the focus
- EU funded Solar R&D projects in the 1990's which allowed UK to demonstrate Solar as a Building material
- Prior to April 2010 the only UK Government subsidies to encourage deployment of Solar were for demonstration projects for Low Carbon Buildings
- By April 2010 UK had deployed 26MW and were not in the top 30 Solar markets of the World



## Solar in the UK post April 2010

- In April 2010 the Feed in Tariff for microgeneration was introduced and Government was expecting a slow climb to 860MW deployed over 5 years
- In fact by 2011 deployment, using the FIT, was over 1GW and virtually all Solar PV
- Tariffs were high, global Solar prices were reducing fast, and Solar was predominantly installed on Domestic properties but with some Large Roofs and a few Solar Fields installed prior to DECC reducing the Tariffs by 50%+



## Solar now using FIT's and ROC's

- Solar installed prices continued, and continue, to fall and stay in line with tariff reductions
- The market today in many cases believe they have missed the opportunity or that the FIT is no longer available, when in fact the FIT is still available and the returns are the same as in 2010
- 2.0 ROC's were always available for Solar (over 50kWp) but initially at this level it was not commercially viable
- However Solar's continued price reduction resulted in rapid growth of Solar Fields and in April 2013 DECC reduced the ROC's for Solar to 1.6



## Solar in the UK today

- Today the UK is the 6<sup>th</sup> largest market for Solar in the World
- We have FIT's set out to at least 2015 (could be a FIT2)
- We have ROC's set out to 2017
- We have a consultation at present for CfD's which includes Solar
- Solar is heading to be the lowest cost renewable with grid parity likely before the end of this decade
- Therefore no more subsidies will be required!!

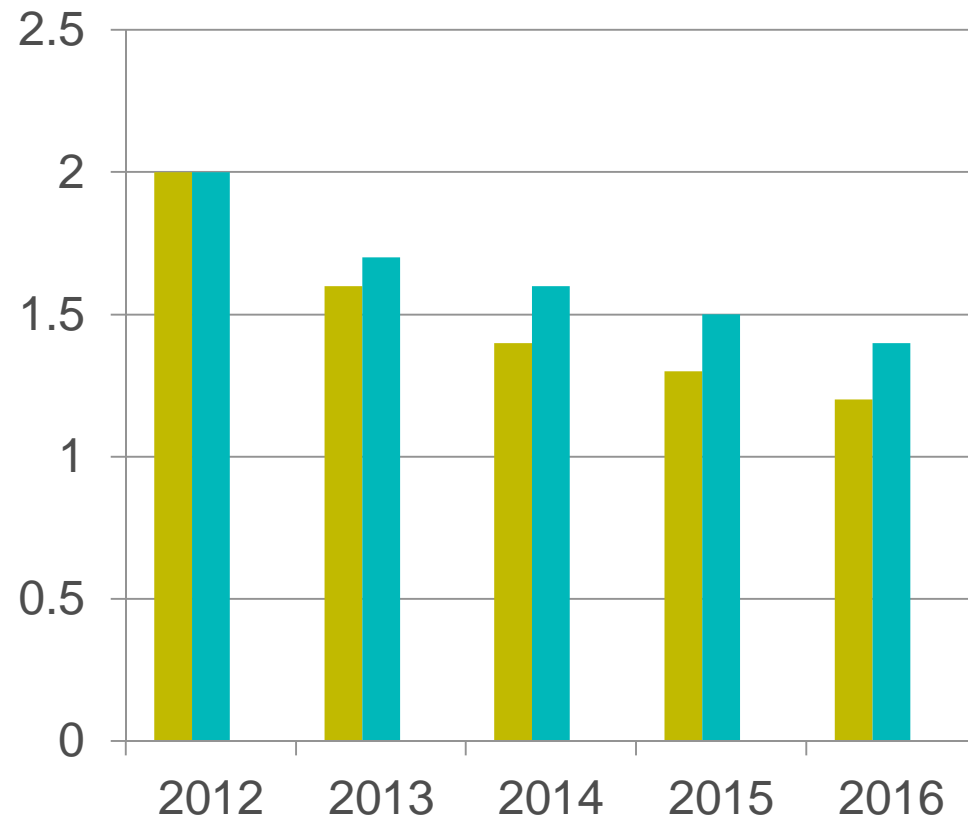


## Solar using FIT's

- Solar tariffs continue with capacity triggered digression to 2015

System Size (kWp)	To end of June 2013 (p/kWh)	From July 2013 (p/kWh)
0 to 4	15.44	<b>14.90</b>
4 to 10	13.99	<b>13.50</b>
10 to 50	13.03	<b>12.57</b>
50 to 100	11.10	<b>11.10</b>
100 to 150	11.10	<b>11.10</b>
150 to 250	10.62	<b>10.62</b>
250 to 5000	6.85	<b>6.85</b>
Export Tariff	4.64	<b>4.64</b>

## Solar ROC's for Fields & Large Buildings



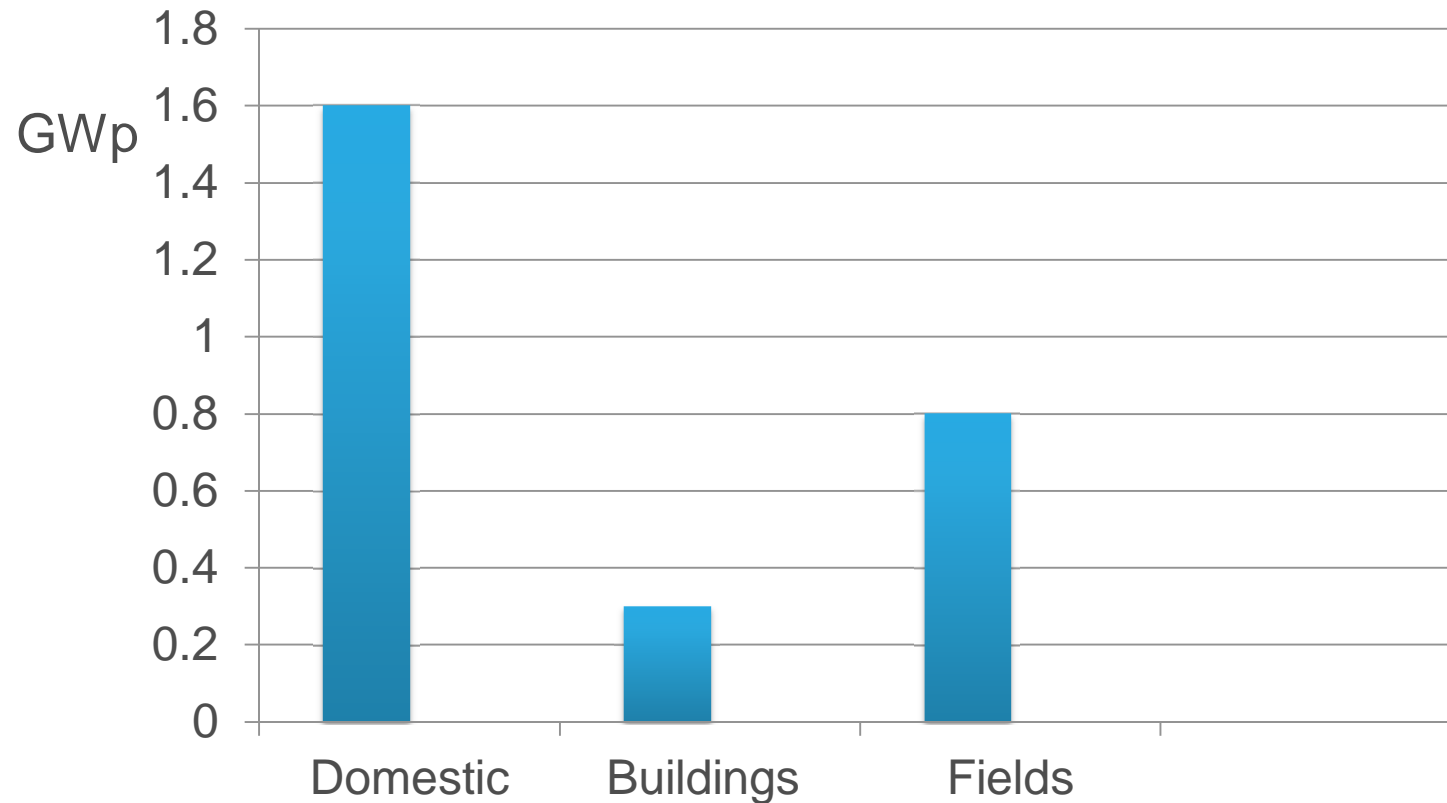
Offshore Wind

- Fields
- Buildings

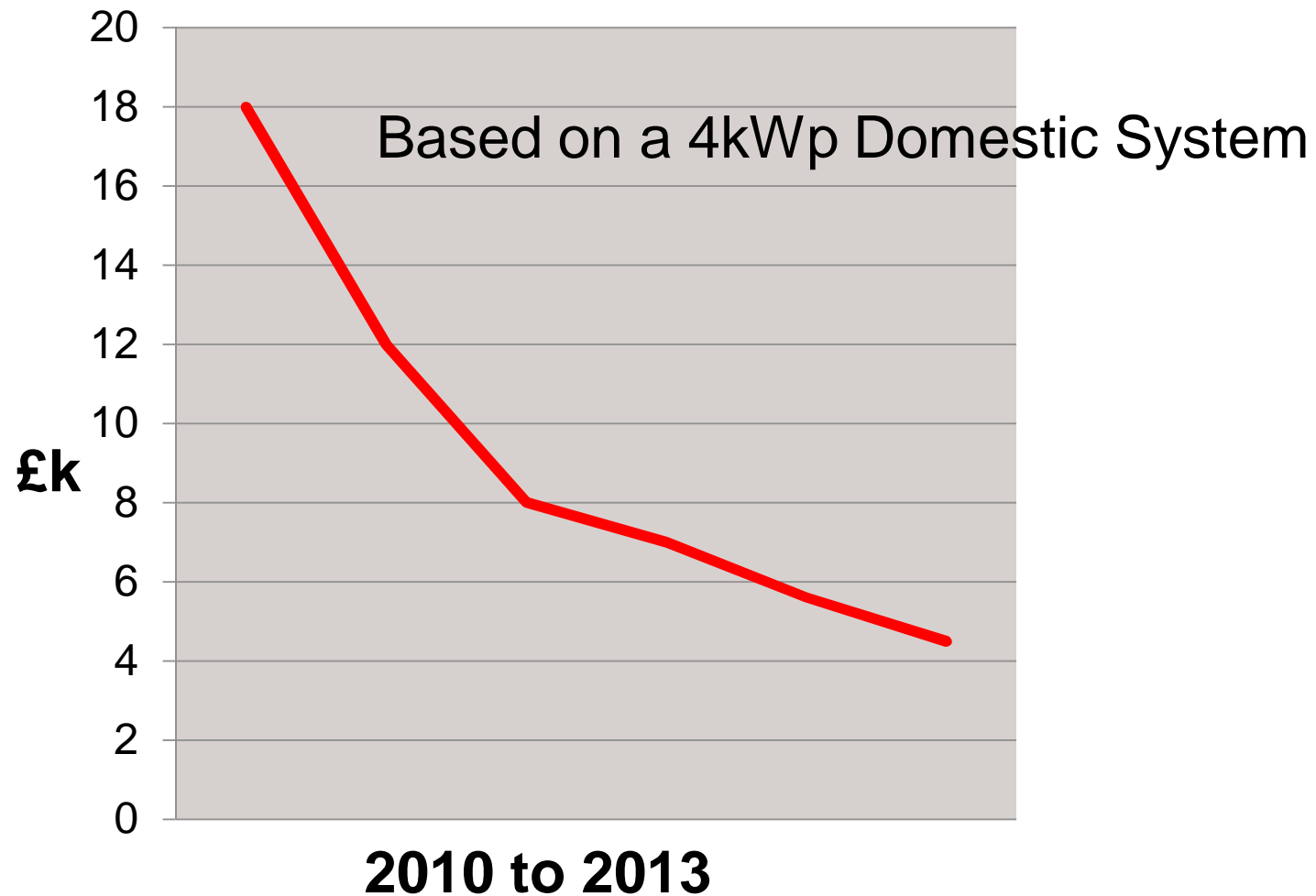


## Solar installed using FIT's and ROC's

- Solar deployed to date – total 2.7GWp
- A total of around 500,000 installs

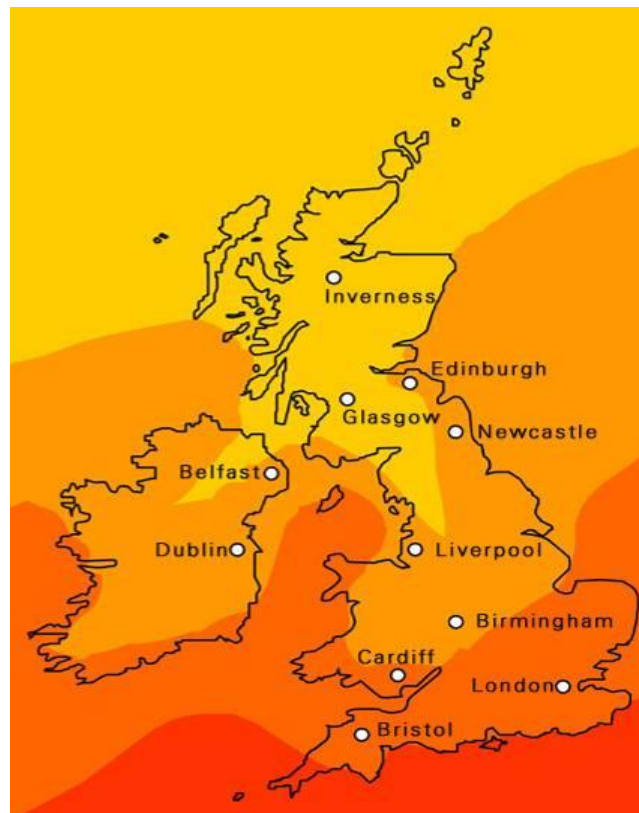


## Solar installed price reduction



## Solar UK performance

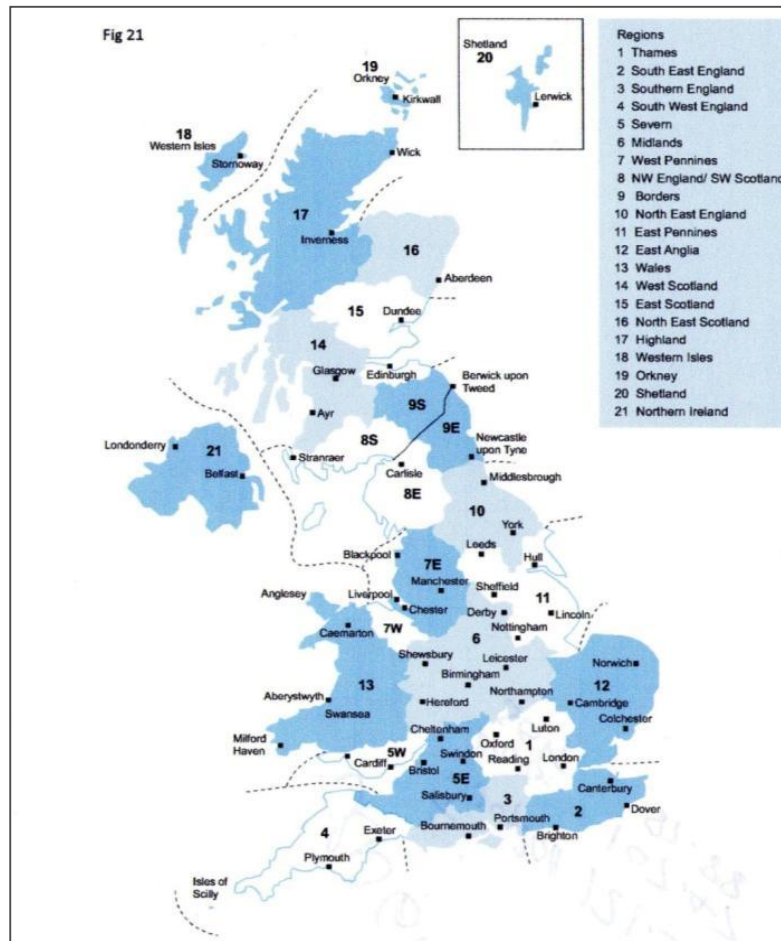
- The generating performance of Solar in the UK has been shown to be significantly better than previously predicted – these were the “old” figures



Location	kWh/kWp/year
	790
	830
	850
	900

# Solar UK performance

- an increase of 10% to 15%



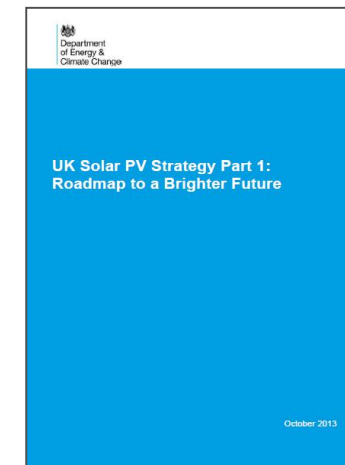
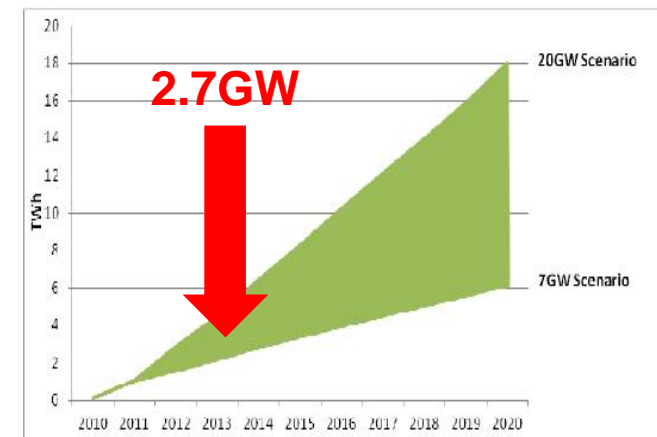
- MCS Design figures (still conservative!)

MCS Design Zone	kWh/kWp
Zone 1	985
Zone 2	1132
Zone 3	1023
Zone 4	1093
Zone 5W	950
Zone 5E	972
Zone 6	937
<b>Zone 7W Chester</b>	<b>933 (was 830)</b>
Zone 7E	866
Zone 8S	868
Zone 8E	880
Zone 9S	906
Zone 9E	907
Zone 10	918
Zone 11	893
Zone 12	963
Zone 13	922
Zone 14	835
Zone 15	944
Zone 16	877
Zone 17	837
Zone 18	768
Zone 19	735
Zone 20	714
Zone 21	847

## Solar UK Strategy

- In December 2012 the Government included Solar in the Renewable Roadmap for the first time and pencilled in the Ministers ambition for up to 20GW by 2020
- The deployment of Solar has shown to date that it is the fastest in deployment of all generation technologies
- In October 2013 – Part 1 of the Solar Roadmap was published
- In the Spring 2014 the Solar Strategy to 2020 and beyond will be published

Figure 9 Technical deployment potential to 2020 for solar PV



## Solar UK Strategy

- Setting out the Roadmap to 2020 and overcoming any barriers
- Ambition is 20GW by 2020 of clean energy but only if:-
  1. The industry continues to drive down costs
  2. We overcome grid issues
  3. The funders continue to support
  4. The Communities get involved
  5. The public continue to love Solar



# Solar Strategy Task Force

## Sustainability and Land Use

Aims as follows:

- a. Explanation of coarse-scaled agricultural land classification - developers should
- b. Explain use
- c. Exam enviro
- d. Explo
- e. How d
- f. Work

Suggested programme

- f. Ensuri
- g. Deter
- h. Identif
- i. Identif
- j. Assign

## Grid

Draft Aims as follows:

- a) The Challenge:
  - Impact of solar PV on b
  - Reach an accepted pos
  - Interaction with other typ
  - Getting timely and affor
- b) Role of market balancing vs
- c) Solutions/mitigation – their r
- Solutions/mitigation – th
- Control systems for PV
- Demand Side Response
- Storage – electricity and
- Interconnection
- **Microgrids**
- Other generation
- d) Improving forecasting – enc
- e) Work with Innovation sub-g

Suggested programme:

- a. Inform group o
- b. Assign individu

## Finance

Draft Aims as follows:

- a. To improve understanding of the solar sector among financiers & investors
- b. To improve access to financing for developers and installers
- c. To identify methods of reducing the overall cost of solar development and installation
- d. Network with
- e. Develop the
- f. Working with

Suggested programme

- k. Develop dra
- l. Determine v
- m. Develop the
- n. Based on th
- o. Assign indiv

## Innovation

Draft Aims as follows:

- a. To identify technology and innovation that will lead to reduced costs in the solar PV value chain.
- b. To identif
- c. To identif

Suggested programme

- p. Develop d
- q. Determin
- r. To identif
- s. To identif
- t. Work with
- u. Assign in

## Engagement

Aims as follows:

- a. promote wider use of Solar PV within communities
- b. ensure full understanding across wide range of developers, landowners
- c. to promote wider deployment of solar PV through engagement with sectors
- d. to work with e.g. local and broader govt, supermarkets and retail, social housing, architects, estate agents

Suggested programme:

- e. Develop draft list of appropriate sectors eg
  - i. MoD and Defence Industry
  - ii. Home builders, estate agents and architects
  - iii. Crown and Church Estates
  - iv. Schools
  - v. etc





## Planning requirements – small scale

Residential generally ‘permitted development’  
*(Nominally up to 4kWp)*

- Panels should not be installed above the highest part of the roof (excluding the chimney) and should project no more than 200mm from the roof slope or wall surface.
- The panels must not be installed on a building that is within the grounds of a listed building.
- The panels must not be installed on a site designated as a scheduled monument.
- **Wall mounted only** - if your property is in a conservation area, or in a World Heritage Site, panels must not be fitted to a wall which fronts a highway

Stand alone generally ‘permitted development’

- Only the first stand alone solar installation will be permitted development. Further installations will require planning permission.
- No part of the installation should be higher than four metres
- The installation should be at least 5m from the boundary of the property
- The size of the array should be no more than 9 square metres or 3m wide by 3m deep
- Panels should not be installed within boundary of a listed building or a scheduled monument.
- If your property is in a conservation area, or in a World Heritage Site, no part of the solar installation should be nearer to any highway bounding the house than the part of the house that is nearest to that highway.

## Planning requirements – commercial scale

*Very little guidance*

Commercial <i>(Nominally 4kWp – 50kWp)</i>	generally will be given as ‘permitted development’
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Commercial large scale  Ground mounted Building mounted and BIPV	Approval required
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## Solar on Commercial Roofs

- The Solar FIT was increased from 50kWp to 5MWp just before the 2010 launch
- Solar on roofs was made Permitted Development
- Unfortunately it referred to the Energy Act (Microgeneration)
- Discussion Point – Should Large Solar Roofs (over 50kWp) require a formal Planning Application ?



## Ground Mounted Solar over 1MW

- Active Growth Market
- 149 built
- 229 in pipeline
- Attracting Press Comments

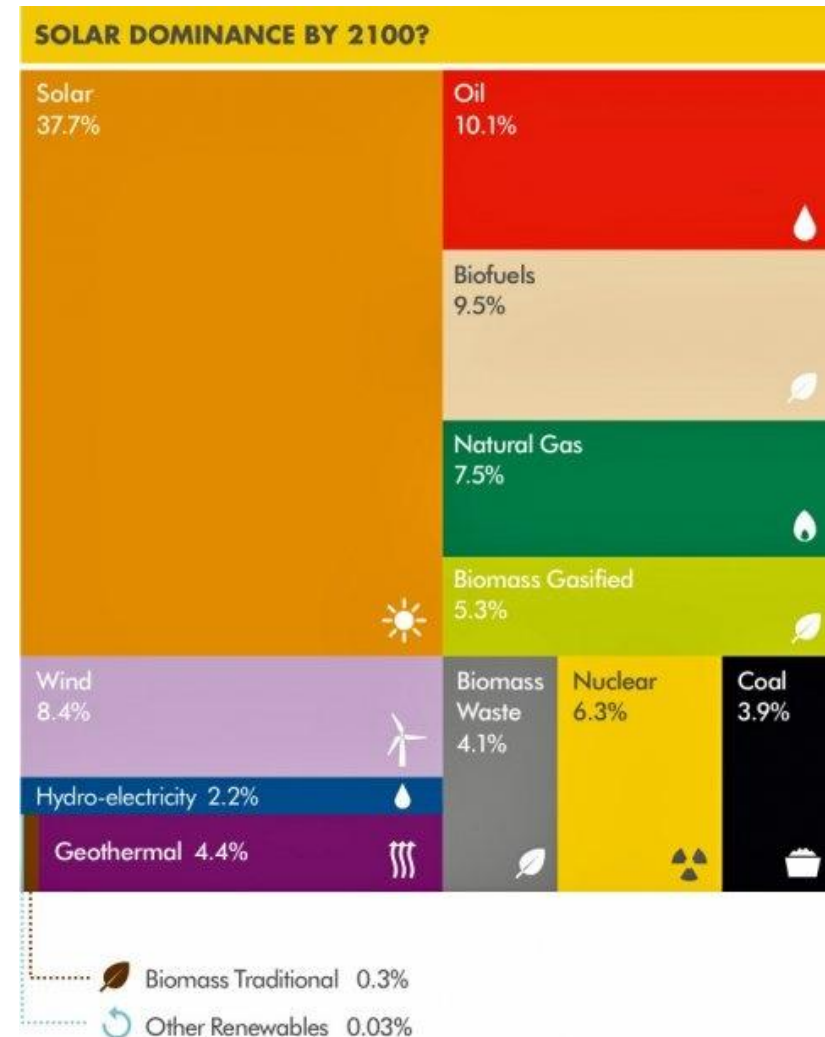




## The dream is happening!

- Sir David King – the former UK Government Chief Scientist and Economist Lord Richard Layard calling for all Countries to now back Solar. Their “Sunpower step change” initiative would see 25% of the Worlds energy from Solar by 2025 and predicting that Solar will be cheaper than any fossil fuel by 2025

-Even Shell are saying Solar will dominate the Global energy industry by 2100 (37.7% of the market) in their “New Lens” Report



## National Solar Centre

- Re - locating to the Eden Project
- Providing independent evidence based Solar knowledge
- Comparison module evaluation testing and system testing
- Training in system design and installation and O&M
- Fault finding
- Specifications
- Developing a Solar Code of Practice with IET
- Demonstrating the Technology



## National Solar Centre

- The NSC have been producing a number of reports on various aspects of Solar particularly around deployment and future pricing, many of which are providing the facts for the Solar Strategy
- One of the first reports was produced to set out Guidance for Solar Fields and I will now hand you over to Barry Marsh to take you through this document





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# Planning Implications of Large Scale Solar

The National Solar Centre

Barry Marsh

NSC Director

December 2013



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## Introduction to Solar Farms



## Backdrop

- A number of ‘solar parks’ are being planned at different locations around the UK. The emerging interest in these systems is sponsored by the Government’s Renewable Energy Strategy
- Although new to the UK, solar generation installations of this type have been widely adopted in other countries, starting in the USA in the 1980’s and deployed in substantial volumes in Germany in recent years.
- The NSC document provides a description of how solar parks are typically designed and gives an overview of the main planning considerations

## Why Solar Farms



- Solar park developments are generating stations producing clean renewable energy for local consumers and/or electricity users in general.
- In a good sunshine area a 1MW installation would generate about 1,000 MWh (one million kilowatt hours) per annum. This is equivalent to the total annual electrical consumption of some 240 typical households displacing 544 tons of carbon emissions

## The Technology



- PV modules on a support structure
- The front surface of the solar modules is toughened glass with an anti-reflective coating to maximise the light captured by the solar cells. From the front, the modules look predominantly blue/black in appearance.

## The Technology

- Inverters, transformers and switchgear



As a rule of thumb in the UK the space between rows is about three times the width of the row. Typically an installation of one megawatt would require 2 to 2½ hectares.

## The NSC Planning Guidance

For Ground Mounted Systems

- Derived from experience gained in Cornwall
- Headline guidance
- Contributions from industry, planners, planning consultants and land management experts.



## Planning Application considerations

### Pre-application

- Recommend early consultation with LA and local community

### Application

- Location and block plans, elevations and design access statement
- Ecological assessment, Impact assessment, visual assessment and historic statement where applicable
- Construction Management plan (traffic)
- Generation Capacity
- Application Fee



## The site selection

Many solar farms are merchant generating systems feeding power straight into the national electricity grid.



Under the present Feed-In Tariff regime the viability of projects can be enhanced by supplying electricity to on-site users.

## Grid Connection

- Another significant consideration in the location of solar parks is the availability of a suitable grid connection. Even where much of the energy produced is to be supplied to local users, there are likely to be times when the system will export most of its energy to the grid, so a connection is needed, normally at 11 or 33kV.
- An early part of the site selection and design process is to identify where there is adequate grid capacity to connect the system.

## NSC headline guidance - Ground mounted

- **Ground Mounted Solar projects, over 50kWp, should ideally utilise previously developed land, brownfield land, contaminated land, industrial land or agricultural land preferably of classification 3b, 4, and 5 (avoiding the use of “Best and Most Versatile” cropland where possible).**



## NSC headline guidance - Ground mounted

- **Ground Mounted Solar projects, over 50kWp, should ideally utilise previously developed land, brownfield land, contaminated land, industrial land or agricultural land preferably of classification 3b, 4, and 5 (avoiding the use of “Best and Most Versatile” cropland where possible).**
- **Land selected should aim to avoid affecting the visual aspect of landscapes, maintain the natural beauty and should be predominantly flat, well screened by hedges, tree lines, etc and not cause undue impact to nearby domestic properties or roads.**



## The site selection

- The best locations for solar parks are often previously developed land or brownfield sites, as these often have substantial energy use nearby. However agricultural land is often also suitable, subject to the local planning considerations
- Solar parks should not typically proposed in landscapes designated for natural beauty.



## Planning Policies

- Solar systems are physically inert and environmentally benign therefore they present few planning concerns.
- The government's planning policy statements generally encourages the promotion of suitable renewable energy projects.
- Consideration should be given to the opportunity for incorporating renewable energy projects in all new developments.

## Application considerations

### Site Levelling Works

- Utilise flat site where possible

### Development in Relation to Current Land use

- Previously developed land
- 3b, 4 and 5
- Local assessment

### Assessment of the Impact upon Agricultural Land

- Recognise the need to support diversification of agricultural land that helps to sustain an agricultural enterprise.

## Application considerations

### Ground Maintenance

- Land Management etc

### Construction Compound

- Traffic management
- Siting of temporary works

### Soil Stripping, Storage and replacement

- Topsoil and subsoil stripping

### Access Tracks

- Minimise disturbance





## Application considerations

### Security Fencing/Lighting

- Sensitive specifications
- Location of lighting/cameras

### Ground Anchors

- Piles
- Concrete shoes

### Tracking and orientation

- Maximise solar gain



## Application considerations

### Ecology

- Assessment – more information later

### Historic Environment

- Heritage Assets – evaluation

### Drainage, surface water Run-off and flooding

- Flood Risk Assessment

### Glint and Glare

- Substantially less reflective than glass-houses for example.



## Application considerations

### Community Involvement and Gain

- Integral part of process
- Possible Local Trust or benefit scheme

### Duration of Planning Permission

- Temporary use of land
- Solar facilities developed on agricultural ground are 'reversible'.
- Land may be permanently reinstated to its original condition at the end of the project life.
- The equipment can be recycled at the end of its useful life.

### Visitor Attraction/Education Facility

Guardian today-  
*UK Investors see bright future for solar power – if the nimbys can be won over*



# Solar Farms & Biodiversity





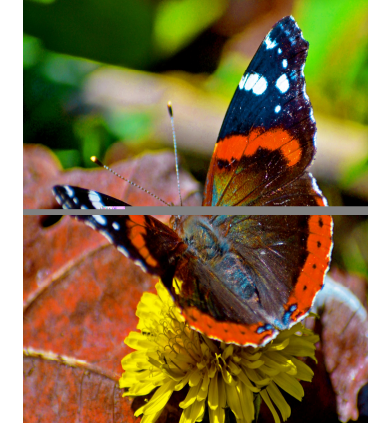
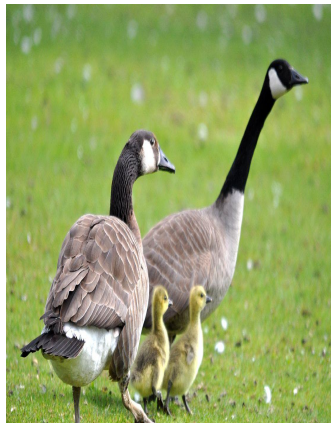
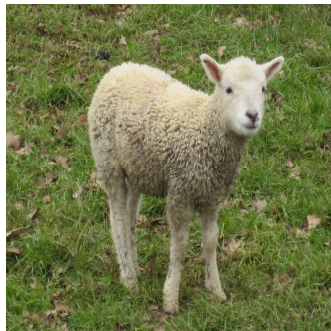
Typically, solar farm panels and infrastructure only occupy 30% of the rented area. This creates great options for biodiversity.



## BEST PRACTICE

- ü Landowner
- ü Local Community
- ü Solar Developer
- ü Council Planner
- ü Local Wildlife Trust
- ü Ecologist

**Through consultation with the landowner and community, a Biodiversity Management Plan (BMP) should be created**





## The Key Components of a BMP

ü ID of key biodiversity on site (protected species, valuable habitats, designated sites nearby)

ü Habitat enhancements planned for the site (meadows, ponds, bat boxes)

ü Management plan for all habitat enhancements for life of solar farm

ü Monitoring plan for life of solar farm



The most important thing to note is that ‘not one size fits all’ and a successful BMP is produced through communication locally

THE RIGHT  
PLAN  
-IN-  
THE RIGHT  
PLACE



The greatest value for biodiversity will be gained from creating a variety of different habitats within a solar farm.

- Boundary Features
- Grassland Habitats
- Woodland Habitats
- Ponds
- Hibernacula



**A BMP is for 25 years. Appropriate management is vital to ensuring habitat enhancements deliver biodiversity benefits.**



**Key elements of biodiversity should be measured at regular intervals.**

**If a protected species is found on site and specific enhancements have been made, this species should be surveyed annually at a suitable time of year to check its status.**

**Monitoring should be undertaken by an ecologist with training in the species or habitat of interest.**



## In Summary

- Preferred sites -
  - Flat
  - Previously developed
  - Well screened hedges
  - Away from roads
  - Away from villages and houses
  - Close to grid connection
  - Well managed

SO

Invisible in the countryside?



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# Planning Roadshows

## the DECC View

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2<sup>nd</sup> December 2013





# Where are we now?

- DECC Opinion polling – PV consistently above 80%
- To Date:
  - 2.7 GW total installed capacity
  - 0.8GW of Solar Fields and a large growth market
  - Large Roofs like Bentley and Sainsbury's being encouraged





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# The Roadmap





# The Roadmap

- Reassurance to industry
- Laying out the key background and direction of travel
- Four guiding principles:
  - Support for solar PV should allow **cost-effective** projects to proceed and to make a cost-effective contribution to UK carbon emission objectives in the context of overall energy goals
  - Support for solar PV should deliver genuine **carbon reductions** that help meet the UK's target of 15 per cent renewable energy from final consumption by 2020
  - **Support for solar PV should ensure proposals are **appropriately sited**, give proper weight to environmental considerations such as landscape and visual impact, heritage and local amenity, and provide opportunities for local communities to influence decisions that affect them.**
  - Support for solar PV should assess and respond to the impacts of deployment on: **grid systems balancing**; grid connectivity; and financial incentives – ensuring that we address the challenges of deploying high volumes of solar PV.



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2nd December 2013