



Climate &
Renewables



The impact of sustainability issues on commercial development of bioenergy

Ben Goh

Bioenergy Research Forum on 'Sustainability'

Centre of Renewable Energy, Retford

10th November 2009

Agenda

- Background
 - UK bioenergy drivers
 - Relevance of sustainability to UK market
- E.ON Climate & Renewables
 - UK biomass portfolio
- Commercial Sustainability
 - Biomass economics
 - Major risks
- Conclusions and questions

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UK Bioenergy Drivers

UK Climate Change Agreement

Greenhouse gas reductions (on 1990 levels): 34% by 2020, 80% by 2050

EU Renewable Energy Directive

15% of energy in the UK to be renewable by 2020

UK Renewable Energy Strategy

Renewable energy share: 15% by 2020, of which:

- ca. 50% from electricity
- ca. 30 to 50% from sustainable bioenergy

Renewables Obligation

Co-firing: 0.5 to 1 ROC/MWh, dedicated: 1.5 to 2 ROCs/MWh

Sustainability: relevance to UK

Ambitious planned bioenergy development

Ca. 3 GWe of capacity in operation, under construction, planned or announced

Equivalent to ca. 17 million odt/yr biomass requirement ► imports

Short timeframe

Looming energy gap; 'blackouts by 2017'

2020 RES and GHG targets

Domestic resource constraints

Energy and food security, land and water availability, infrastructure

→ Strong demand for domestic and imported biomass

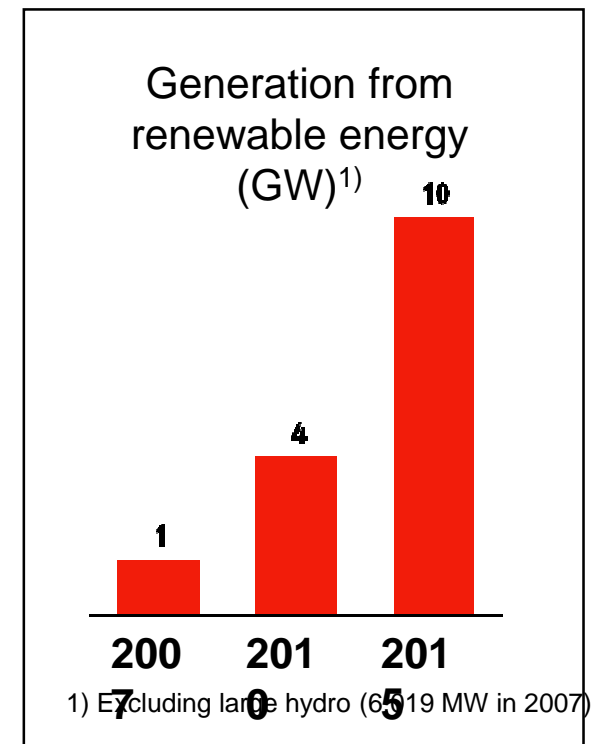
Ensure primary objectives are met in UK, whilst addressing challenges of source markets

Agenda

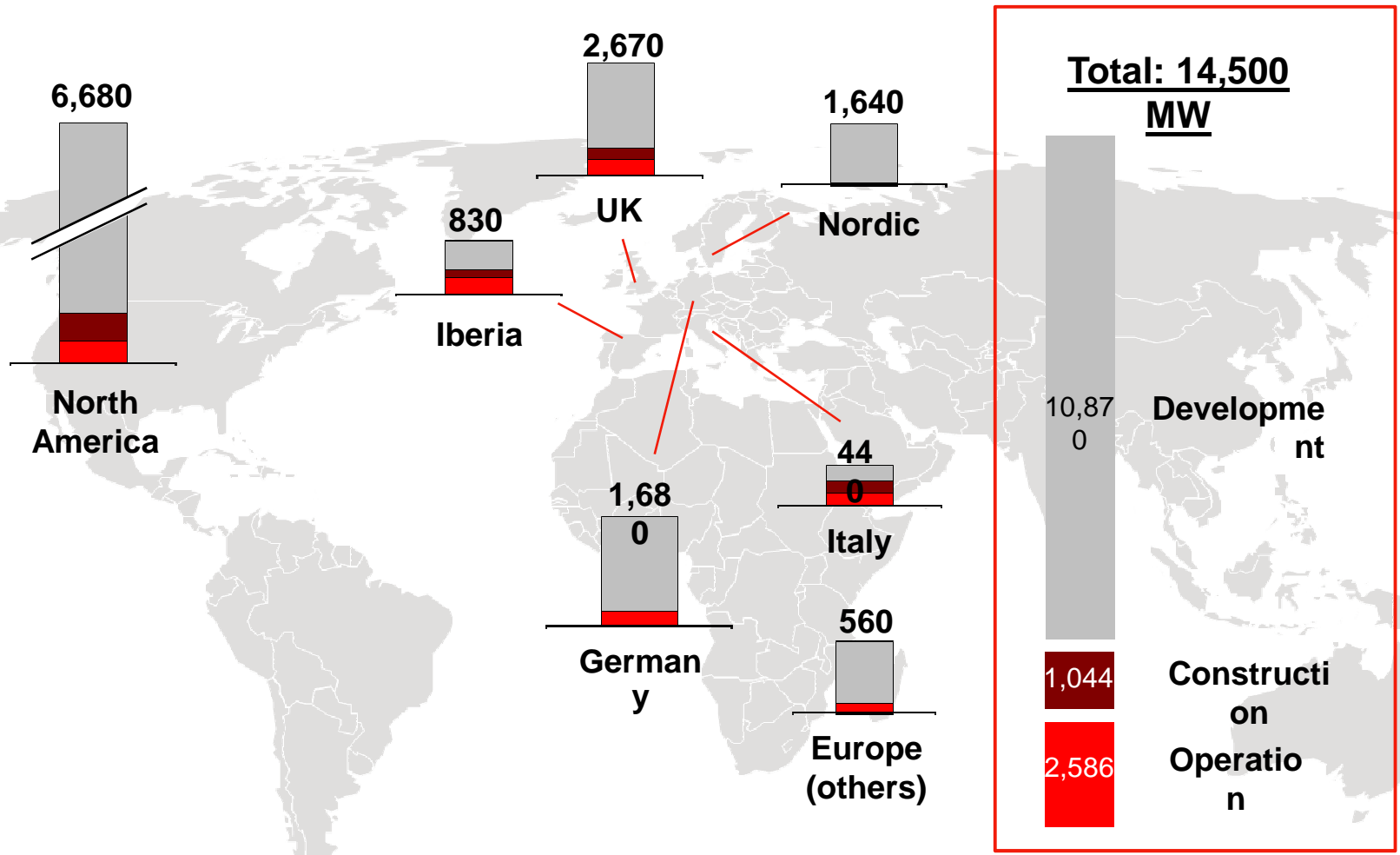
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E.ON Climate & Renewables (EC&R)

- Established January 2008
- Responsible for the generation and future development of all activities relating to renewable energy within the E.ON Group, as well as carbon sourcing and international carbon protection projects
- Strong expansion of activities supported by major investments: €8bn from 2007 to 2011
- Expansion of renewable generation from 1 GW in 2007 to 10 GW in 2015
- Long-term engagement for strong position in the



EC&R: project pipeline



Figures as of September 2009 (MW)

2 market segments have emerged for large biomass plant



Inland plants

Coastal plants

Size & Scope

- Up to around 50MW
- Limited efficiency (elec) & economies of scale
- CHP load important to increase efficiency & improve economics

- Large plants of 50-350 MW
- High efficiency (elec) & economies of scale
- Size means that appropriately sized CHP load rarely available which reduces efficiency

Feedstock & Logistics

- Feedstock locally produced
- Transport by road/rail , which limits plant size

- Feedstock is internationally sourced
- Transport by panamax/handimax vessels
- Wood processed to increase density for transport

Key Success Factors

- Site near energy intensive industrial cluster
- Close to significant power grid
- Cost-effective access to resources & good transport network

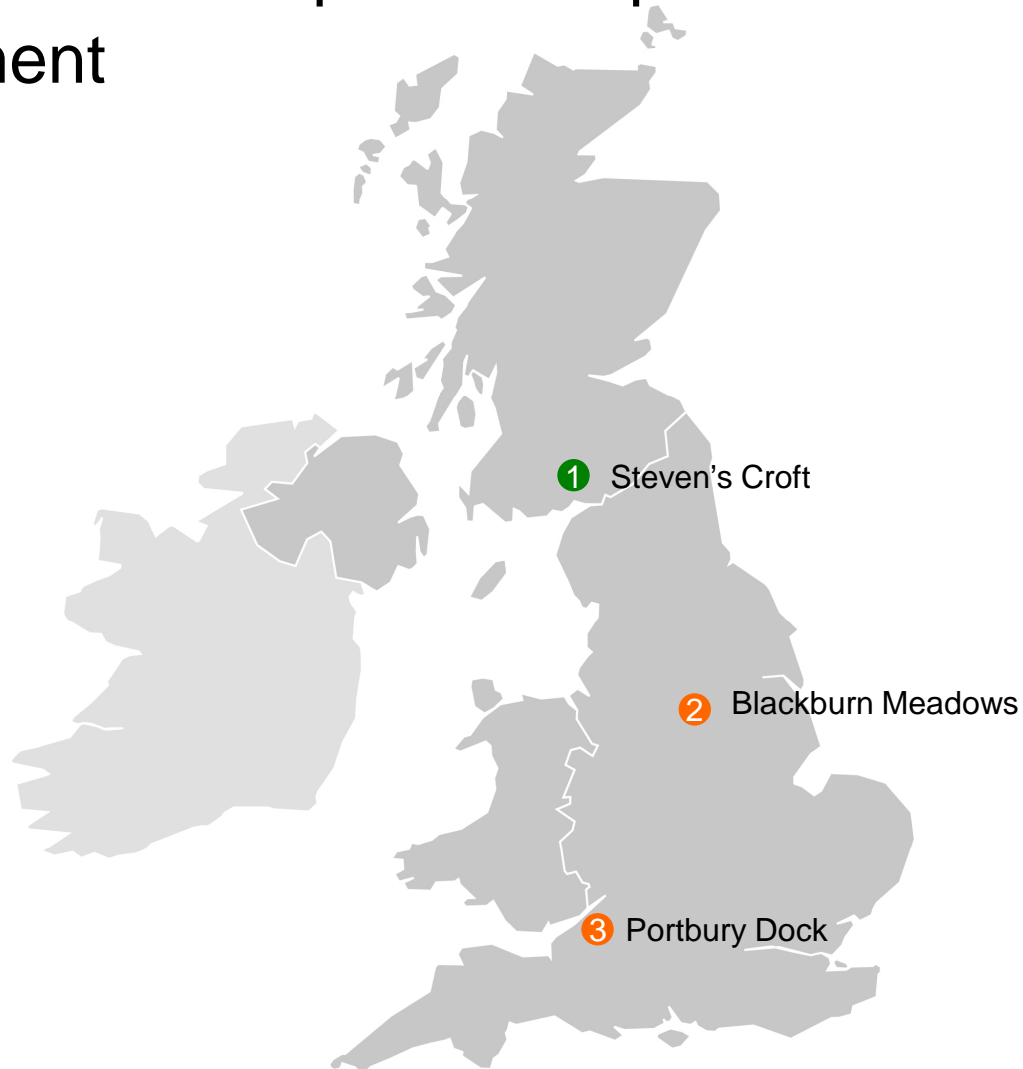
- Site near to a deep sea port essential
- Close to significant power grid
- Long term large scale freight & feedstock contracts required

Business Model

A mature business model for regions with good local feedstock availability

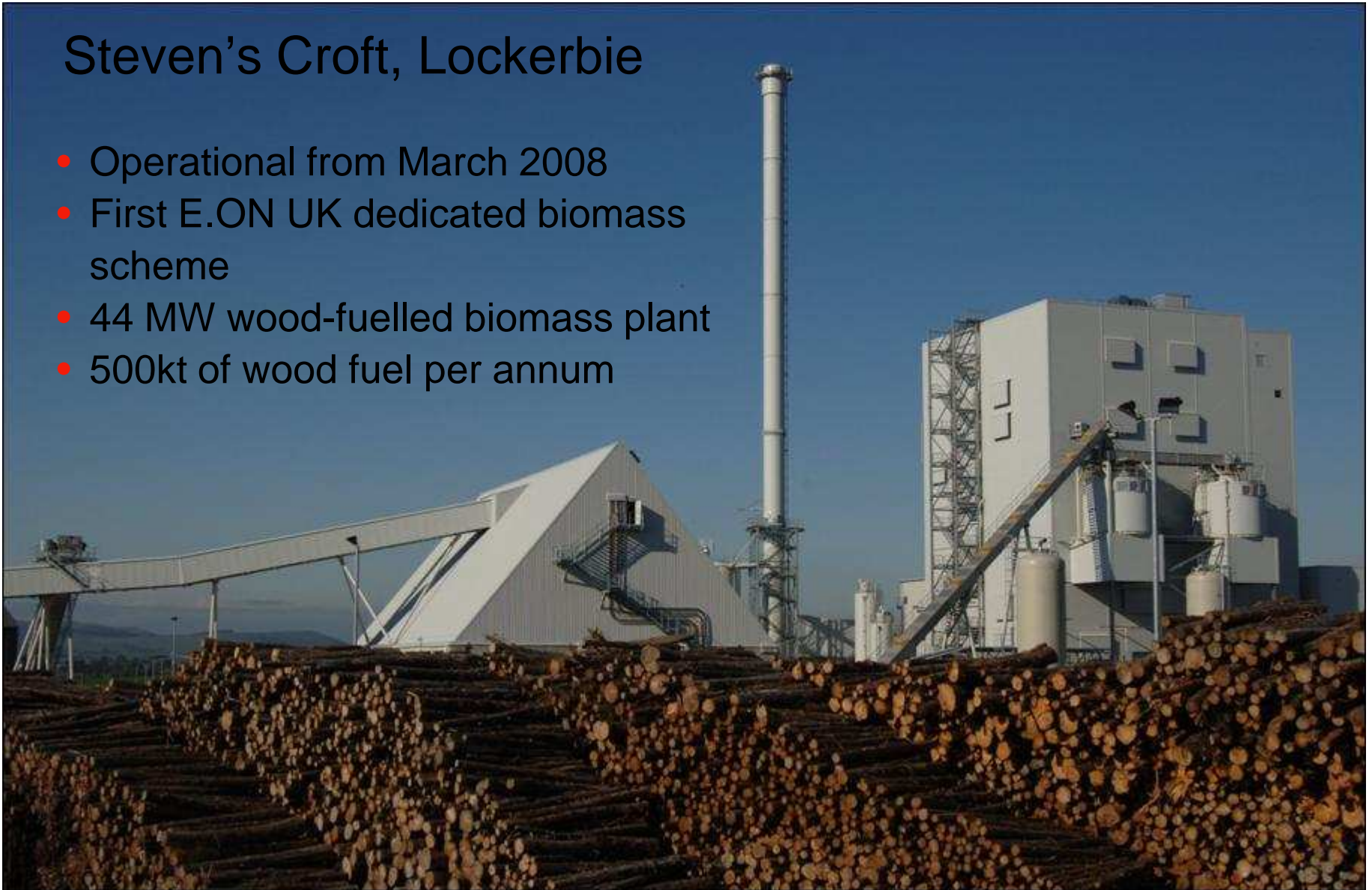
An emerging business model for regions with a feedstock deficit relative to the demand

EC&R UK biomass plants in operation and development



Steven's Croft, Lockerbie

- Operational from March 2008
- First E.ON UK dedicated biomass scheme
- 44 MW wood-fuelled biomass plant
- 500kt of wood fuel per annum



Steven's Croft: fuel blend

Sawmill residues (wood chip, sawdust)

Small round-wood (chipped)

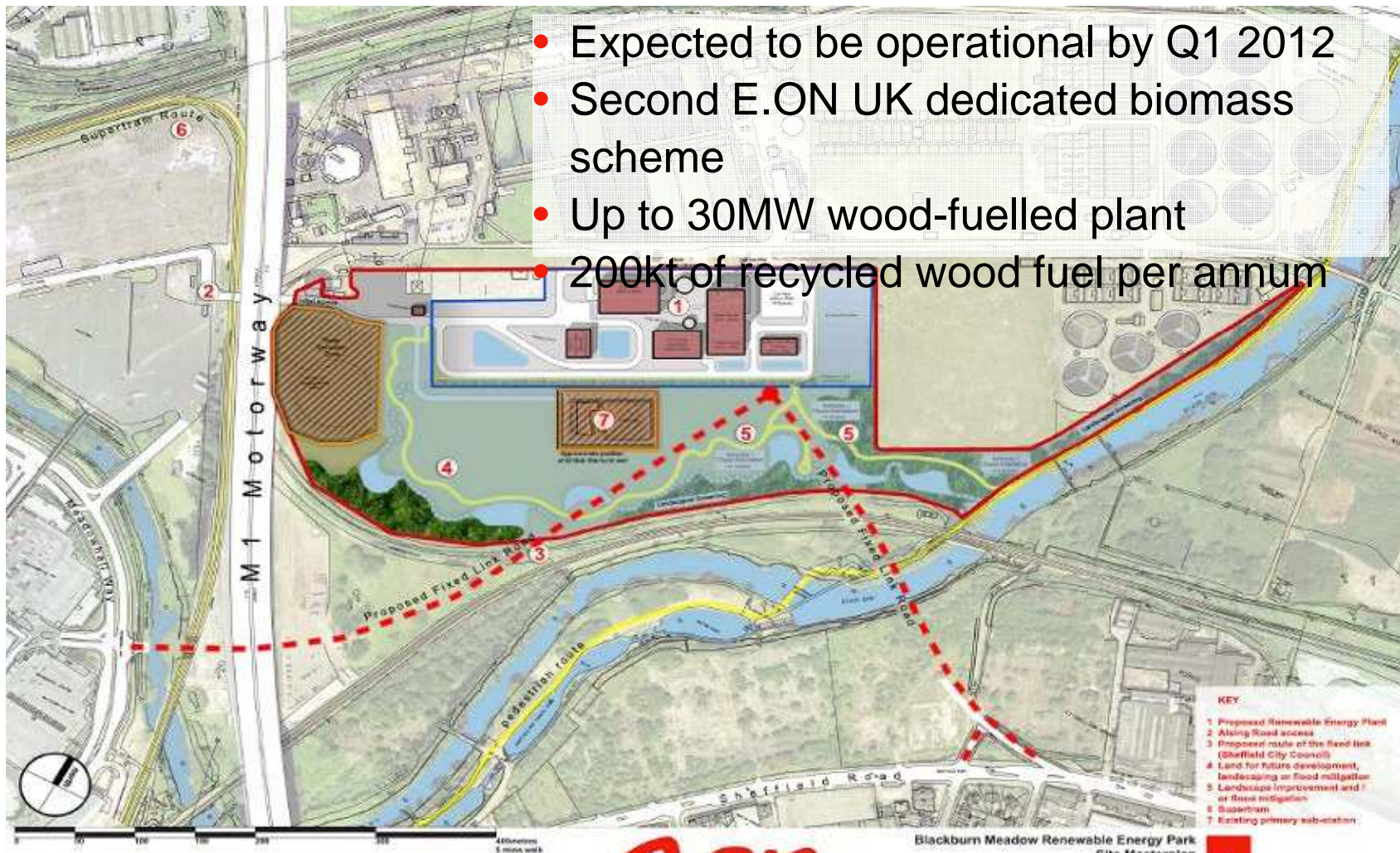
Recycled wood (chipped)

Energy crop (short rotation coppice)

Sustainability reporting since April '09 (type, origin, quantity)



Blackburn Meadows, Sheffield



- Expected to be operational by Q1 2012
- Second E.ON UK dedicated biomass scheme
- Up to 30MW wood-fuelled plant
- 200kt of recycled wood fuel per annum

KEY

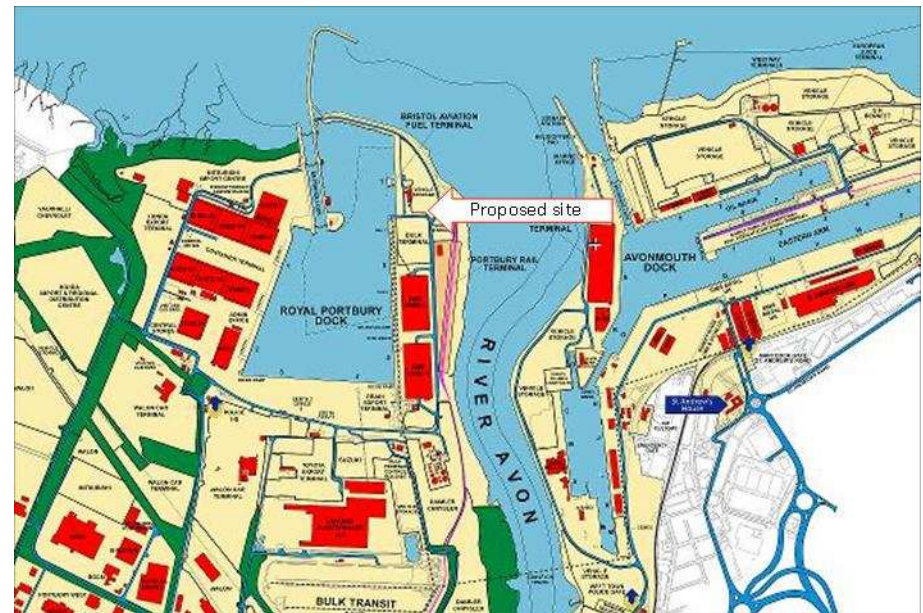
- 1 Proposed Renewable Energy Plant
- 2 Access Road access
- 3 Proposed route of the fixed line (Sheffield City Council)
- 4 Land for future development, landscaping or flood mitigation
- 5 Landscape improvement and / or flood mitigation
- 6 Supertram
- 7 Existing primary substation

Blackburn Meadows: recycled wood



Portbury Dock, Bristol

- EC&R has submitted an application to DECC to build a Renewable Energy Plant at the Royal Portbury Dock in North Somerset
 - Sufficient to provide the needs of more than 200,000 homes
 - Will reduce emissions of CO₂ by at least 500,000 tonnes annually
- Proposed 150 MWe Scheme
 - 14 days processed fuel storage
 - Fluidised bed combustor with single turbine-generator set
 - Hybrid cooling tower
 - Emissions control: hydrated lime, activated carbon, SNCR
 - Dust control: fabric filter unit



Portbury Dock: fuel

Fuel supply not finalised, but primarily sustainable accredited virgin and recycled wood

Key Issues when considering fuel supply

- De-forestation
- Water Usage
- Food vs. Fuel

Best Practice & Main Considerations

- Avoid negative impacts on the natural environment
- Virgin wood from sources managed in accordance with recognised accreditation schemes
- Apply relevant international and national standards, policies and legislation
- Apply comprehensive, transparent, consultative, processes with stakeholders
- Contribute to social and economic development of local communities
- Avoid using human food
- Avoid violation of land rights
- Significantly reduce CO₂ emissions relative to coal & gas

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Basic economics of UK biomass

Benefits:		ROC Value	(Fixed)
	+	Recycled Value	(Variable)
	+	LEC	(Fixed)
	+	Value of Displaced Coal (In the case of co-firing)	(Variable)
	+	Value of Carbon Abated (In the case of co-firing)	(Variable)
Less Costs:		Biomass Fuel	(Variable)
	+	Operating Costs	(Fixed/Variable)

Key commercial risks

Price

Dependant on diverse new markets; difficult to hedge
Strong demand in illiquid, non-transparent markets

Volume

Immature market and infrastructure
Competing demands; supplier may divert material

Quality

Impacts plant performance and availability
If several suppliers, difficult to trace

Supplier

Many small players; difficult to guarantee investment



+
sustainability risks
→
go upstream?

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Conclusions

Strong drivers for bioenergy

Produced large response from developers

Imported biomass forecast to play a significant role

E.ON biomass development activities

Range of technologies and fuels

Committed to an ethical and sustainable approach to biomass sourcing

Uncertainty, but potential, in market

Sustainability means many things; knowledge and experience still developing

Significant risks to long-term commercial sustainability

Opportunities to develop best practice for safe and sustainable supplies



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Thank you for listening

Ben Goh
Biomass Fuel Developer
E.ON Climate & Renewables
Westwood Way
Westwood Business Park
Coventry CV4 8LG

ben.goh@eon.com

Tel: + 44 (0) 2476 19 2720