

# Delivery & operational maintenance of large scale domestic solar PV

Graham Phillips  
Head of Sales  
British Gas Solar

In association with:

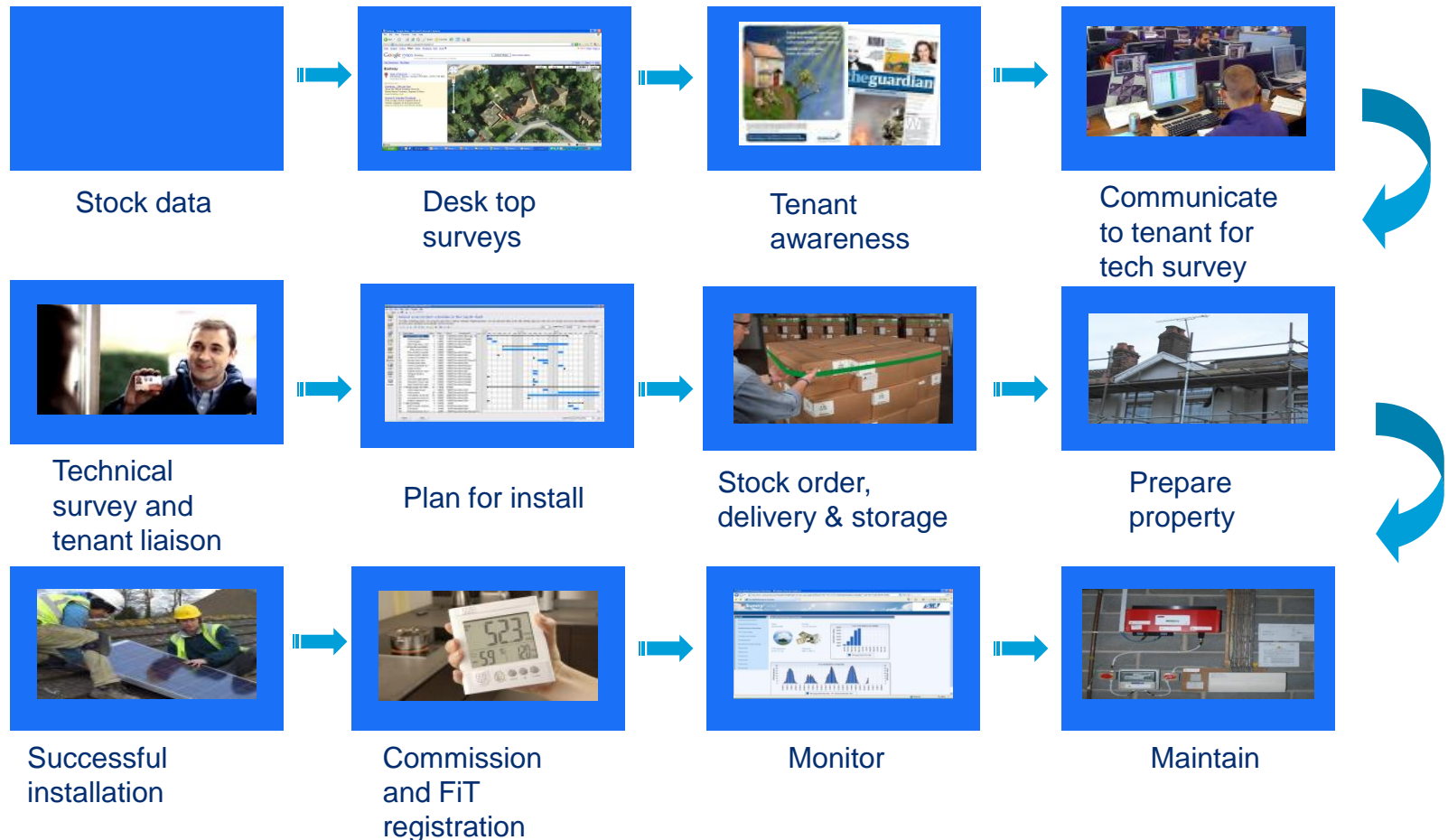


# Introduction to British Gas Solar

- 18 year pedigree in UK solar PV market
- Exemplary H & S record – zero LTI
- Multi-site roll out – L&Q, WHG, Wates, PAYS, Domestic RAR.
- Installed solar on over 300 schools
- Design, build and operate one of the UK's largest industrial PV system for Toyota in Derbyshire
- Proven ability to design, deliver and support major PV installations and rollout programs
  - End to end service using in-house resources
- MCS Approved for Solar PV, Solar Thermal
- Provision of operation and maintenance contracts
- British Gas Solar is a 100% subsidiary of Centrica plc a FTSE top 25 company.



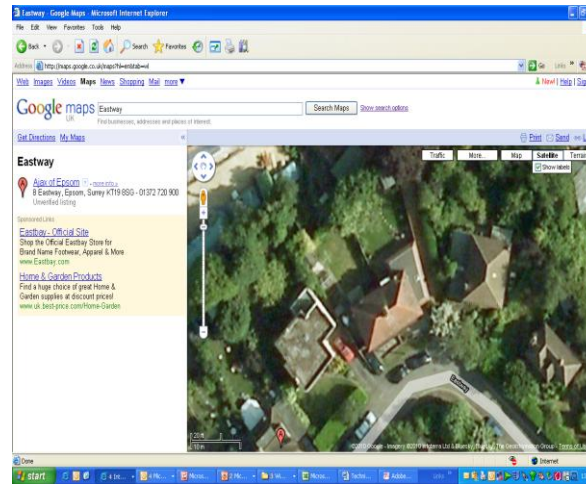
# Gen Community or multi site rollout



# Desktop feasibility



- Properties to undergo desktop survey
- Orientation
- Roof size
- Potential Obstructions
- Shading
- Detailed desktop report



- 1) All Stock
- 2) Incorrect building orientation
- 3) Inadequate Space
- 4) Shading complications
- 5) Other obstructions
- 6) POA - decline

**Target stock**

# Working in Partnership with PH Jones



## Central Heating Installations

PH Jones sees the installation of modern, efficient boilers as a crucial step towards helping reduce the UK's CO<sub>2</sub> emissions.

- Clear lines of communication to help understand your requirement
- Committed to creating local employment and growing the local economy
- Monitor levels of quality through our robust management systems

## Kitchen and Bathroom Installations

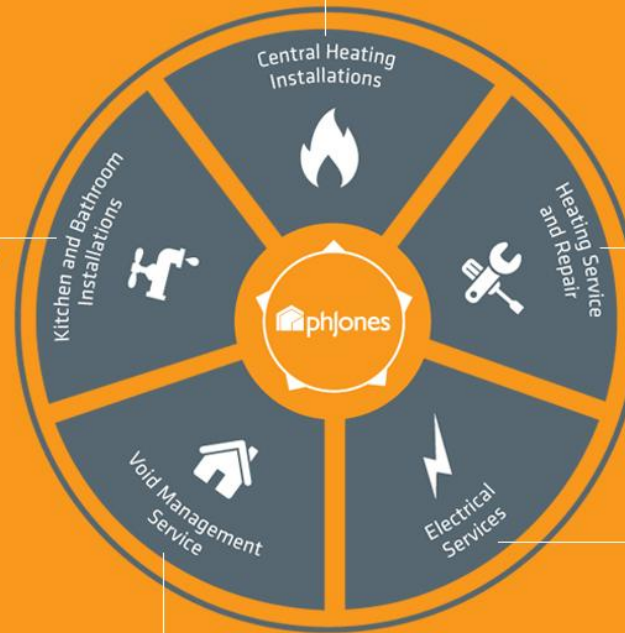
Through our national network of experts we work closely with our clients to deliver a range of solutions which includes the installation of kitchens and bathrooms:

- Experience in installing Kitchens and Bathrooms through our local contractors
- Provides greater resident engagement and minimises disruption as works can be completed at the same time as CHI works
- RLOs will spend less time engaging with residents to complete the works
- Opportunity to relocate boilers to a more convenient location (if required)
- Meeting customers full requirements

## VoidCare

We will save you time and money and can help you:

- Increase revenue by reducing void time
- Manage your bills through tailored billing solutions
- Reduce admin costs through Personal Account Management
- Help your tenants with their energy needs



## Heating Service & Repair

We work closely with our partners to deliver services which exceed expectations across the UK. We realise that providing a gas maintenance service is only one part of the customer experience. We provide a high level service which truly makes a difference in people's lives.

- Local service to meet your requirements
- ISO 9001 certified business driving the quality of our work
- Support for vulnerable residents, 2013 £64m invested
- 99.7% of replacement parts available for the following day through the National Distribution Centre

## Electrical Services

Electrical installation services include:

- Domestic Rewires
- Electrical Upgrade Works
- Electrical Maintenance
- Electrical Heating Installations
- External Lighting
- Voltage Optimisation
- Portable Appliance Testing
- Periodic Inspection Reports
- Control Wiring
- Fire Detection
- Door Access

# Technical Survey



## Energy Experts

- Examine loft space
- Measure internal roof space
- Check consumer
- External assessment
- Identify location of inverter and generation meter
- Identify suitable wiring run between array, inverter and consumer unit
- Provide tenant with overview of the technology and what will happen during installation
- Full risk assessment of property



MPAN 7900 243 07544

**British Gas**  
Looking after your world

### Risk Assessment

**Customer Details**  
Customer name: Mr. M. Owa  
Customer address: The Fairway, Leamington Spa, CV32 3JY  
Customer phone number: 01922 805407

**Energy Expert**  
Name: Charles J. van Raveling  
Contact telephone number: 01922 805448  
Job reference: 5800003

Will an elderly or infirm person be present during the works? If yes, please provide details	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Will a child be present during the works? If yes, please provide details	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Will a person with visual impairment or hearing difficulties be present during the works? If yes, please provide details	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Will any other person be present during the works? If yes, please provide details	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Are there any pets in the property? If yes, please provide details	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Does the work present a risk in terms of ladder or hoist positioning on a public highway? If yes, please provide details	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Does the work present a risk in terms of dust/noise from drill or blowing machine? If yes, please provide details	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Will an area need to be cordoned off? If yes, please provide details	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Is parking available and adequate for type of vehicle used for the works? If no, please provide details	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Are there any parking restrictions at the property? If yes, please provide details	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Can the vehicle (up to 7.5 tonnes) get close to the property? If no, please provide details	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

# The installation

## Install



### Activities:

- Confirm install on D-1
- Arrive and set up
- Review plan with customer
- Prepare materials
- Install panels and DC
- Install inverter and AC
- Check installation
- Cleanup site

## Commission



### Activities:

- Arrive and review install
- Explain installation and operation of equipment
- Get customer sign-off



# We do not cut corners

## Installation March 2014



## A British Gas installation



Zero lost time incidents in the last 3 years

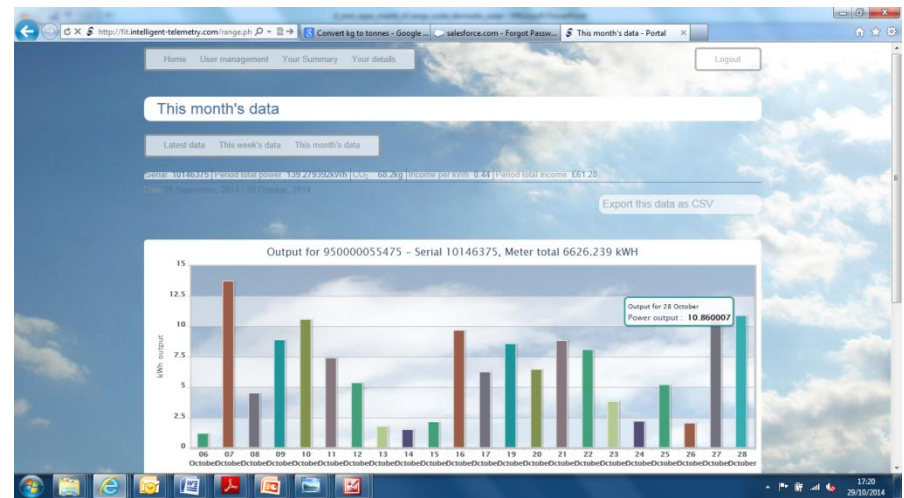


# Monitoring and Maintenance

- Monitoring 15MW
- Providing traffic light warning
- Email alerts
- Asset Register
- Total meter readings
- Previous day generation
- FiT data compatibility

The screenshot shows a web browser window displaying the 'Home - Portal' for British Gas Solar. The page includes a navigation menu, a welcome message, and a table of solar assets. The table has columns for Owner, Serial, Status, Type, MPAN / Desc, Location, Perf, Last read, Last day, Total, and Edit?.

Owner	Serial	Status	Type	MPAN / Desc	Location	Perf	Last read	Last day	Total	Edit?
L&QHousing	11204113	Green	AS230	950000055523	Temple Gate High Wycombe	N/A	28-10-14	6,291 kWh	2124,699 kWh	Edit
L&QHousing	11203990	Green	AS230	950000056517	170183 Hughs Avenue High Wycombe	N/A	28-10-14	5,511 kWh	8590,763 kWh	Edit
L&QHousing	11203982	Green	AS230	950000056517	155169 Hughs Avenue High Wycombe	N/A	28-10-14	6,165 kWh	8771,433 kWh	Edit
L&QHousing	11263725	Green	AS230	950000056109	Flats 512 Warwick Court Beaconsfield	N/A	28-10-14	9,847 kWh	7885,698 kWh	Edit
L&QHousing	11263558	Green	AS230	950000055746	Constance Court Audley Close London	N/A	28-10-14	14,673 kWh	8699,908 kWh	Edit
L&QHousing	11263288	Red	AS230	950000055746	3646 Harewood Terrace Southall Middlesex	N/A	28-10-14	4,949 kWh	5352,139 kWh	Edit
L&QHousing	11263287	Green	AS230	950000056503	2434 Harewood Terrace Southall Middlesex	N/A	28-10-14	7,121 kWh	6080,14 kWh	Edit



# Maintenance

With no moving parts PV is inherently low maintenance and should perform without any maintenance intervention at all.

Modules	Electrical	Structural	Inverter
Damage	Loose Connectors	Mechanical damage	DC fans
Hotspots	insulation failure	Loose bolts	AC contactor
De-lamination	damaged cables	Loose connections	Inverter swap out
Corrosion	DC fuse inspection		
Pollution and dirt	AC circuit breaker inspection		
cell cracks			
loose junction boxs			
Loose framing			

- Large projects – spare parts are held in local hubs
- All failures and damage are documented with photographic evidence
- Complete inspection status information provided to the client
- Any pro-active checks planned would be done in conjunction with the client

# Summary

- Health and Safety is our number 1 priority
- 18 year pedigree in solar installation with a 200 year pedigree in the energy industry
- British Gas to provide full end to end service from Desktop activity to ongoing monitoring and maintenance programs.
- Experts in delivery to large multi site social housing projects
- Experts in Commercial sector for all other stock ie Schools, commercial rooftops, and Ground
- Pro- active maintenance using local hubs