

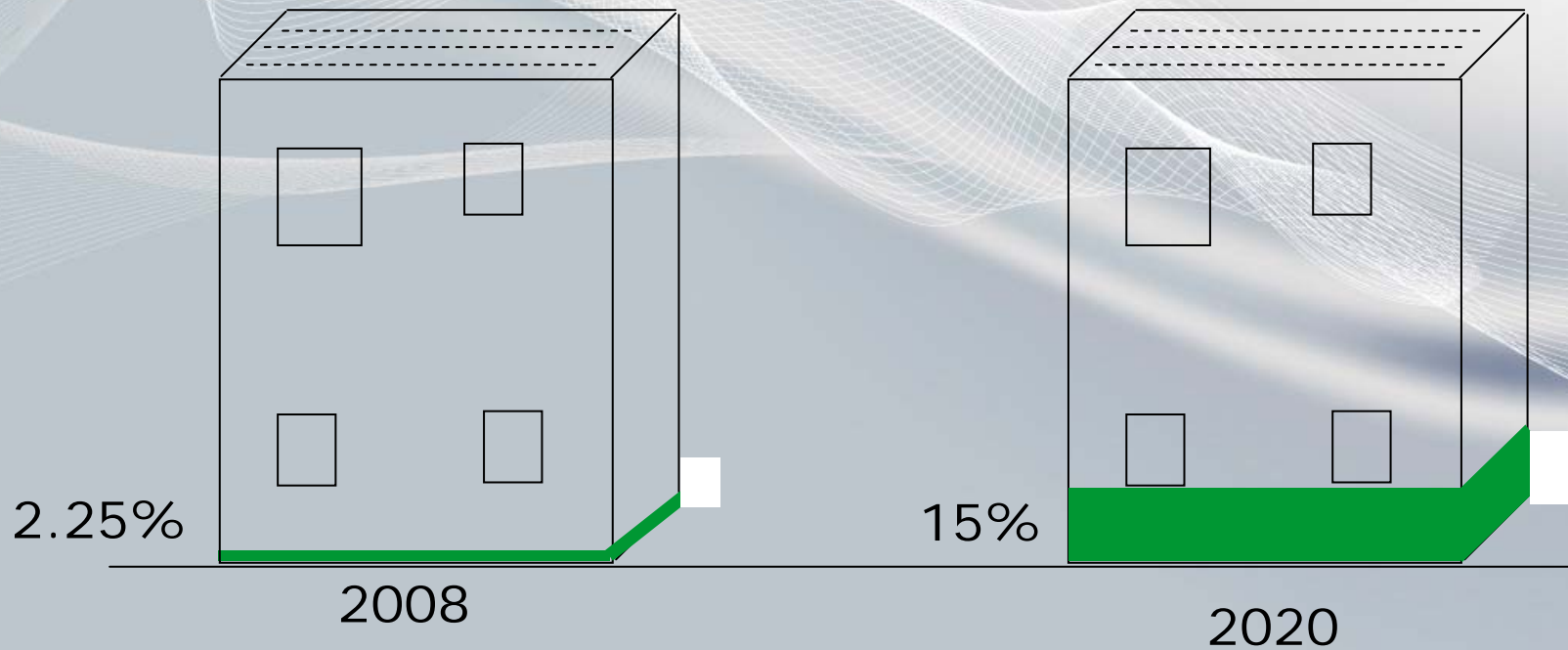


# ***Feed-in Tariffs and the Renewable Heat Incentive***

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# Current & future electricity use

*Proportion of UK energy from renewable sources:*



Source: The UK Renewable Energy Strategy 2009

# What is a feed-in tariff?



- *Guaranteed payment for the on-site generation of electricity from approved renewable sources.*
- *Electricity generated may be used on-site or exported and gain an additional tariff [3p/kWH].*
- *Users [business and domestic] gain by:*
  - *Guaranteed payments for guaranteed period*
  - *Additional premium if electricity is exported*
  - *Offset purchase of grid electricity*
  - *Payments to domestic consumers not subject to income tax*
- *The guarantees improve investment return to a target of at least 8% pa.*
- *Paid by your electricity supplier*

# *Policy benefits*



- *Contributes to achieving the UK commitment of 15% renewable energy by 2020*
  - *Capitalises on the on-site renewable capacity*
  - *Contributes to achieving zero carbon buildings*
  - *Offsets need for additional power generation and network capacity*
  - *BUT, does not link directly to reducing energy demand or improved energy efficiency*
- we can still waste the renewable energy generated*

## **Other policies**



- *RO Renewable obligation*
  - *ROCs generally used to support larger installations but does overlap with FiTs*
- *RHI Renewable Heat Incentive*
  - *Similar to FiT but focussed on heat generation*
  - *Arrives April 2011 but currently out to consultation*
- *HESS Heat and Energy Saving Strategy*
  - *Aim to achieve zero carbon in existing homes*
  - *Includes district heating and CHP*
- *CESP Community Energy Saving Programme*
  - *Focused on measures in housing through CERT/energy suppliers*

## ***FiT - technologies included***



- *The scheme covers the following electricity generating technologies, up to 5 MWe:*
  - *Solar electricity (PV) (roof mounted or stand alone)*
  - *Wind turbine (building mounted or free standing)*
  - *Hydroelectricity*
  - *Anaerobic digestion*
  - *Micro combined heat and power (mCHP) but limited to a pilot at this stage*

# Solar photovoltaic panels (PV)

- *Monocrystalline*
- *Poly/multi crystalline*
- *Amorphous/thin film*



# Solar photovoltaic panels (PV)

- *Electricity generation*
  - *Approx 800kWh per 1kWp / 10m<sup>2</sup>*
  - *10 – 20% total electricity consumption*
- *Considerations*
  - *Roof orientation & pitch*
  - *Roof type*
  - *Inverter / DC connection*



# Small wind turbines

- **Electricity generation**
  - 1.5kW = 3 to 4,000kWh
  - 5kW = 13,000kWh
  - 15kW = 40,000kWh

*Figures from RenewableUK (Formerly BWEA)*

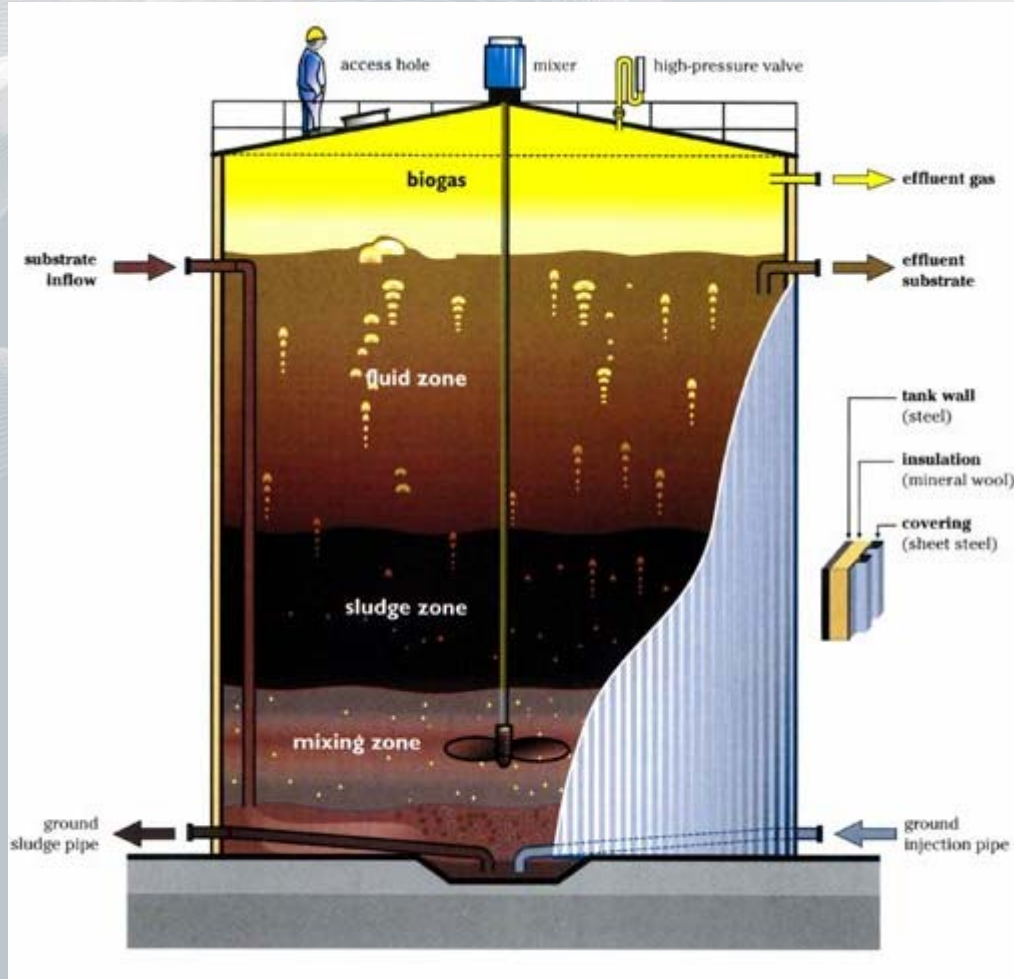
- **Considerations**

- Exposure to prevailing wind
- Surroundings / neighbours
- Roof type / land available





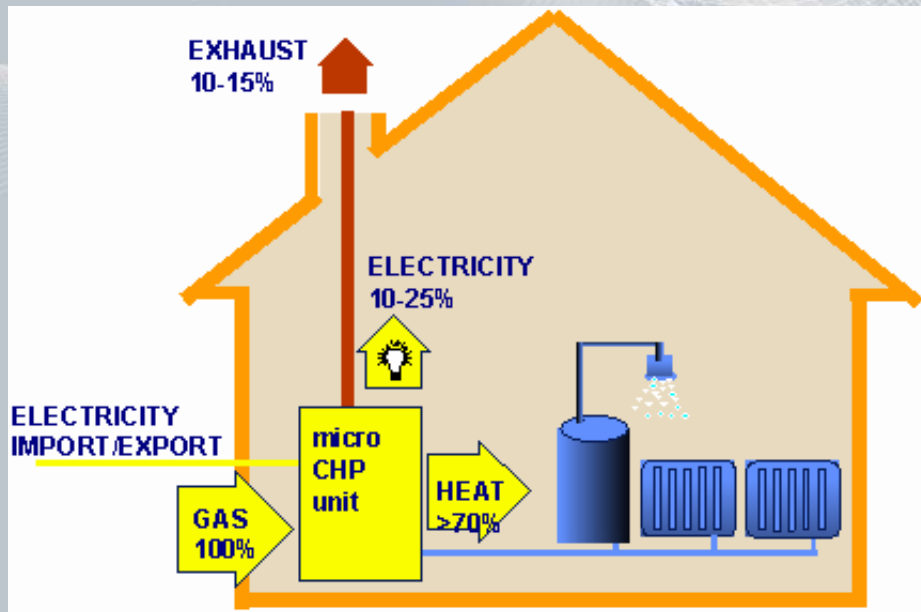
# Anaerobic digestion



- *Micro-organisms break down biodegradable material in absence of oxygen -> Biogas*

# Micro Combined Heat and Power (CHP)

- Pilot scheme for 30,000 non-renewable micro CHP installations



# Summary technologies and FiT rates



Energy Source	Tariff p/kWH	Duration Years
Anaerobic digestion	11.5 - 9.0	20
Hydro	19.9 - 4.5	20
Solar PV	41.3 - 29.3	25
Wind	34.5 - 4.5	20
Micro-CHP (<2kW)	10.0	10
Existing transferred from RO	9.0	To 2027

- *Once registered tariff is set over period - index linked*
- *Some tariffs reduce on subsequent years*
- *MicroCHP limited to first 30,000 installations [review at 12,000]*
- *Generation to be metered - initially 'deemed'*

# Table of generation tariffs to 2020

Source: Government response URN 10D/535

Technology	Scale  Scheme Year	Tariff level for new installations in period (p/kWh) [NB tariffs will be inflated annually]											Tariff lifetime (years)
		1 1/4/10 – 31/3/11	2 to 31/3/12	3 to 31/3/13	4 to 31/3/14	5 to 31/3/15	6 to 31/3/16	7 to 31/3/17	8 to 31/3/18	9 to 31/3/19	10 to 31/3/20	11 to 31/3/21	
Anaerobic digestion	≤500kW	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	20
Anaerobic digestion	>500kW	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	20
Hydro	≤15 kW	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	20
Hydro	>15-100 kW	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	20
Hydro	>100 kW-2 MW	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	20
Hydro	>2 MW – 5 MW	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	20
MicroCHP pilot*	≤2 kW*	10*	10*	10*	10*	10*	10*	10*	10*	10*	10*	10*	10
PV	≤4 kW (new build**)	36.1	36.1	33.0	30.2	27.6	25.1	22.9	20.8	19.0	17.2	15.7	25
PV	≤4 kW (retrofit**)	41.3	41.3	37.8	34.6	31.6	28.8	26.2	23.8	21.7	19.7	18.0	25
PV	>4-10 kW	36.1	36.1	33.0	30.2	27.6	25.1	22.9	20.8	19.0	17.2	15.7	25
PV	>10-100 kW	31.4	31.4	28.7	26.3	24.0	21.9	19.9	18.1	16.5	15.0	13.6	25
PV	>100kW-5MW	29.3	29.3	26.8	24.5	22.4	20.4	18.6	16.9	15.4	14.0	12.7	25
PV	Stand alone system**	29.3	29.3	26.8	24.5	22.4	20.4	18.6	16.9	15.4	14.0	12.7	25
Wind	≤1.5kW	34.5	34.5	32.6	30.8	29.1	27.5	26.0	24.6	23.2	21.9	20.7	20
Wind	>1.5-15kW	26.7	26.7	25.5	24.3	23.2	22.2	21.2	20.2	19.3	18.4	17.6	20
Wind	>15-100kW	24.1	24.1	23.0	21.9	20.9	20.0	19.1	18.2	17.4	16.6	15.9	20
Wind	>100-500kW	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	20
Wind	>500kW-1.5MW	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	20
Wind	>1.5MW-5MW	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	20
Existing microgenerators transferred from the RO		9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	to 2027

\* Note the microCHP pilot will support up to 30,000 installations with a review to start when the 12,000<sup>th</sup> installation has occurred

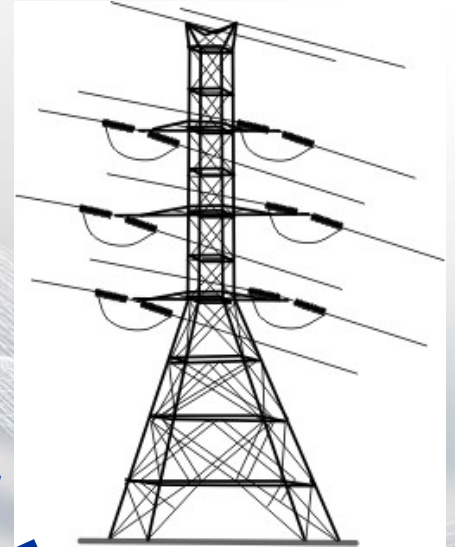
\*\*[“Retrofit” means installed on a building which is already occupied ; “New Build” means where installed on a new building before first occupation ; “Stand-alone” means not attached to a building and not wired to provide electricity to an occupied building

# ***FITs in practice***



**Electricity needs:  
4,000kWh/yr**

**Import  
4,000kWh/yr**



**Cost:  
4,000 x 13p = £520/yr**

# FITs in practice

Install 2kWp  
PV panels  
1,600kWh/yr

Tariff:  
 $1,600 \times 41.3\text{p} = \text{£}661$

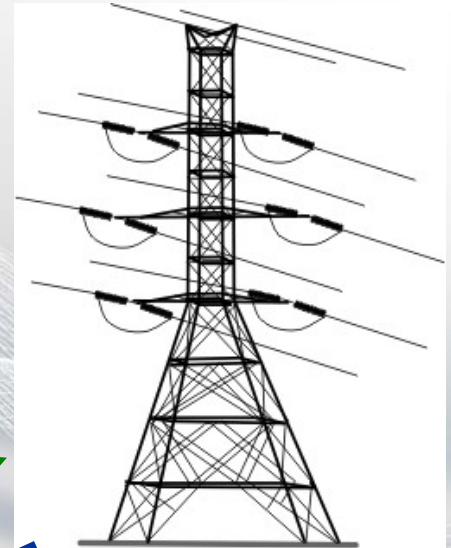
50% used on  
site  
800kWh/yr



Electricity needs:  
4,000kWh/yr

50%  
exported  
800kWh/yr

Tariff:  $800 \times 3\text{p} = \text{£}24$



Import  $4,000 - 800 =$   
3,200kWh/yr

Cost:  
 $3,200 \times 13\text{p} = \text{£}416$

# FiTs in practice



Element	No Generation	Generation
Import Costs	4,000 x 13p/kWh = £520/yr	3,200 x 13p/kWh = £416/yr (save £104/yr)
Generation tariff (<4kW PV retrofit)	0	1,600 x 41.3p/kWh = (gain £661/yr)
Export tariff	0	800 x 3p/kWh = (gain £24/yr)

Total: £104 + £661 + £24 = £789 or **£19,720** over 25 years

# Mechanism

Meter to measure electricity generated

Advise energy supplier

Supplier registers the installation

Payments will be made by energy supplier

# Relationship to R0



- $\leq 50\text{kWe}$  capacity = FiT
- $> 50\text{kW}$  and  $\leq 5\text{MWe}$  = choice of FiT or R0
- $> 5\text{MWe}$  capacity = R0
- 'Microgenerator' applications for R0 before 15 July 2009 remain with R0
- 'Microgenerator' applications between 15 July 2009 and 1 April 2010 transfer to FiT at 9.0 p/kWh supported to 2027
- New government expect to extend FiT to existing installations

# *What is the Renewable Heat Incentive (RHI)?*



- *Guaranteed payment for the on-site generation of heat from approved renewable sources.*
- *Users [business and domestic] gain by:*
  - *Guaranteed payments for guaranteed period*
  - *Offset purchase of natural gas or other fuels*
  - *Payments to domestic consumers not subject to income tax*
- *The guarantees improve investment return to a target of at least 12% pa.*
- *Paid by your gas supplier.*
- *Due to start April 2011. Consultation now closed.*

# Renewable heat technologies included



- *Air source heat pumps*
- *Ground source heat pumps*
- *Solar thermal*
- *Biomass boilers*
- *Biogas*
- *Biomethane added to the national gas network*
- *Bioliquids*
- *Renewable CHP*
- *Renewable district or community heating*



# Criteria and payment



- *Small and medium generators (< 45kW):*
  - *Microgeneration Certification Scheme*
  - *Annual payment*
- *Large-scale installations:*
  - *Register and seek accreditation directly from Ofgem*
  - *Quarterly payment*

# Calculations of tariffs



- *Small scale: deemed*
- *Medium-scale: deemed, with option of metering for solid biomass installations*
- *Large-scale and process-heating: metered*
- *Biomethane injection and district heating: metered*

# Proposed tariffs



Technology	Scale	Tariffs (pence/kWh)	Tariff lifetime (years)
<b>Small installations</b>			
Solid biomass	Up to 45kW	9	15
Biodiesel (restricted use)	Up to 45kW	6.5	15
Biogas on-site combustion	Up to 45kW	5.5	10
Ground source heat pumps	Up to 45kW	7	23
Air source heat pumps	Up to 45kW	7.5	18
Solar thermal	Up to 45kW	18	20
<b>Medium installations</b>			
Solid biomass	45kW-500kW	6.5	15
Biogas on-site combustion	45kW-500kW	5.5	10
Ground source heat pumps	45kW-500kW	5.5	20
Air source heat pumps	45kW-500kW	2	20
Solar thermal	45kW-500kW	17	20
<b>Large installations</b>			
Solid biomass	500kW and above	1.6-2.5	15
Ground source heat pumps	350kW and above	1.5	20
Biomethane injection	All scales	4	15

## ***RHI in practice***



- *15,000kWh heat consumption per year*
- *Switch gas to combination of biomass and solar thermal*
- *Installer determines requirements:*
  - *10,000 kWh for space heating*
  - *3,700 kWh for hot water*
  
- *Solar thermal: 2,200kWh (@ 18p = £400/yr for 20 years)*
- *Biomass boiler: 11,500kWh (@ 9p = £1,035/yr for 15 years)*



**Thank you**

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