



## WASTE: AN OVERLOOKED ENERGY SOURCE FOR UK

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# KEY UK ENERGY ISSUES



## Two key issues

- security of supply
- climate change

Renewables (including waste) have major role in addressing these

Importance of waste as a current and future energy source has been largely ignored until recently

# SECURITY OF SUPPLY

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UK oil and gas reserves running down (6 years proven reserves left?)

Nuclear currently declining

- projected plant closures
- new build programme?

Coal declining

- new build programme and carbon capture and storage issues?

UK imports of oil and gas currently mainly from Norway

- but will increasingly come from more distant and riskier sources
- investment in gas storage provides temporary buffer and enables diversity of supply (but still leaves reliance on imports)

Energy prices peaked last year

- now much lower reflecting world economic slow down

Long term energy security remains key issue

# THE RENEWABLE ENERGY CHALLENGE



UK targets to generate 15% of total electricity from renewables by 2015 and potentially 15% of total energy (30 to 40% of electricity) by 2020

- compared to 5% of electricity at present

Waste currently accounts for largest portion of UK renewables (30%) and has grown six-fold over the past 10 years

- represents around 1.5% of total UK electricity

Could account for much larger proportion of total UK electricity

- up to 17/20% per Institutions of both Civil and Mechanical Engineers

A huge and overlooked potential contribution to UK energy security and climate change strategy

# THE WASTE MANAGEMENT CHALLENGE



UK faces major municipal landfill diversion challenge

- LATS targets and penalties
- recycling targets
- huge investment requirements (up to £30bn per ICE)

How can councils best fund the massive investment required and meet their diversion targets

- in face of large number of uncertainties and risks
- whilst taking account of potential synergies with other councils and industrial/commercial sector
- and maximising scope for renewable energy generation including CHP

# WAYS OF RECOVERING ENERGY FROM WASTE (1)



## Landfill gas

- currently the largest component of waste related energy (24% of total renewables; 1.2% of total UK electricity)
  - 600% growth in last 10 years
  - Some limited scope for further growth
- effectively large scale anaerobic digestion
- huge environmental benefit of converting methane (21 times as harmful as CO<sub>2</sub>) into energy

## Energy from waste combustion

- proven technology very widely used on continent
- probably most efficient way of recovering energy from waste especially if large scale
  - Lakeside EfW plant (Viridor/Grundon) 37MW on 400kt waste or 11kt per MW
- even better when combined with CHP
  - planned Runcorn plant (Viridor/Ineos/Laing) 750kt with 120MW (electricity plus heat) or under 7kt per MW
  - requires use of heat (see below)

# WAYS OF RECOVERING ENERGY FROM WASTE (2)

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## Anaerobic digestion

- popular proposed route for food wastes
- c30kt source segregated food waste per MW power export
- also produces compost or compost like substance

Advanced thermal technologies such as pyrolysis and gasification

# WASTE VERSUS OTHER FORMS OF RENEWABLE ENERGY

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All the above waste solutions provide base load capacity generating 80% plus of the time

- compare wind

Distributed round the electricity network typically near major centres of population/industry

- source of waste inputs
- compare off shore wind and hydro/tidal

Generally much more economic than competing sources of renewable energy because a bi product of waste management

- wind typically twice as expensive
- tidal four times as expensive?

This is not to knock down other forms of renewables

- we need every source of energy possible



# THE CHP CHALLENGE

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Finding uses for heat is a key challenge on CHP

Planned Runcorn facility has large on site industrial use

- but not many sites like this in UK

Other possibilities

- leisure centres/swimming pools?
- greenhouses?
- flats/housing (as in Scandinavia)?
- etc

Requires changed mindset of putting waste facilities near to rather than away from other facilities

# RENEWABLE OBLIGATION (RO)



Under RO generators of renewable energy are paid

- basic wholesale/brown energy price
- value of renewable obligation certificate ROC
- (climate change) levy exemption certificate

Brown energy price set by world supply/demand

ROC value depends on actual renewable production versus government targets; if we fall behind target, prices go up

- target 5% of electricity in 2005 rising to 10% in 2010 and 15% in 2015
- ROC face value £30 per MWH (plus inflation)
- if target were 10% and actual production 5% then ROC value is £60 (plus inflation)

Complex eligibility rules

- AD double ROCS
- pyrolysis/gasification eligible
- reduced eligibility (quarter ROC) for new landfill gas schemes
- good quality CHP now eligible

# VIRIDOR RENEWABLE ENERGY PROJECTS



## Landfill gas

- 101MW currently (compared to 28MW in 2002)

## Lakeside joint venture with Grundon Waste Management

- 400kt pa and up to 37MW EfW plant at Colnbrook near Heathrow due to open this year
- £160m capex, 85% non-recourse debt with balance split equally between equity providers

## GMWDA/Runcorn

- existing 9MW plant at Bolton
- planning permission for up to 750kt, 120MW CHP facility

## Exeter

- 60kt pa 3MW electricity
- planning permission achieved

## Other possible long-term EfW/CHP sites

- Trident Park, Cardiff (site acquired)
- Dunbar (existing Viridor site; planning application submitted)
- Ardley (existing Viridor site; planning application submitted)

## 6 proposed Anaerobic Digestion (AD) plants all with planning permission

- Greater Manchester 4 plus Beddington (Croydon) and Walpole (Somerset)
- total 10MW

# SUMMARY

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Waste is an overlooked strategic energy source for UK

Biggest prize is EfW/CHP

Challenge is to come up with combined waste and renewable energy strategies

- requires councils, government and waste contractors to work together