RESCO
RENEWABLE ENERGY SUPPLY CHAIN OPPORTUNITIES

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The Business Case for Microgeneration

17th March 2010

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Institute for Environment Sustainability and Regeneration

investing in your future
European Regional Development Fund
European Union

Advantage West Midlands
www.advantagewm.co.uk

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Agenda

1. Introduction

2. What do we mean by “Microgeneration”
3. Financial support for microgeneration
4. Opportunities

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Introduction

Encraft

- Independent professional engineering specialising in renewables and energy efficiency
- Established in 2003
- Employing 12 staff
- Based in Leamington

Microgeneration

Definition from

- The Climate Change and Sustainable Energy Act 2006

Climate Change and Sustainable Energy Act 2006

CHAPTER 19

CONTENTS

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Microgeneration techmologies

(a) biomass;
(b) biofuels;
(c) fuel cells;
(d) photovoltaics;
(e) water (including waves and tides);
(f) wind;
(g) solar power;
(h) geothermal sources;
(i) combined heat and power systems

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Microgeneration

Microgeneration systems sized up to

- 50 kW for electrical output
- 45 kW for heat output.

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Low carbon economic opportunities are local and massive

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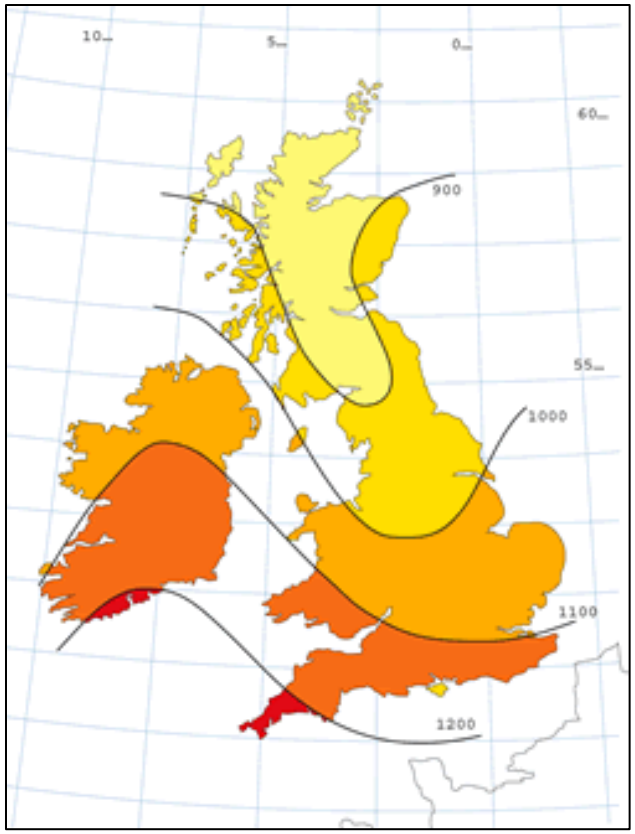
Annual solar energy kWh/m²



Germany has created 120 000 jobs and an industry worth £5 billion p.a. In less than 10 years

Renewable technologies are sensitive to location

Skilled deployment and operation adds far more value than in commodity fuel-based industries

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Business Drivers.

- Sticks
  - Legislation
- Carrots
  - Grants and financial incentives

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Regulatory complexities are increasing

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Building sector

Permitted development
Building Regulations
Energy labelling of buildings
Merton rule
Code for Sustainable Homes
European Directive (EPCs)
PPS1, PPS22 etc

Energy industry

CERT
Targets for micro-generation (CCSE Act)
Agents for ROCs
Framework contracts
Smart metering
R&D grants
DECC

Consumer policy

VAT reduction
Stamp duty exemption
Grants available
Income tax allowances
Export rewards

Targets

Standards

Incentives

Opportunities

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Standards will drive more developers and individuals to on-site generation

2006 Code for Sustainable Homes

2007 Energy Performance Certificates

2008 Permitted Development Rights

2009 EUDEPB – Formal consideration of on-site generation required

2010 Building Regulations + 25%

2013 Building Regulations +40%

2016 Building Regulations zero net CO_2

The 2006 Building Regulations marked a fundamental shift to whole building emissions evaluation

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Financial Support for low carbon technologies

CERT

Feed in Tariffs

Renewable Heat incentives

ECA’s

Interest free loans.

Grants

CERT

- Obliges energy companies to take steps to reduce CO2 emissions from homes.
  - Covers both energy efficiency and micro generation
  - Products used need to demonstrate proven CO2 reduction benefits
  - OFGEM oversee the CERT program

Feed in Tariff

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- Due to be introduced from April 2010
- Rates dependent on technology

Technology	Rates / kWh	Lifetime
Solar Electric up to 5 MW	41.3p to 29.3p	25 years
Wind up to 100kW	34.5p to 24.1p	20 years
Hydro up to 100 kW	19.9p to 17.8p	20 years

Full details of scheme can be found on the DECC web site

http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/feedin_tariff/feedin_tariff.aspx

Renewable heat incentive

Currently under consultation so details are not finalised.

Examples

Technology	Rates / kWh	Lifetime
Solar Thermal up to 20kW	18p	20 years
Ground source heat pump up to 45 kW	7p	23 years
Air source heat pump	7.5p	18 years
Wood fuels up to 45 kW	9p	15 years

Details on the RHI consultation
http://www.decc.gov.uk/en/content/cms/consultations/rhi/rhi.aspx

ECA's and interest free loans

- Enhanced capital allowances available for products on the Energy Technology List (www.eca.gov.uk)
- Interest free loans available through The Carbon Trust
  - Available to SME's
  - Loan will be repaid over 4 years
  - Loan will be between £3,000 and £500,000
  - Measures must pay back in 4 years or the loan will be no more than the first 4 years predicted savings.

Grants

- Low Carbon Building program
  - Still open for heat technologies for home owners and community groups.
- Community Sustainable Energy Program
  - Supports projects on community buildings and schools
  - Last funding round October 2010

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Renewable technologies in brief

Sun

Wind

Water

Life

And of course energy efficiency

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Insulation and build quality save costs and carbon forever

This house in Ireland requires less than 1 kW to heat
Its thermal performance is 8-10 times better than UK building regulations

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Sun

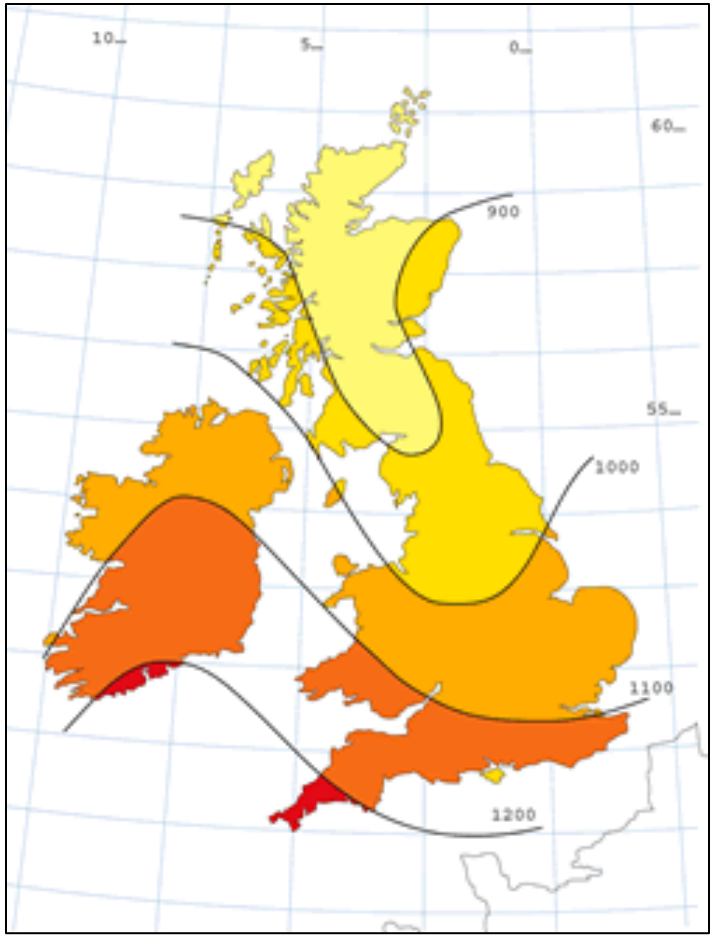

Chart shows annual irradiation kWh/m²

In context....

Typical home – 4000 kWh electricity
- 20000 kWh heating

And note the geographical variation

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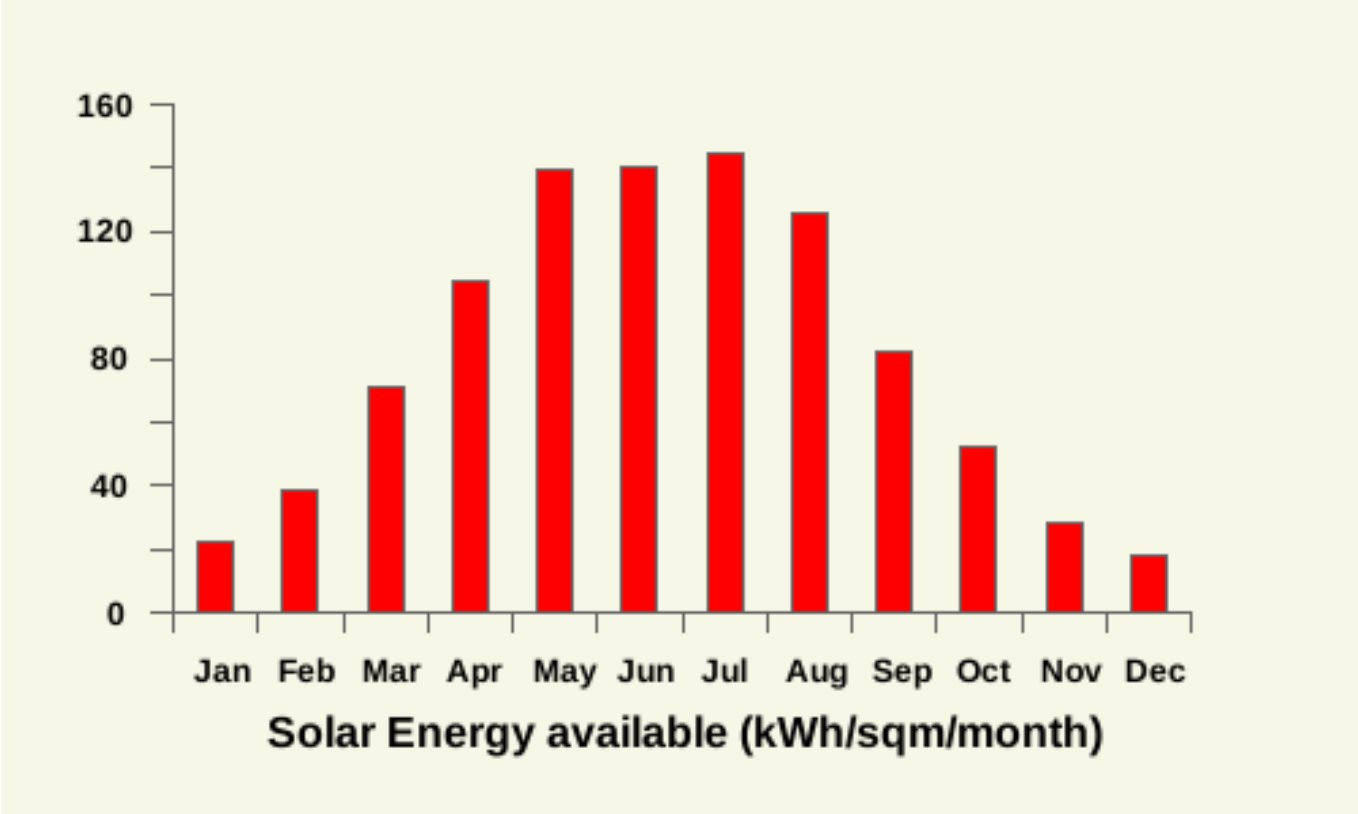
And the weather...



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There are two fundamental solar technologies used in the UK

Solar PV

Electricity

Solar thermal

Hot water

Flat plate

Evacuated tube

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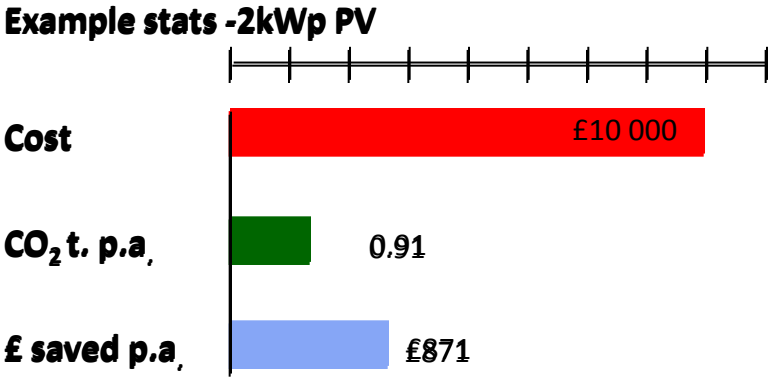
Solar PV systems come in many varieties

Like most renewable technologies, solar PV can be imaginatively integrated into developments if designed in early enough



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Wind power – variable economics like all renewables

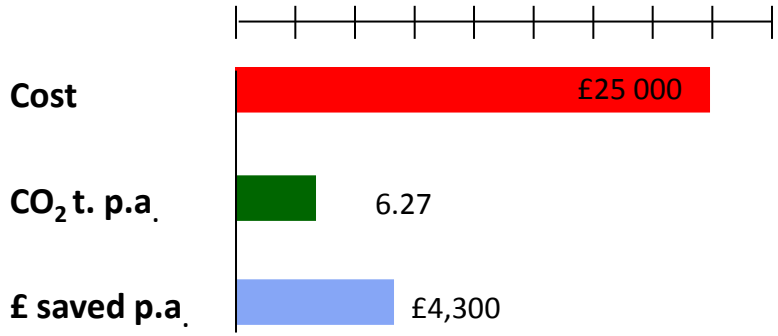
6 kW

£25 000

8000-15000 kWh p.a.

Wind works best in rural locations where there are few obstructions close by to cause turbulence in the wind.

Example stats -6 kW wind turbine Wind speed 5.5m/sec average (rural location)



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Heat pumps are another way of using solar energy

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Renewable Heat incentives

Ground source heat pumps.

- Cost of electricity 12p/kWh
- Coefficient of performance 3.2
- Cost per kWh of heat 3.75 / kWh
- RHI 7p/kwh
- Net cost to run **-3.25p**
- RHI paid for 23 years

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Air source heat pumps

Renewable Heat incentives

Air source heat pumps.

- Cost of electricity 12p/kWh
- Coefficient of performance 2.5
- Cost per kWh of heat 4.8p / kWh
- RHI 7.5p/kwh
- Net cost to run **-2.7p**
- RHI paid for 18 years

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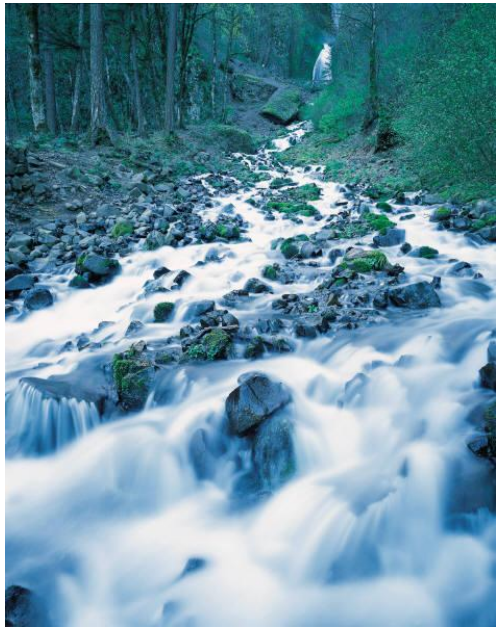
Water

Potential energy = mass x height x g



Yorkshire stream

Q = 300 l/s = 300 kg/s
H = 10 m

Power = 300 x 10 x 10 = 30 kW

River Avon

Q = 2000 l/s = 2000 kg/s
H = 1.5 m

Power = 2000 x 1.5 x 10 = 30 kW

Hydropower

300 years ago there were 30,000 micro hydropower schemes in England –

Now there are 90

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Life: biomass comes in many forms

The more energy dense take longer to renew, so are less sustainable

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Bioenergy can be effective in the right context

Anaerobic Digestion (Biogas)

Capital: £60 000 - £300 000

Output: 180 000 kWhe 220 000 kWht

Payback: 8-15 yrs

Important variables:

- Waste stream
- Scale
- Avoided disposal costs
- Grid connection

Example above and picture for plant processing manure from 2700 pigs.

230kW biomass heating

Capital: £150 000

Output: 330 000 kWh

Payback: 5-15 years at £50/t woodchip fuel

Important variables:

- Fuel supply and costs
- Storage space and access

This scheme will require approx 100-120 tonnes of fuel per yr (10 t per ha).

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Biomass is great when you control the supply chain

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Sustainability depends on securing your supply chain, locally or globally

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District heating (CHP) is a very efficient approach in the right contexts

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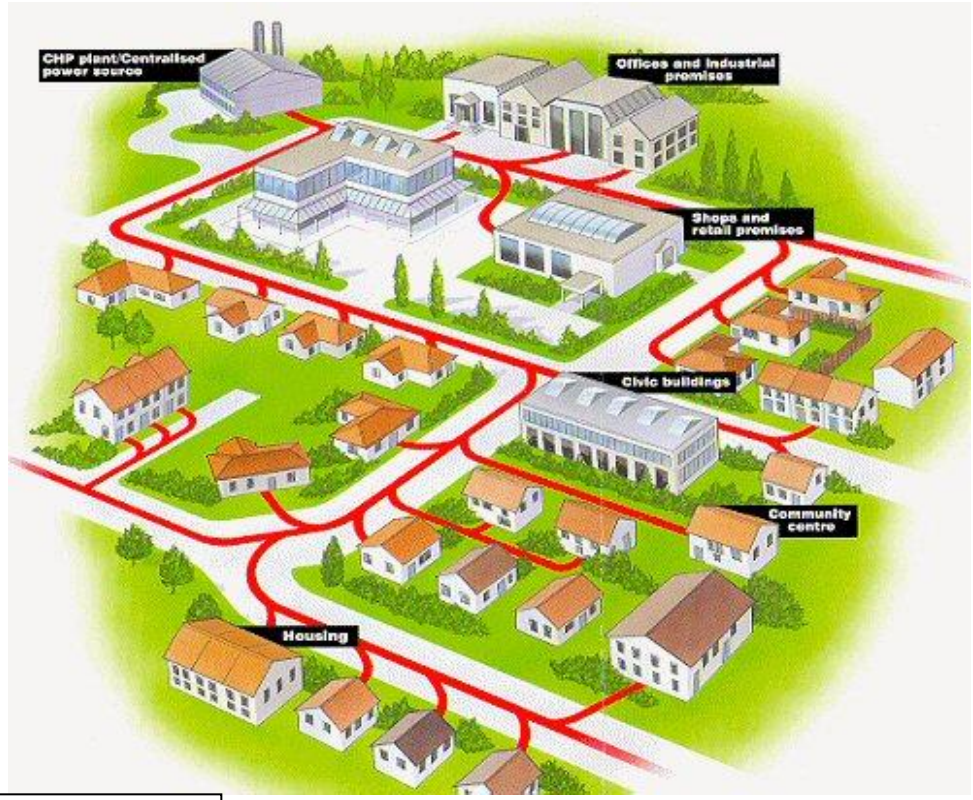
- Complementary loads
- Capacity/load ratio - sizing
- Optimisation of plant
- Utilisation of CHP/waste heat and alternative fuels
- System security
- Lower maintenance
- Lower customer costs
- Improved safety
- Future proofing – easier to retrofit emerging LZC technologies



Expanding networks in Sheffield, Southampton, Nottingham, London, Woking, Aberdeen & more

Slide from Michael King CHPA

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It ain't what you do – it's the way that you do it!

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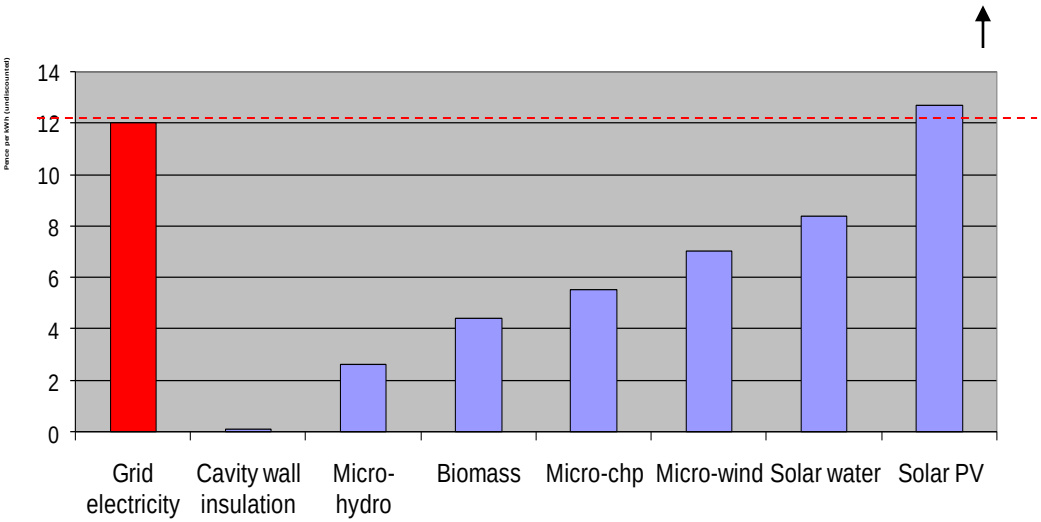
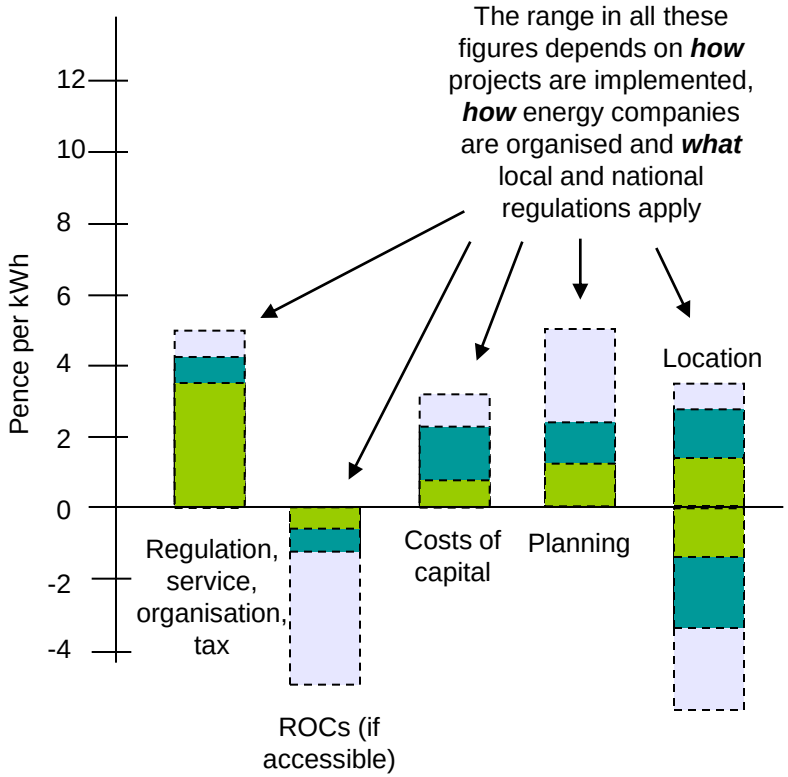
Theoretical energy costs to customers technology, installation and maintenance only



These figures include grants under current schemes, where applicable. Maintenance is included and costs are calculated over the lifetime of the microgeneration equipment. All are from real projects or technical feasibility studies.

Other microgeneration project costs and benefits to add to baseline



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Source: Encraft analysis

Strategic and visionary planning can make a massive difference

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Elephant and Castle

MUSCO

Infrastructure

Integrated approach from day 1

Finance key lever

Rare to see this properly technically and financially informed in the UK

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Developers can be dominated by short-term financial risk

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Benefits
44% reduction in energy costs
430 t CO_2 saved p.a.

1.8% increase in build costs
3 year payback

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Change could be more radical and faster than we expect

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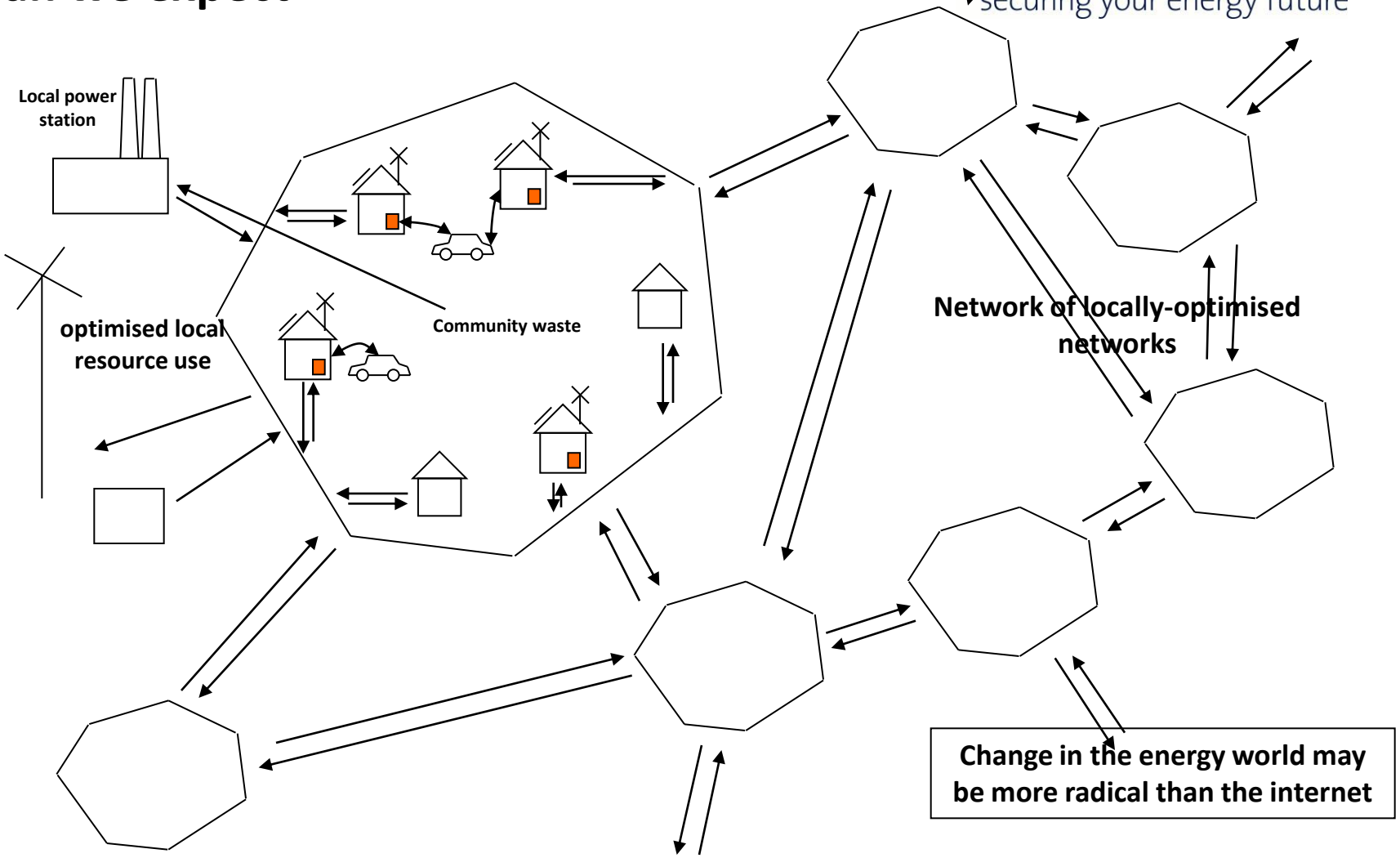

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Independent and impartial technical advice is now very accessible

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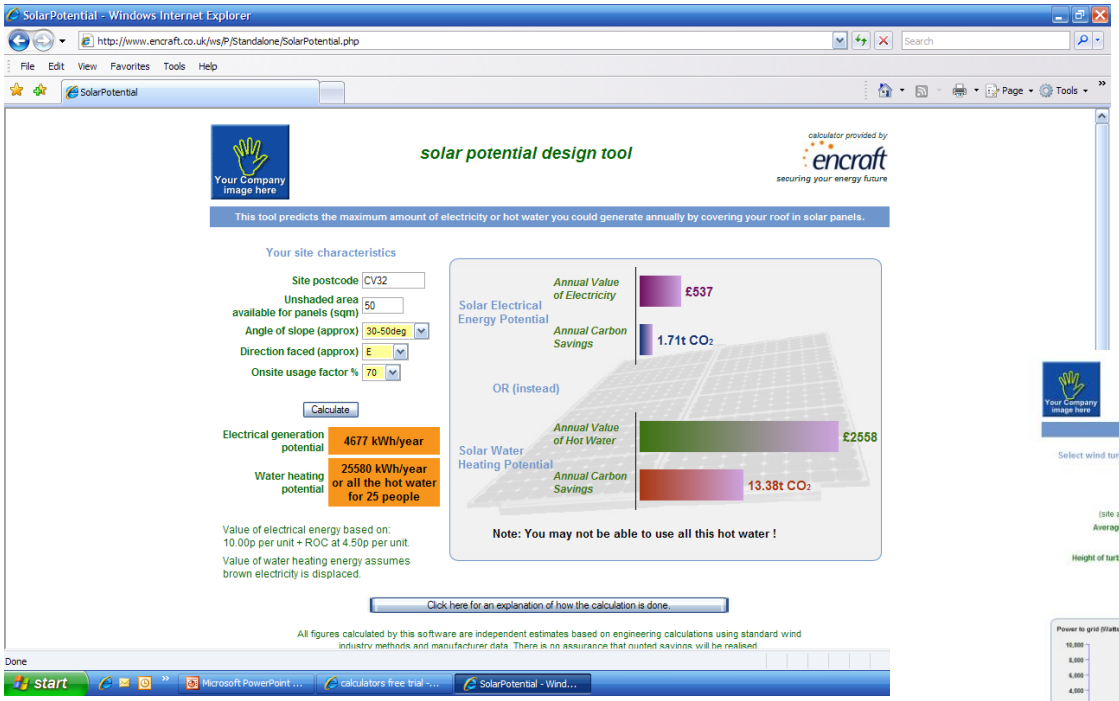

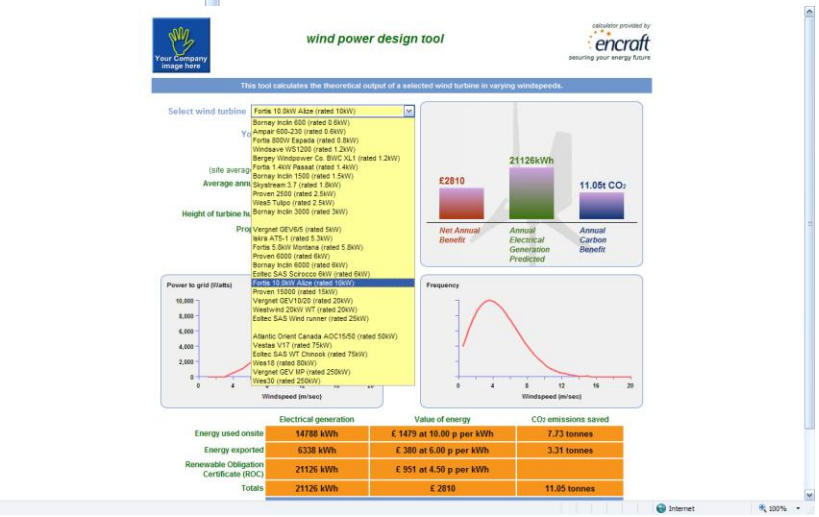

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Questions and discussion

Local experience?

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