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NEMEX Renewable
Innovation: Environment
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Large Farms over 300
hectares: Wye Valley AONB
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Renewable Energy: A brighter future



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Presentation aims

- Overview of wind and solar energy technologies
- Provide some financial information on each technology
- Discuss some of the advantages and disadvantages of each technology
- The future of small-scale renewables in the UK



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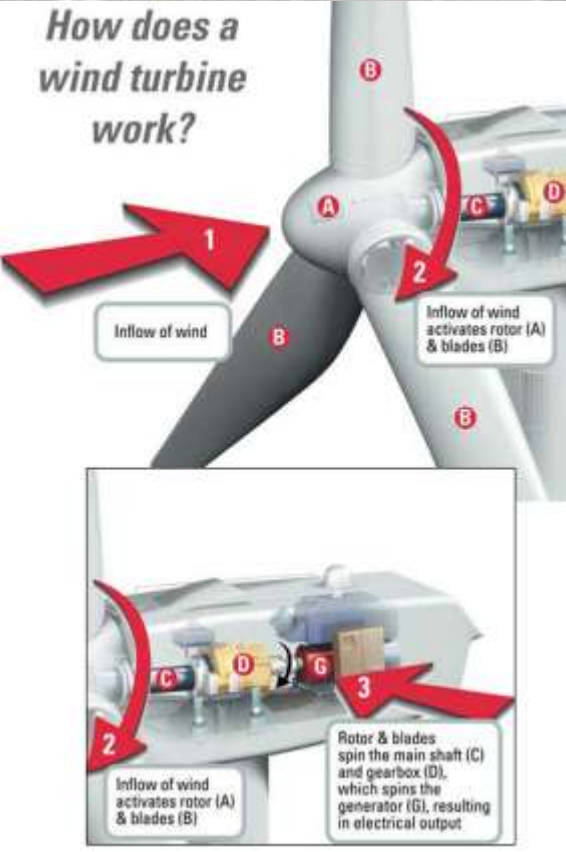
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Wind Energy

- Wind energy is actually another form of solar energy!
- The UK has 40% Europe's wind resource
- 1,500 small-scale wind turbines have been installed between April 2010 and September 2011.
- Wind turbines benefit from the Feed-in Tariff scheme set up in April 2010.

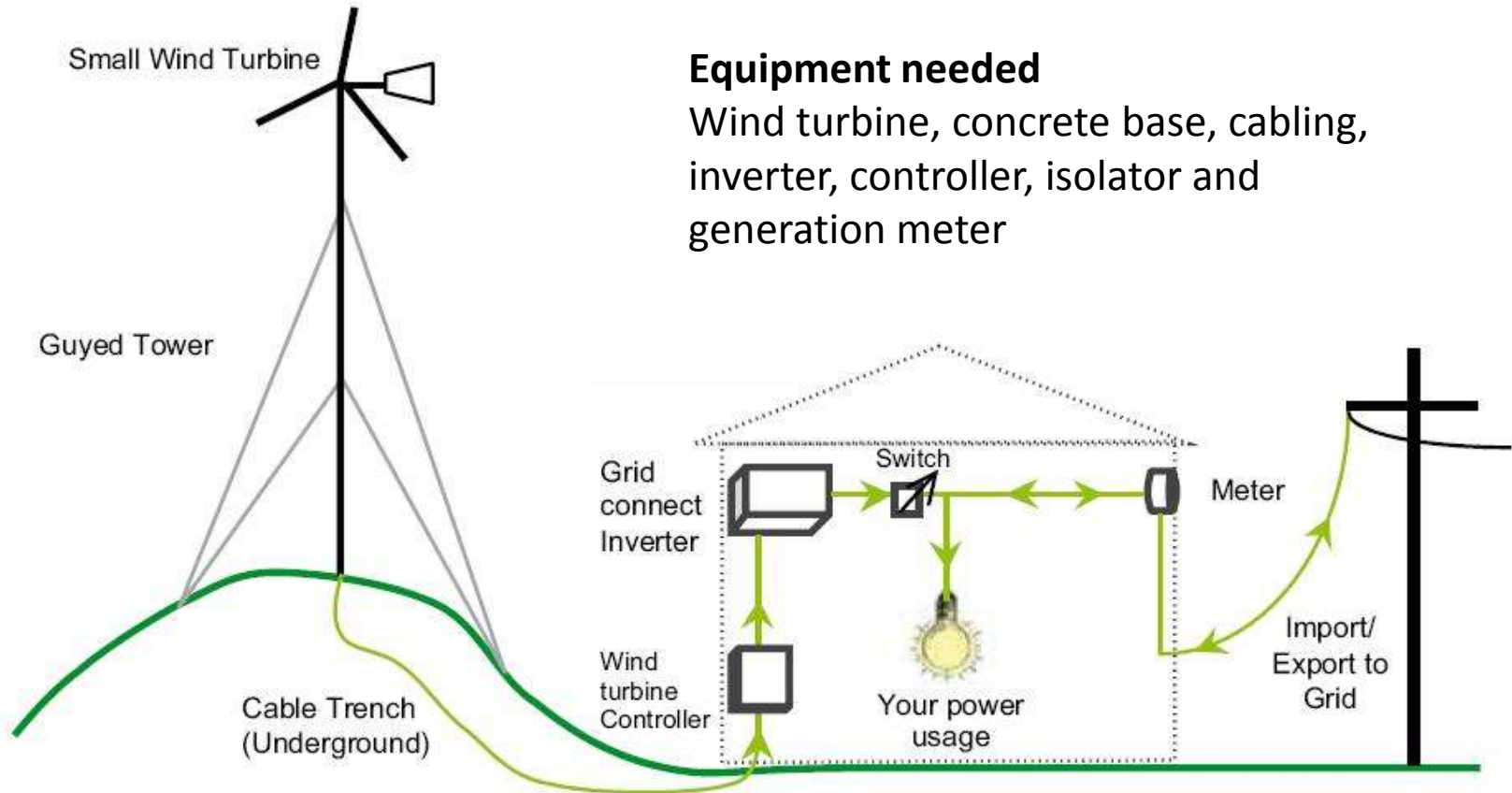
How does a wind turbine work?



How does a wind turbine work?

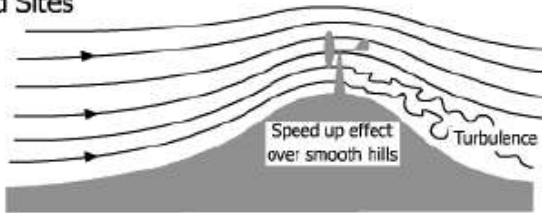
The principle is exactly the same for both small and large scale wind turbines.

- Aerodynamically-tuned blades are driven by the wind.
- The rotor turns, driving an electrical generator (sometimes via a gearbox) in the hub.
- The power is transformed to an appropriate voltage and is then supplied either directly to a building (small-scale) or to the grid via a substation (large-scale).

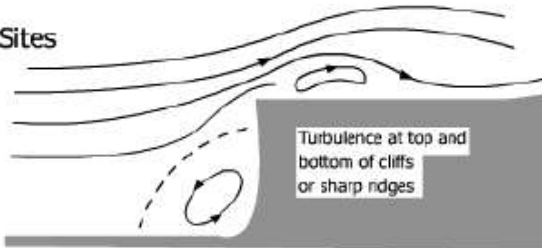


Flow over hills and obstacles

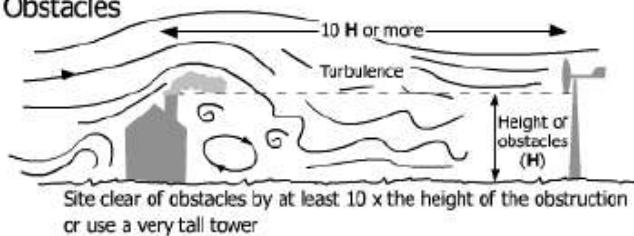
Good Sites



Bad Sites



Obstacles



Location, Location, Location

Single biggest issue with wind turbine performance is the location of the turbine itself.

- Monitoring the wind onsite is essential
- Avoid turbulent sites even if they are windy
- High average wind speeds are vital - energy in the wind is proportional to the cube of its speed



Wind Turbine Financial returns

FIT rate (1.5-15kW) – 28.0p > ??? (20 yrs)

Fully installed 15kW turbine

£60,000

Expected annual generation

24,000 kWh

Estimated generation tariff (FIT)

£6,720

Estimated export tariff

£372

Estimated savings in electricity

£1,213

Estimated effective annual revenue

£8,305

Annual rate of return

13.8%

"Proven Energy Go Bust"

The Herald

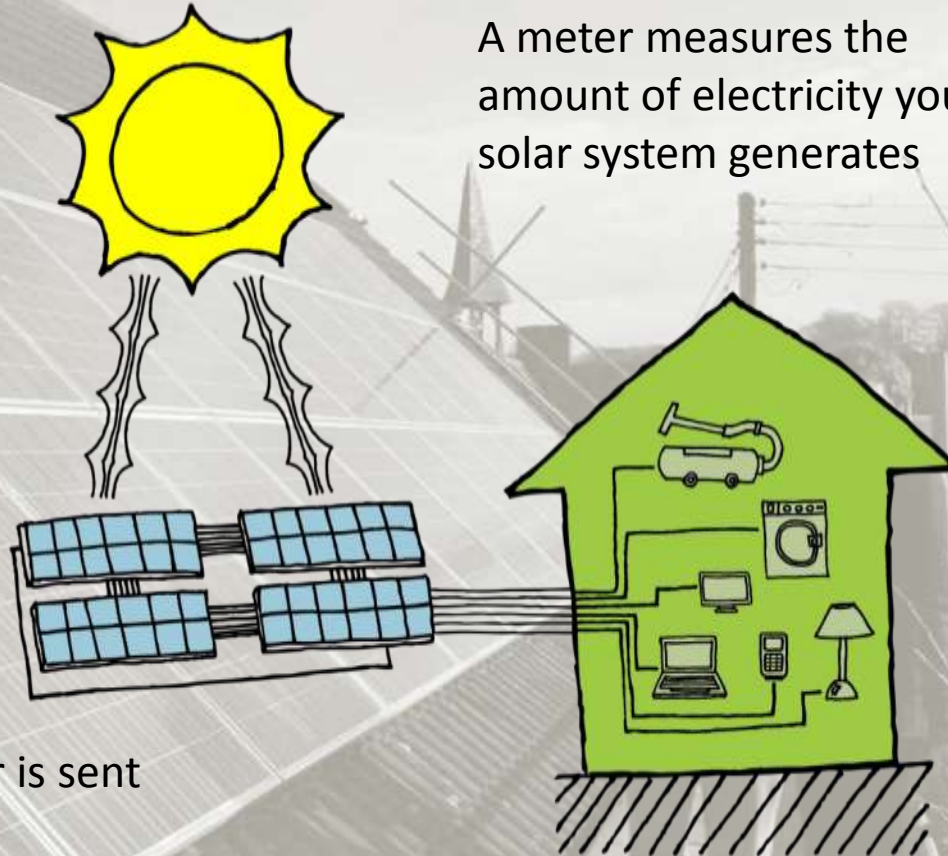
Solar Energy

- Solar Photovoltaic (PV) – generates electricity from light
 - 43,000 PV installations between April 2010 and Sept 2011
 - PV benefits from the Feed-in Tariff scheme set up in April 2010
- Solar Thermal – generates heat from the sun
 - Unlike wind and PV, thermal generates hot water rather than electricity.
 - Thermal benefits from the Renewable Heat Incentive. The RHI for Commercial systems was set up in November 2011. Domestic RHI is due October 2012.

Solar panels turn photons from the sun's rays into DC (direct current) electricity

An inverter turns DC into AC (alternating current) so it can be used in your home

Any unused AC power is sent back to the grid



A meter measures the amount of electricity your solar system generates



Considerations for PV

- Much more applicable than wind
- Roughly south-facing aspect – orientation between south-east and south-west is fine
- A 30% tilt is optimum – a steeper slope means more electricity generated in the winter and less in summer, and vice versa for a shallower slope
- Panels should ideally be unshaded from buildings or trees
- For commercial or agricultural premises that use daytime electricity (for refrigeration or running an office) PV is perfect.



PV Financial returns

"Solar Subsidies to be cut by half"

The Times

Commercial FIT (10-50kW) - 32.9p > 15.2p (25 years)

260 panel (50kWp) roof-mounted system including
all kit, labour, scaffolding, design and commissioning.

£90,000

Expected annual generation

41,138 kWh

Estimated generation tariff (FIT)

£6,253

Estimated export tariff

£638

Estimated savings in electricity

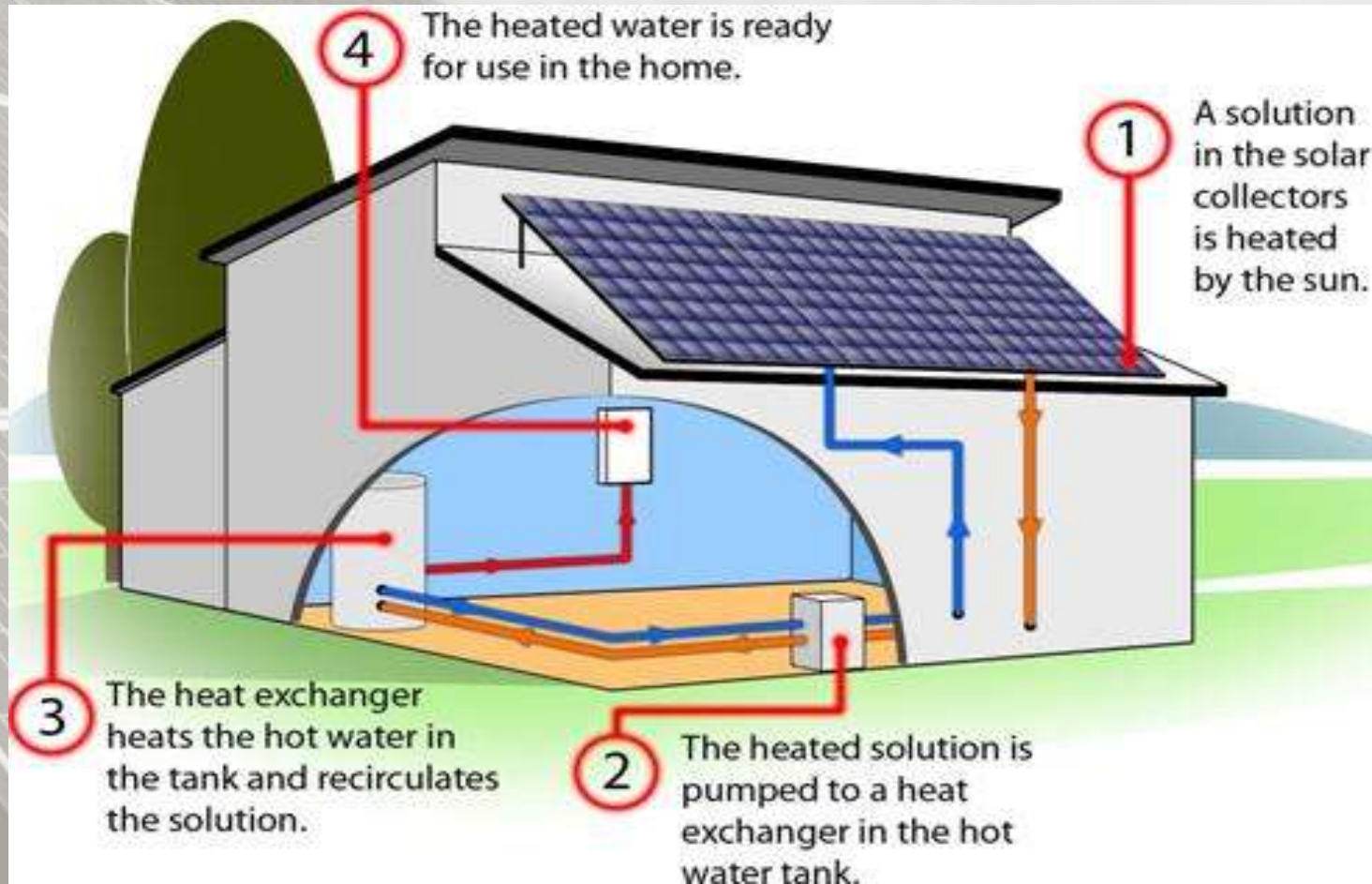
£2,080

Estimated effective annual revenue

£8,971

Annual rate of return

10.0%



Considerations for Thermal

- Heats and pre-heats stored water
- Can generate 50% of your hot water requirements
- You need 2-4m² of roof space for a standard domestic system
- Thermal systems work better with a hot water tank – some combi boilers are not compatible.
- If you have a high demand for hot water especially in the summer – campsites, B&B – solar thermal makes a lot of sense.





Thermal Financial returns

"Green heating scheme launched"

Reuters

Commercial RHI (<200kWth) – 8.5p (20 years)

60 tube roof-mounted system including
all kit, labour, scaffolding, design and commissioning.

£9,000

Expected annual generation

3,617 kWh

Estimated generation tariff (RHI)

£308

Estimated export tariff

£0

Estimated savings in electricity (based on oil at 6p/kWh)

£310

Estimated effective annual revenue

£618

Annual rate of return

6.9%



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Technology	Advantages	Disadvantages
Wind Energy	<ul style="list-style-type: none"> • Can offer best returns if in optimum location • Generation fits well with demand 	<ul style="list-style-type: none"> • Question mark over reliability of technology • Can perform very badly if not correctly sited • Planning can be difficult
Solar PV	<ul style="list-style-type: none"> • More applicable and simpler to install than wind • Good levels of return even with FIT drop • Fits well with high daytime energy users 	<ul style="list-style-type: none"> • Will only generate during daylight hours
Solar Thermal	<ul style="list-style-type: none"> • Relatively cheap to install • Reliable technology • Great for users with high hot water demand in summer 	<ul style="list-style-type: none"> • Often requires internal work to be carried out • Not so compatible with some older combi boilers

The future of small-scale renewables in the UK

- What will the Feed-in Tariff look like in 6 months time?
- Has solar PV become too a victim of it's own success?
- Will wind energy continue to be hampered by planning issues?



GRID PARITY



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