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Biomass (Bioenergy) in the UK: a growing market?

IEA Task 40 [BIOTRADE]-

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Dr Jeremy Woods (ICEPT)
E-mail: jeremy.woods@imperial.ac.uk
Tel: +44 (0)20 7594 7315

Overview

- Bioenergy markets in the UK- future developments
  - Heat
  - Renewable Transport Fuels (RTFs)
  - Electricity and CHP
- The need for accreditation
  - National and International
- Summing Up

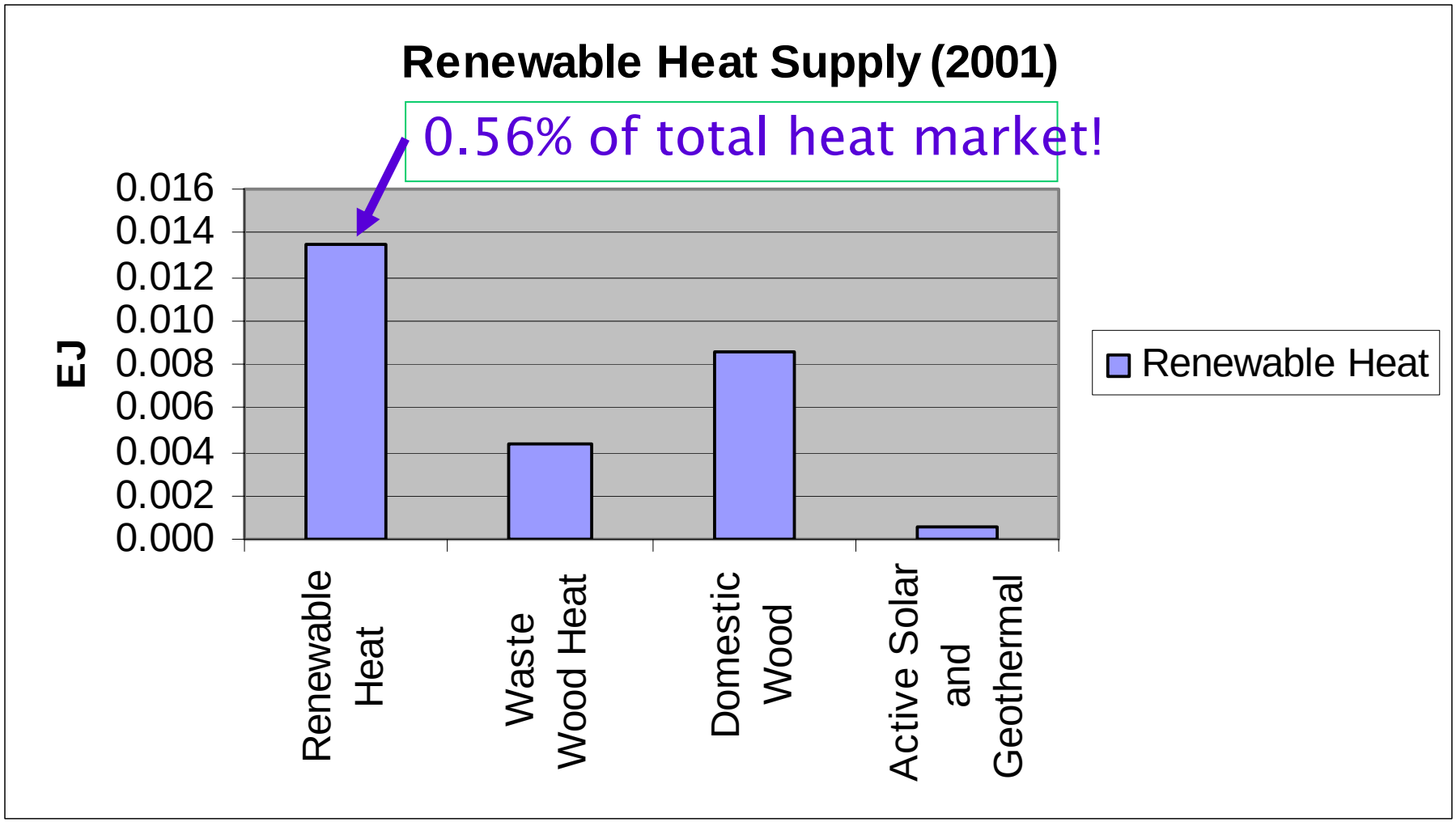
Background:

- Heat: Woods, Gross & Leach (2004)
  - 'Innovation in the renewable heat sector in the UK – markets, opportunities and barriers.' DTI
  - http://www.dti.gov.uk/energy/renewables/policy/renewables_innovation_review.shtml
- RTFs: Rickeard,D.J., *et al*. WTW Evaluation for Production of Ethanol from Wheat. London: LCVP. 1-39, 2004. http://www.lowcvp.org.uk
  - Woods & Bauen (2003) and Mortimer *et al (2003, 2004)*…
  - Also recent ECUCAR/CONCAWE/JRC rpt
- Electricity and CHP: Bauen & Woods (2004)
  - 'Bioelectricity Vision: Achieving 15% of Electricity from Biomass in OECD Countries by 2020.' WWF
- Biomass: RCEP (2004) & E4Tech (2004)

Heat:

- Heat: Woods, Gross & Leach (2004)
  - ‘Innovation in the renewable heat sector in the UK – markets, opportunities and barriers.’ DTI
- Biomass is already by far the dominant supplier of renewable energy in the UK (80%+)
  - Of this heat is the dominant sector!
  - Renewable heat can be supplied from:
    1. Biomass,
    2. Heat Pumps (Geothermal), and;
    3. SHW

Heat: Current; from renewables



Heat: markets by technology

- Biomass: if it were to supply 10% of the heat market, it would require:
  - A resource of 0.24 EJ (14.1 Mt biomass):
    - Notional land area req. = c. 2.82Mha (5 t/ha)
    - c. 8.6% UK land area
  - Generate an industry with biomass (pellet) sales worth **£ 700 Million** per year plus would need:
    - c. 200k 50kW units over 10 years (capital value **£900M**)
    - c. **£85M/yr** if installing 17 000, 50kW units per year!

Heat: biomass markets & costs

- Biomass the installed capital costs vary between £50 to 500 / kW_{th}
  - Biomass fuel costs may be broadly comparable to natural gas systems; £1.8 to 4.1/GJ.
  - Typical condensing gas boiler (25kWth) installed for £1300 = £50/kWth. Natural Gas domestic supply price (1.85p/kWh) = £5/GJ.
- Only biomass can provide sufficiently high temperatures for 'processes' other than space and water heating and for electricity.
  - Its challenge is to provide heat with the convenience and cost of fossil alternatives i.e. the fuel supply chain is critical.
  - Uniquely for biomass, the potential market for small-scale domestic CHP may also prove lucrative if key conversion technologies can be successfully developed.
- For SWH and Heat Pumps the main challenge is to reduce or justify high capital costs whilst improving usability.

RTFs: markets & costs

- Total UK market for biofuels as anticipated by:

1. EU Biofuels Directive (2% by 2005 and 5.75% by 2010; energy basis)
2. Proposed Renewable Transport Fuels Objective (HoL; May 2004)- same eventual object as EU Directive.

Fuel	PJ	Market
Bioethanol	53	£ 741M
Biodiesel	41	£ 858M
Total	94	**£ 1 600M**

UK Markets for RTF Feedstocks

- Estimate UK exports c. 1 million tonnes grain/osr for processing into bio-diesel/ bioethanol of this:
- Wheat grain exports of 500,000 tonnes per year
  - Probably all to Abengoa in Spain for bioethanol
- No fuel ethanol plants exist in the UK at the moment
- 2 major Biodiesel plants are under construction both using blends of OSR and Palm oil
  - Scotland- ARGENT (250kt/yr)
  - Newcastle - NE Biofuels plant (250kt/yr)

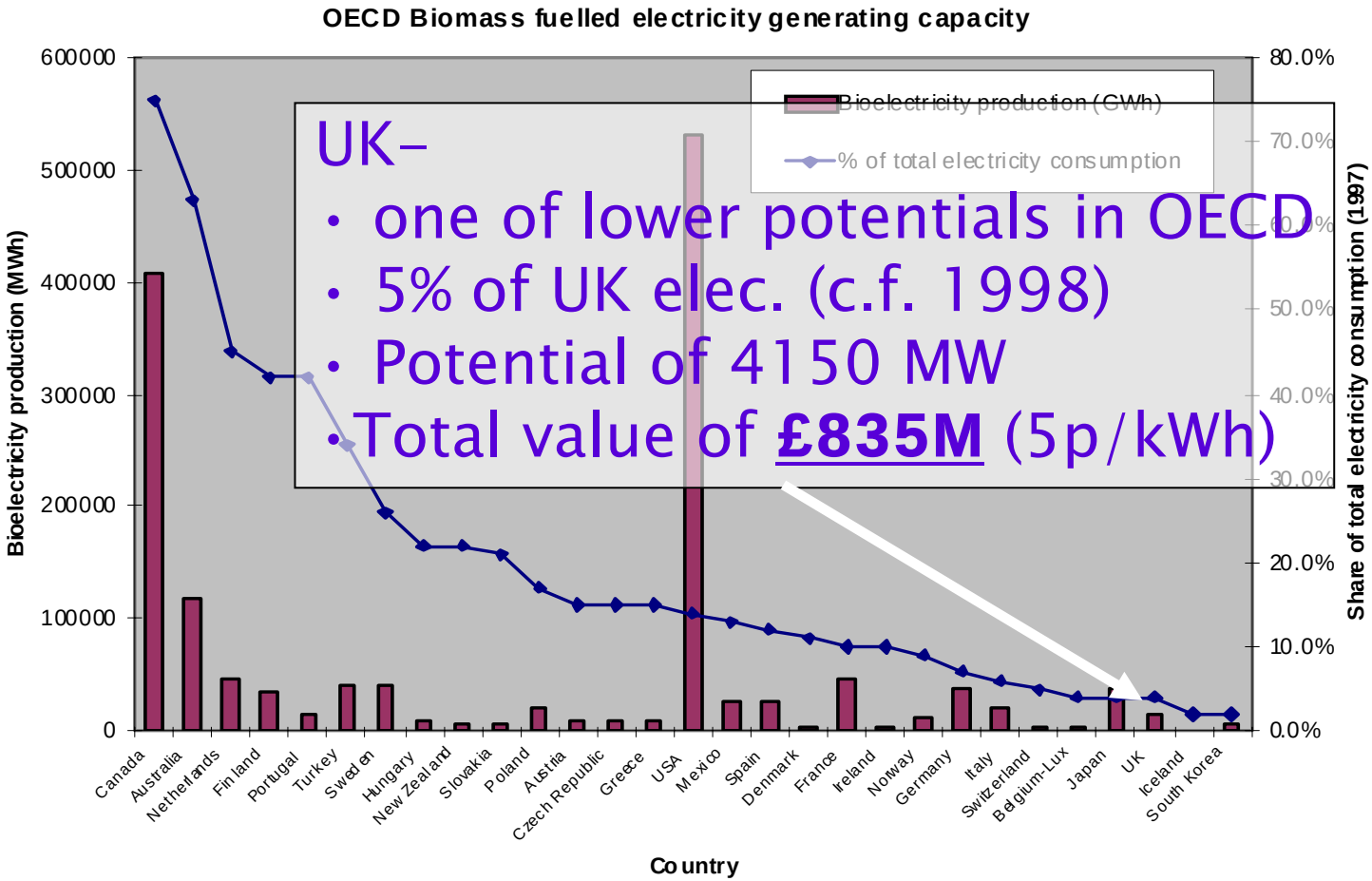
Source: Peter Billins (pers. Comm, 22nd October 2004 – by email)

Bioelectricity: WWF PowerSwitch

- Combination of use of agri and forestry residues and 5% of forest and woodland area
- Conservative technology assumptions
- No reconciliation with other potential uses
- Potential for OECD conservatively estimated at 15% by 2020.

BIOPOWER: 15% BY 2020 (OECD avg)

- A small number of countries could produce 50% or more of their current electricity demand from biomass, most countries over 10% and a few countries less than 10%



UK Co-Firing Markets

- Major new market as a result of the RO (Renewables Obligation)

1. RWE/Innogy at Didcot
   - forestry residues/pellets from Baltic States and palm oil kernels/residues from Malaysia/Indonesia
2. Eon/Powergen at Kingsnorth
   - mainly pellets from baltic
   - 2 x 30,000 tonne shiploads per month
3. Drax (4 GWe)
   - Own supply chain for palm oil residues from Malaysia (not confirmed)
4. British Energy Eggborough
   - source unknown
5. Alcan
   - Baltic pellets

Source: Peter Billins (pers. Comm, 22nd October 2004 – by email)

UK Co-Firing Markets: scale

- Estimate quantities in excess 1 million tonnes per year
- all by ship and then rail to power stations.

Issues:

- Ash disposal – requires new regulations
- Appear not to be interested in:
  - T40
  - Accreditation
- Imports are a pre-requisite for this capability!

Source: Peter Billins (pers. Comm, 22nd October 2004 – by email)

Conclusions

Bioenergy Sector	PJ Biomass	Market Value
Bio Heat[a]	239	£ 900M
Biofuels[b]	c. 150	£1 600M
Bioelectricity[c]	172	£ 800M

Notes: Total = c. 550PJ

a Bioheat equiv to 14Mt biomass (2.8 Mha = 8.6% land area)

b Biofuels = 5.6 Bl EtOH or 4.1 Bl Biodiesel (2.4 Mha)

c Bioelectricity = 9.5 Mt biomass (1.9 Mha)

– UK land area 24Mha

UK Accreditation: HGCA/Brit. Biogen & ICEPT

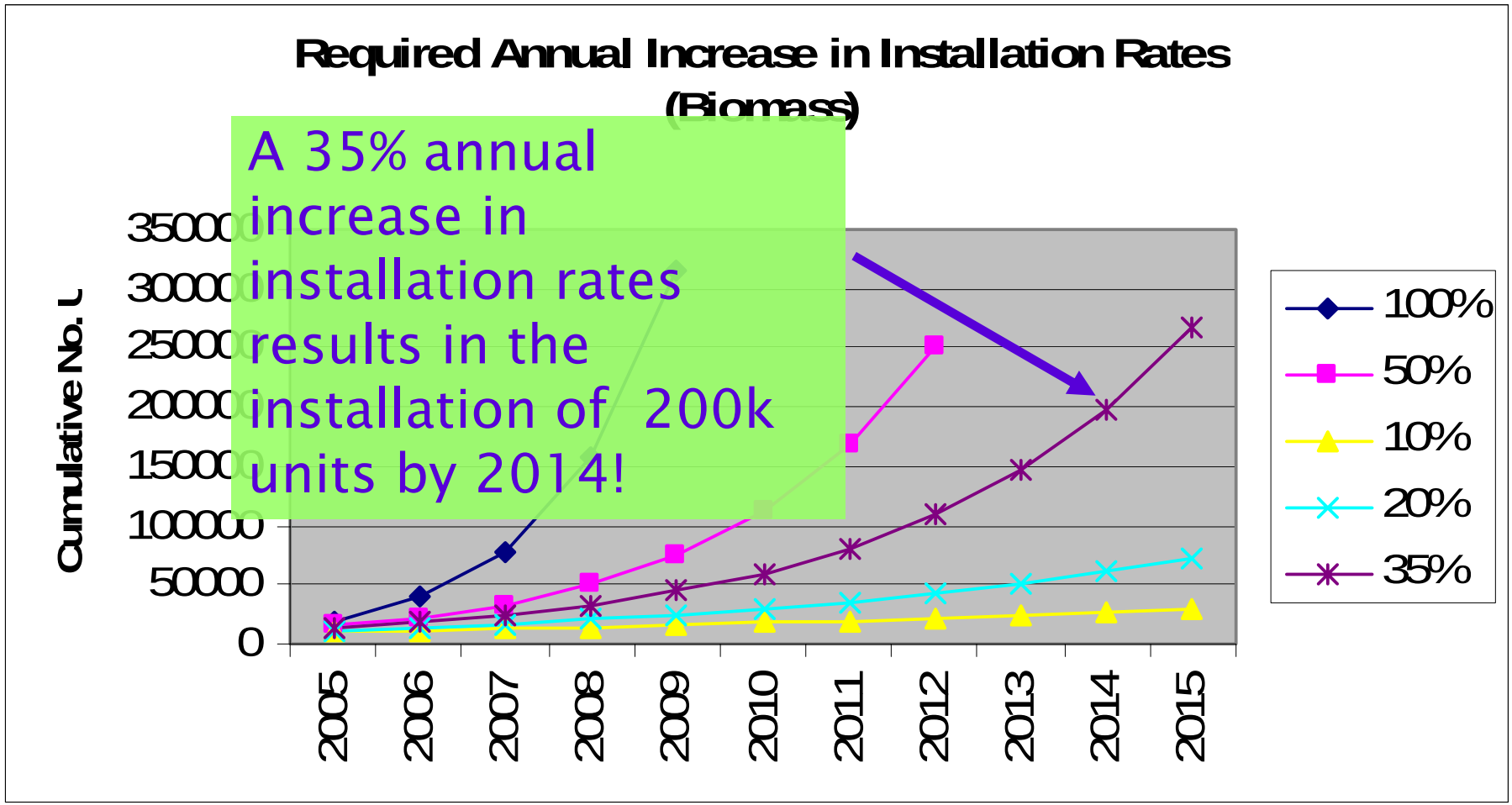
- Initially Bioethanol only
- UK Gov. interest because want understand that GHG impacts are closely tied to the chain and technology/management choice throughout the production chain
  - national or international

Conclusions

- Very substantial markets for bioenergy could emerge- sometimes competing for resources.
- Drivers: Energy Security, rural development, climate change mitigation, decentralisation, deregulation.
- There should be a unique role for biomass in linking renewables to conventionals.
- Information, collaboration and innovation are the key drivers.
- Strategic development of single purpose and poly-generation technologies (pathways).
- Incentives must be linked to environmental performance which requires robust, transparent and credible accreditation

- **Very Substantial TRADE in biomass (imports and exports) will be a basic component of the sector**

Are Predicted Market Increases Practical?



I THANK YOU!