

Renewable Energy for Your Home

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Why?

- Cost saving?
- Return on Investment?
- Energy saving?
- Warmer home?
- Save the planet?
- Good exercise?

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Incentives to Invest

- Feed in Tariff
 - Small-scale electricity generation (micro-generation)
 - Paid for all generation plus extra for exports (metered & deemed)
 - Same scheme for everyone: business, public sector, charities, homes etc
 - Specified technologies with own rates
 - Paid for by Energy Companies (but government cap)
- Renewable Heat Incentive
 - Renewable heat generated (based on metered output)
 - Specified technologies with own rates
 - Currently different schemes for homes and non-domestic
 - Paid for by Central Government (£860m to 2015)

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Feed In Tariff

- Consultation on rate change Nov-Dec 2011
 - Taken to court by Friends of the Earth
 - Appeal 25th Jan decision upheld, but further appeal likely
- Consultation announced 19th Jan
 - Tariff change from 3rd March 2012
- Tariff rates from 1st April still subject to review
 - Very short window of confirmed tariff (March)
- Latest information
 - www.decc.gov.uk/fits
 - www.fitariff.co.uk

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Feed In Tariff (small schemes) to 12/12/11 or 3/3/12??

Technology	System Size	p/kWh	Years
PV	≤4 kW (new build)	37.8	25
PV	≤4 kW (retrofit)	43.3	25
PV	>4-10kW	37.8	25
PV	>10 - 50kW	32.9	25
PV	Standalone system	30.7	25
Wind	≤1.5kW	36.2	20
Wind	>1.5 - 15kW	28	20
Wind	>15 - 100kW	25.3	20
Hydro	≤15 kW	20.9	20
Micro-CHP	≤2 kW	10.5	10
Export Tariff		3.1	

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Feed In Tariff (PV only) from 3/3/12 to 31/3/12 ??

Band (kW)	Current generation tariff (p/kWh)	Proposed generation tariff (p/kWh)
≤4kW (new build)	37.8	21
≤4kW (retrofit)	43.3	21
>4-10kW	37.8	16.8
>10-50kW	32.9	15.2
>50-100kW	19	12.9
>100-150kW	19	12.9
>150-250kW	15	12.9
>250kW-5MW	8.5	8.5*
stand alone	8.5	8.5*

Requirement to meet **Energy Performance Certificate Level C** proposed for homes, after 1st April 2012 (may be retrospectively applied)

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FITs take up of technologies

To end Sept 2011

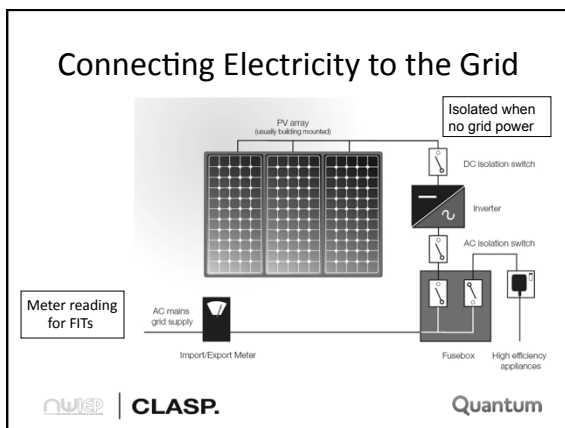
- PV 78,529
– (145,000 by end Dec)
- Wind 1,848
- Micro-chp 253
- Hydro 235
- Anaerobic digestion 10

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Which technology?

<p>Electricity</p> <ul style="list-style-type: none"> • Solar photovoltaic (PV) • Wind • Micro-chp 	<p>Heat</p> <ul style="list-style-type: none"> • Solar hot water • Ground/water source heat pump • Air source heat pump • Woodfuel (biomass) • Micro-chp
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Photovoltaics

- Converts solar energy directly into electricity
- Generate electricity which is a high CO₂-burden fuel
- Electricity can be used onsite or exported to grid
- Feed In Tariff made PV much more financially attractive
- Little maintenance required
- Capital cost reduced significantly

Designing your system

- Orientation
 - SE to SW ideal
 - Lose 15-20% output due E or W
- Angle from horizontal
 - 30° to 40° ideal
- Shading – & time of day
- Access and maintenance space
- Grid connection & cable routing
- Protection from damage & theft
- Weight on supporting structure
 - 13-15kg/m²
- How big?
 - Roof area available
 - Money available
 - How much will you use

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Mounting Types

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Typical Domestic Retrofit



- System size: 2.2 kWp, 14m²
- Capital costs: £5,000
- Energy output: 2,000 kWh/year
- Income & Savings (50% used)

– FIT (2000kWh @ 21p/kWh)	£420
– Export (1000 kWh @ 3.1p/kWh)	£31
– Electricity Saving (1000kWh @ 11p/kWh)	£110
– Total income/savings per year	£561
- Simple payback period: 9 years
- Return on Investment: 7%
- Payback improves if you use more or electricity prices rise

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Small Wind



- 2.5 - 25 kW turbines
- Mast height 10-25m
- Location and mast height critical
 - Wind speed > 5m/sec
 - Consistent: no turbulence
 - Opportunities on farms, playing fields, industrial sites
- Visual impact & noise issues for planning
- Cost: 5-6kW c.£30,000, 10-11kW c.£55,000
- Grid connection costs may reduce viability
 - 3-phase increases options
- Feed in Tariff: payback 10-12 yrs at good site

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Building-mounted Wind Turbines


- Very small scale (200 – 1500W)
- Usually mounted on gable wall or flat roof
- Ineffective below 5m/s windspeed
- Performance affected by turbulence from other buildings or trees
- Generally unsuitable in urban areas
- Can get reasonable output in rural areas or exposed high roofs (tower block)
- Currently none MCS accredited
- Issues
 - Turbine noise
 - Inverter noise
 - Visual appearance

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Micro-CHP

- Generation of heat and power
- Cost and carbon savings vs gas boiler + grid electricity
 - Suits high heat demand
 - Inefficient at low load
 - Unsuitable for annual demand <15,000 kWh/yr
 - Cost savings depend on difference in gas/elec prices
- Carbon savings
 - 5-15% domestic-scale
 - 10-20% small commercial systems
- Small systems £2,500 more than equivalent gas boiler
- FITs for <2kWe for first 30,000 systems @ 10.5 p/kWh
- Payback poor vs gas at current prices (>15 years)



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Which heat technology?

- Solar hot water
- Ground/water source heat pump
- Air source heat pump
- Woodfuel (biomass)

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Renewable Heat Incentive (RHI)

Technology	Definition	System Size	p/kWh	Years
Small Biomass		<200 kWth	Tier 1: 7.6	20
			Tier 2: 1.9	
Medium Biomass	Solid biomass, Municipal Solid Waste (inc CHP)	200 - 1000 kWth	Tier 1: 4.7	20
Tier 2: 1.9				
Large Biomass		>1000 kWth	2.6	
Small GSHP	Ground & water source, geothermal	<100 kWth	4.3	20
Large GSHP		>100 kWth	3	
Solar thermal		<200 kWth	8.5	20
Biomethane	Biomethane & biogas except landfill	Biogas only <200 kWth	6.5	20

- From Nov 2011 for non-domestic only
- Systems installed after July 2009 eligible

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Renewable Heat Premium Payment

Installed between 21st July 2011 to 31st March 2012

All Houses £300 – solar thermal

Houses not heated by gas from the grid

£950 – biomass boiler

£850 – air source heat pump

£1250 – ground source or water source heat pump

Need 250mm loft insulation and cavity insulation where practical

Recipients of RHPP will be eligible to apply for the Domestic Renewable Heat Incentive subject to eligibility conditions (yet to be published)

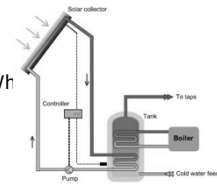
Cash limited: £15m, review at £10m, £3m vouchers to Jan 2012

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Solar Hot Water

- Domestic system: 2-4 m²
- Commercial system
 - Large hot water demand
- Energy output: 500 – 800 kWh
 - 40-50% of hot water demand
- Key issues:
 - South-facing roof
 - Using the hot water
 - Fuel offset cost (off-gas grid most attractive)
 - Needs to be compatible with existing DHW system



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Types of solar thermal collector



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Typical Domestic System

- Capital costs: £3,000 - £5,000
- Cost Savings: £50 – 80 / year
- Typical payback period:
 - Over 30 years with gas heating (a bit less with RHI)
 - Could be under 20 years with electric heating
- Value of solar hot water
 - High hot water demand in summer
 - Turning off heating in summer
 - Mainly immersion heating

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Heat Pumps

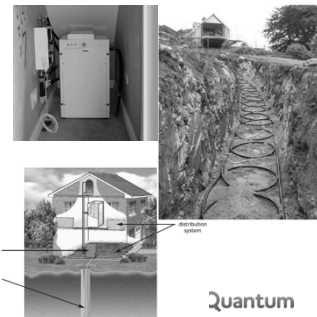
- Compress low grade heat to higher temperatures
- Renewable heat, but use electricity
- Low grade heat
 - Underfloor heating or over-sized radiators
 - Often need hot water back-up
- Cost and carbon savings depend on efficiency (Coefficient of Performance) and fuel replaced
 - Manufacturer's Efficiency 260% - 690%
 - Seasonal Operating Efficiency 130% - 330%

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Ground Source Heat Pump

- Horizontal coils – 100-200m at 1-2m below ground
- Vertical borehole – 100m depth in total
- Operating Efficiency up to 330%
- Effective in winter as ground temperature fairly constant
- Best with high thermal mass building – stone, brick
- Cost £9,000 - £17,000
- Savings depend on fuel replaced – best for off-gas properties




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Air Source Heat Pump


- Cheaper than GSHP – £6,000 - £10,000
- Air-air or air-water
 - Air-air generally more efficient
 - Air-water – with ‘wet’ heating system
- Poor performance in winter
- Usually requires DHW top-up to achieve required temperatures
- Less efficient than ground source
- Can operate in heating and cooling mode – although not necessarily a good idea!
- Currently excluded from RHI for non-domestic
- Savings depend on fuel replaced – best for off-gas



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Wood (Biomass)



- Low carbon if material used is grown relatively recently
- Wood burning stoves £500 - £1500
- Pellet stoves - £4,000 - £5,000
- Pellet boilers - £10,000 – 12,000
- Cost savings depend on fuel replaced and access to free/cheap wood
 - Best for off-gas properties
- Issues
 - Space (boiler and fuel store)
 - Chimney/flue needed (planning?)
 - Smoke (some accredited for air quality)
 - More work than a gas boiler!



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Larger Scale Biomass

- Mainly wood chip or pellet
 - Also logs and farm waste
- Management needed
- Usually use large tank (accumulator) to provide heat store
- Fuel storage
 - Dry & accessible
 - Vehicle movements
- Need **local** reliable supply
- Suitable for larger buildings, schools, farms etc

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How?

- Work out what’s right for you
- Find an installer
- Do I need planning permission?
 - Permitted development
 - Check with Planning Office
- Getting a grid connection
- Claiming the FITs & RHI

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What’s right for you?

- How much energy do you use? Heating? Power?
 - What time of day/year?
 - What fuel do you use for heating?
- How efficient is your home?
 - How much can you sensibly reduce your demand first?
 - Can you reduce the size (& cost) of your heating system?
- What have you got available?
 - Unshaded roof area? www.energysavingtrust.org.uk
 - Large garden space? www.claspinfo.org
 - Fuel storage space?
- How much can you afford?
- How much are you prepared to manage the system?

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Find an Installer

- MCS Accreditation - www.microgenerationcertification.org
- Recommendations
- Experience, references, professional credentials
- Equipment used
- Warranties & Insurance
- Price (anything not included?)
- Checklist on EST
 - www.energysavingtrust.org.uk/Generate-your-own-energy/Finding-an-installer






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Permitted Development

Domestic micro-generation:

- Building mounted and stand alone installations within the curtilage of the dwelling
- Solar PV, solar thermal, ground source heat pumps, water source heat pumps, micro CHP and biomass heating flues

Limitations:

- Projecting no more than 200mm from the plane of the roof and below the ridgeline
- Stand-alone solar: less than 4m high and 9m² area (3m x 3m), more than 5m from boundary
- Biomass flues under 1m from highest point of roof
- Conservation areas: away from the main elevation and not visible from highway (wall-mounted)
- Not listed buildings or World Heritage Sites



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PD for micro-wind & ASHPs (Dec 2011)

Micro-wind:

- Roof-mounted on detached building <3m above highest part of roof or 15m total, 5m from boundary
- Stand alone installations within the garden of the dwelling, tip height < 11.1m, tip +10% from boundary
- Blade area <3.8m² (diameter 2.2m)

Air Source Heat Pumps:

- No more than one per building
- Noise limits 42db

All:

- MCS accredited
- Conservation area & listed buildings excluded

CHECK with your Planning Office



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Grid Connection


- For systems under 3.8kW single phase or 11.4kW three phase (technically 16 Amps/phase) your installer should inform the Distribution Network Operator (Electricity North West)
- For systems larger than this you
 - Need permission from ENW and a grid connection report which may cost £200 - £2,000
 - May need to pay for your connection to be strengthened

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Claiming FITs / RHI

You need to:

- Have an MCS-accredited system installed by an MCS-accredited installer
- Have a generation meter installed (plus an export meter for larger systems)
- Register your system with Ofgem via your FIT supplier (which does not need to be your electricity supplier) by providing details from your MCS Certificate
- Provide quarterly meter readings



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Further Help

- Energy Saving Trust – www.energysavingtrust.org.uk
 - Suitability of each technology
 - Buyer's Guide to Heat Pumps
 - Field trials for solar hot water, heat pumps & small wind
 - FITs, RHI, RHPP
- CLASP – www.claspinfo.org
- MCS – www.microgenerationcertification.org
- DECC – www.decc.gov.uk
 - www.decc.gov.uk/fits
 - www.decc.gov.uk/rhi
- Ofgem – www.ofgem.gov.uk
- Planning - www.planningportal.gov.uk/permission

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Questions?

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