

Nomura Conference

Biomass: the 4th Energy Source

June 2011



Agenda

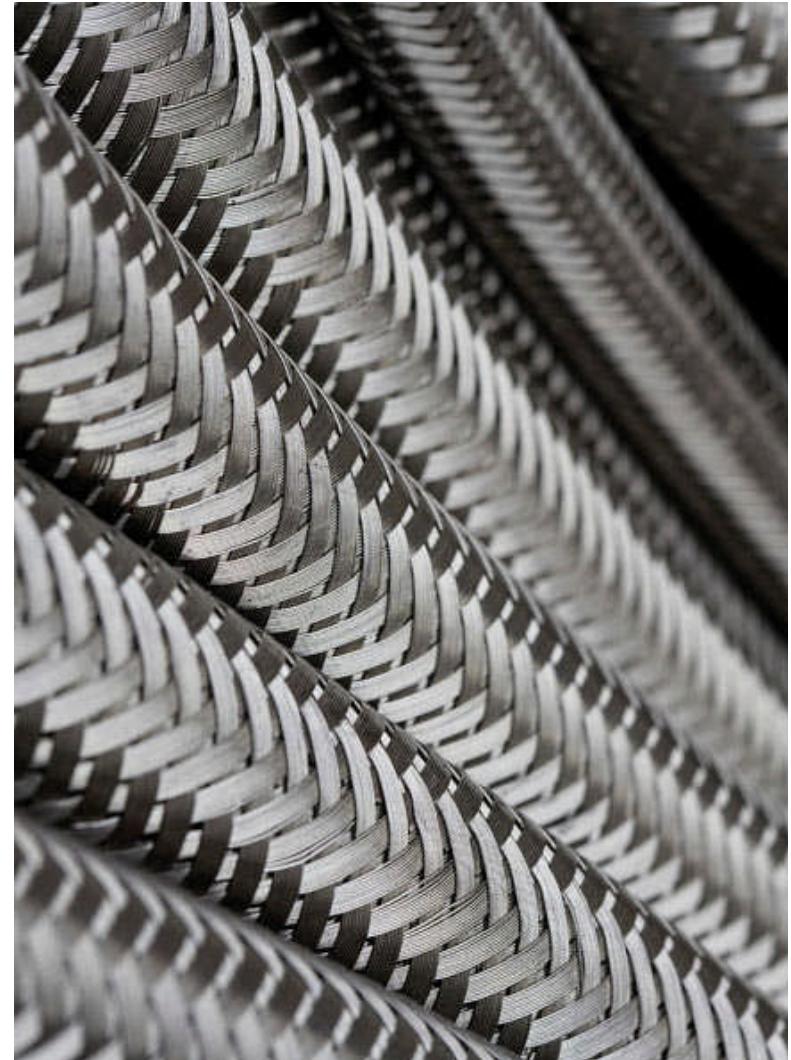
Drax Introduction and Investment Case

Biomass Overview

Biomass Fuel and Supply Chain

Biomass Sustainability

Biomass at Drax



Introduction to Drax

General

Strategic value

- Largest, most efficient UK coal-fired power station
- 4GW – supplies 7% of UK electricity
- Flexibility – provides key support services to grid

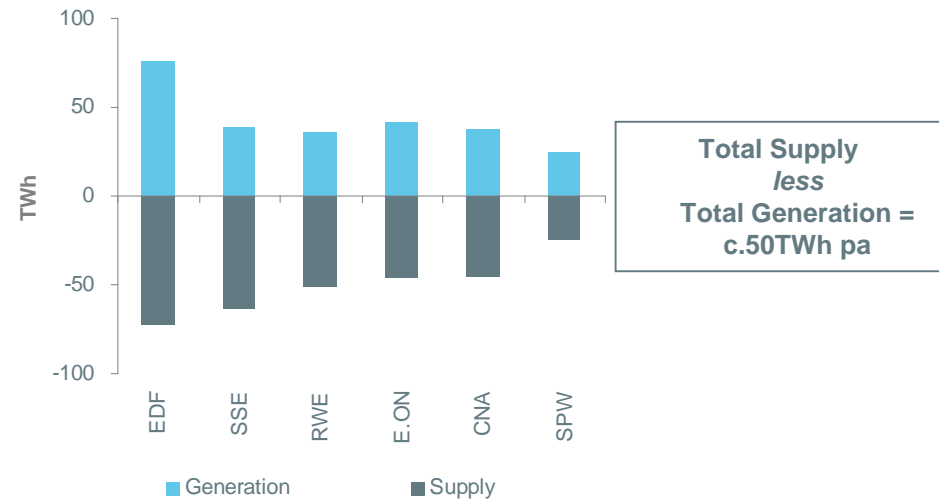
Position in UK power market

- Net physical short position of Verticos is c. 50TWh per annum
- Drax can supply c. 40% of net short via wholesale power market

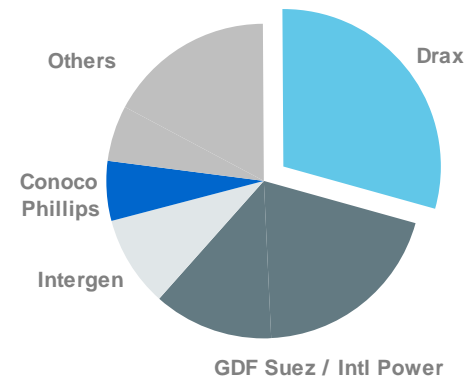
Strategic direction

- Progressively decarbonise generation through biomass
 - 2010: highest renewable output from single UK facility
- Expansion of direct supply through Haven Power

Indicative Annual Net Output / Supply from Verticos



Indicative Net Output* from Independent Generators



Drax Investment Case

Summary

Drax Investment Case - Cornerstones

Short Term

Medium Term

Long Term

Commodity markets

– Gas and coal market outlook?

UK generation capacity margin

– How tight does it get?

Biomass options

– Improve economics / extend life?

Biomass Overview

Introduction

A relatively new fuel for large scale renewable power generation

Potential sources of fuel are abundant

Current sources limited by collection, processing and transport facilities

Prices for many biomass fuels reflect start up costs for these supply chain activities

- Downward price pressure via increased production and supply chain maturity
 - Upward pressure via increased demand
-



Biomass Overview

Carbon Life Cycle and Availability

Biomass is solar energy stored as organic plant based material

Sustainably sourced biomass is carbon neutral

- CO₂ released in combustion equals amount absorbed in re-growing

International Energy Agency (1)

- Biomass is 4th largest energy source in the world after coal, oil and gas

AEA Technology (2)

- By 2020 the UK could access biomass equivalent to 20% primary energy demand

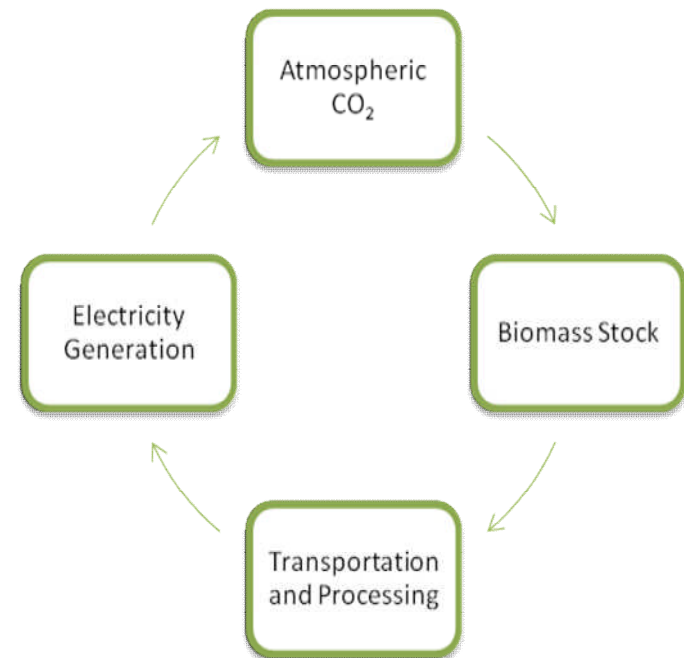
Fuel sources are residuals or by-products of other processes

- No need to affect food production
- Can be grown on marginal land

A cost effective source of renewable power

- Substantially cheaper than offshore wind
- Reliable and flexible form of generation

Biomass Carbon Cycle



(1) IEA, Bioenergy: A Sustainable and Reliable Energy Source, 2009

(2) AEA, UK and Global Bioenergy Resources and Prices, 2011 (commissioned for DECC)

Biomass Fuel

4 Categories

Forestry Residuals



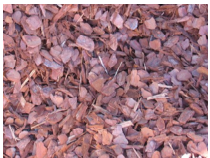
Forestry Thinnings



Harvesting residues



Chips/ sawdust



Bark



Wood pellets



Waste wood

Agricultural By-products



Wheat/Oat straw



Sunflower husks



Sugarcane bagasse



Rice straw



Olive pulp



Nut shell

Energy Crops & Organic Waste



Miscanthus & switchgrass



Bamboo



Jatropha



Short Rotation Coppice (e.g. Willow)



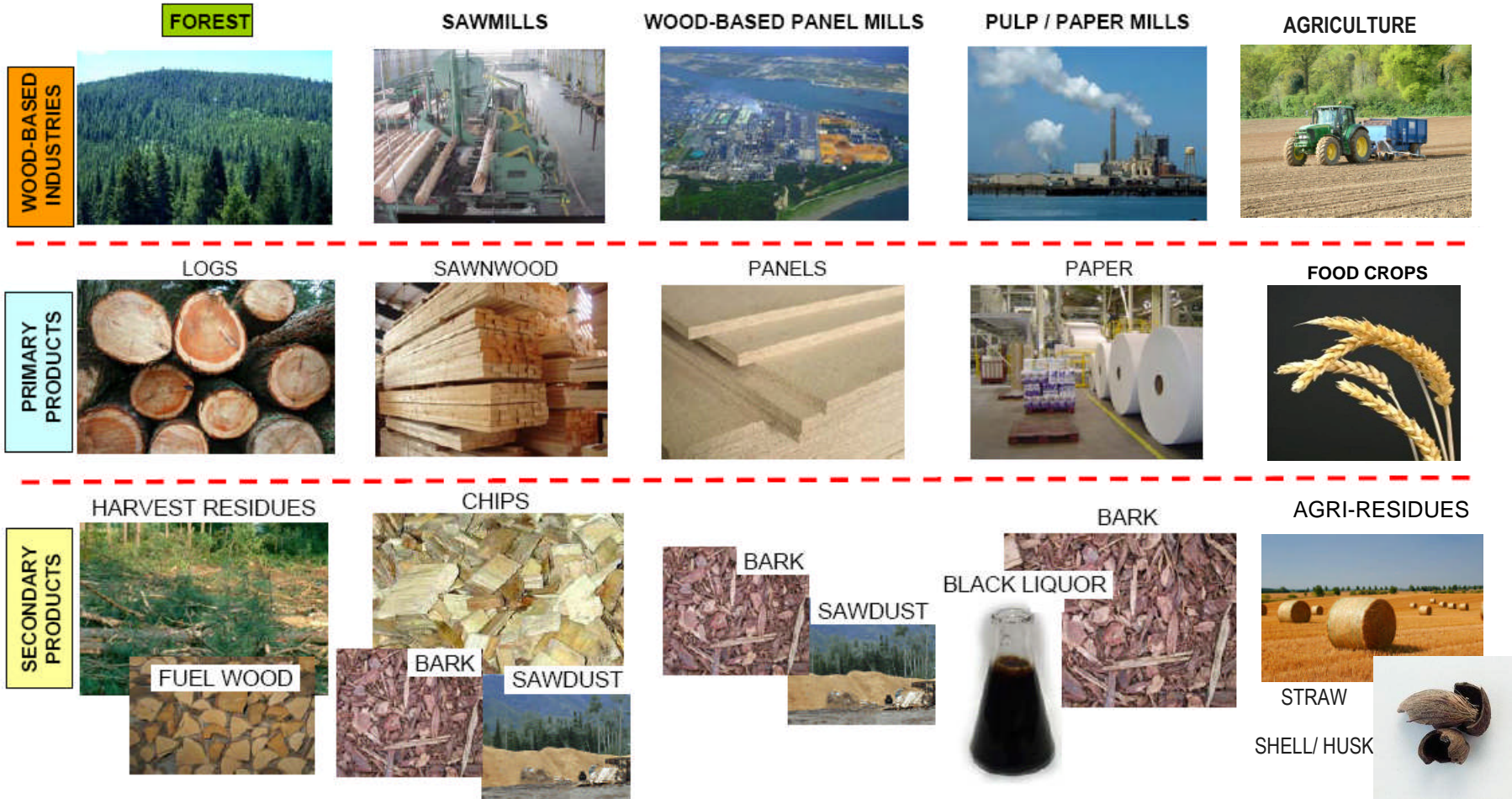
Short Rotation Forestry (e.g. Eucalypts)



Mixed waste paper & other organic materials

Biomass Fuel

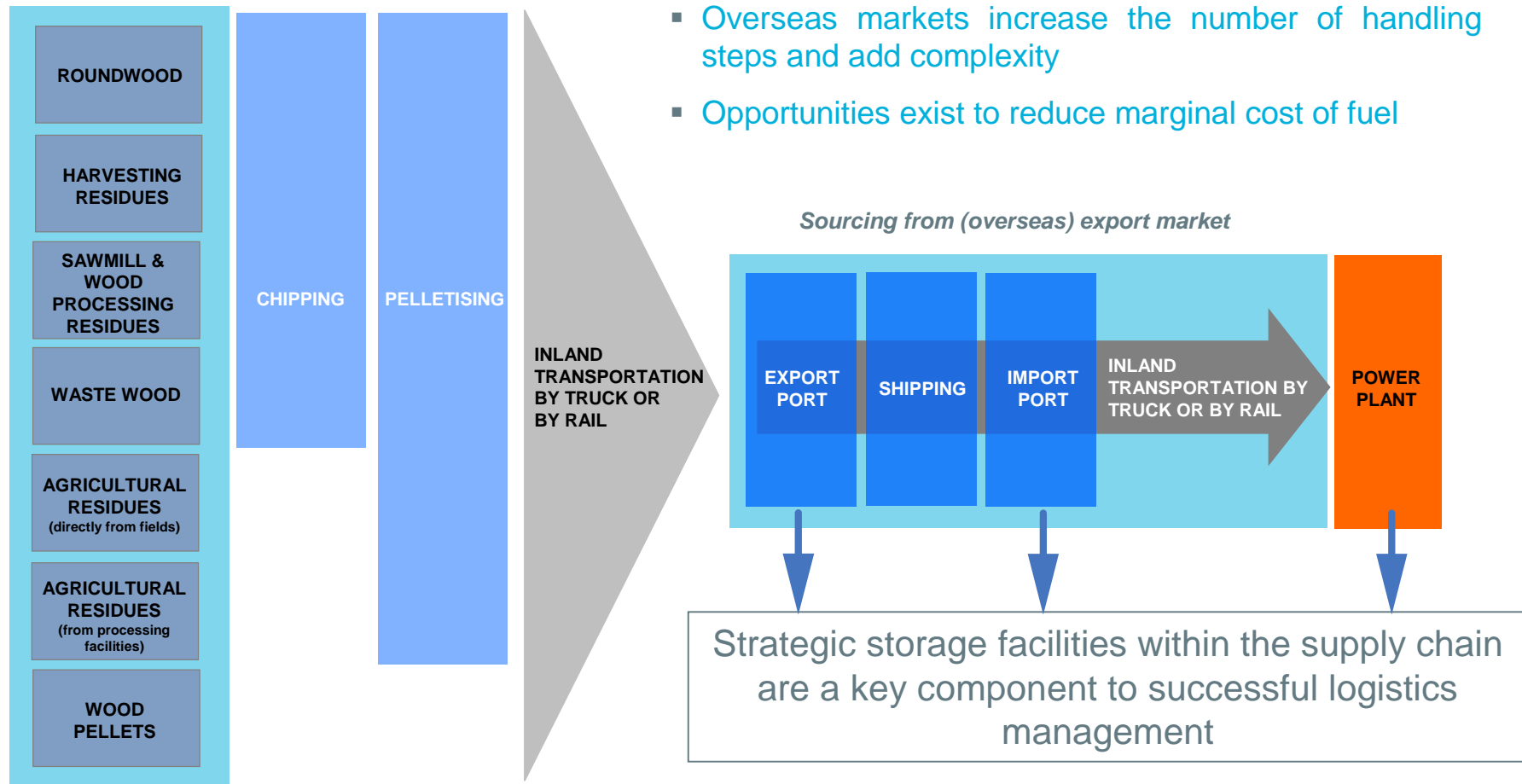
Secondary Products



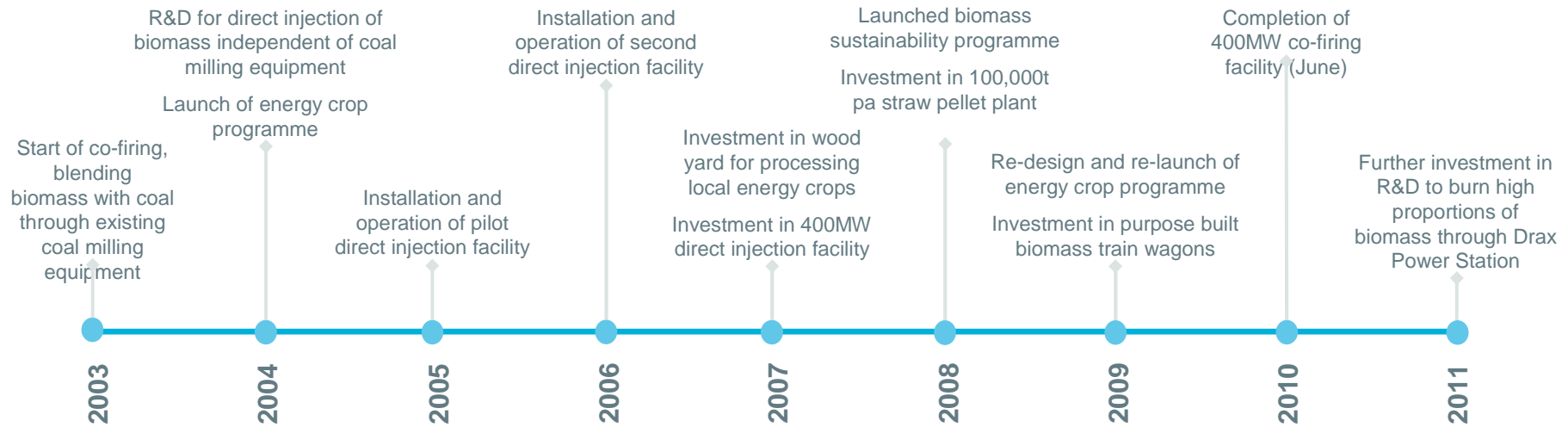
Biomass Supply Chain Characteristics

Supply chain characteristics

- Varies depending on fuel specification and source
- Overseas markets increase the number of handling steps and add complexity
- Opportunities exist to reduce marginal cost of fuel



Biomass at Drax Evolution



Over the past 8 years Drax has made substantial investment in:

- Biomass processing capability
- Biomass generating capability

Biomass at Drax

2010 Operations

Highest renewable output from single UK facility in 2010

World's biggest co-firing facility commissioned

70kt port storage and rail loading facility commissioned

New biomass rail wagons in operation

Complementary 100kt per annum straw pellet plant

Highest UK renewable output (7% ⁽¹⁾ total UK)
– despite operating at less than full capacity

- 2010 biomass burn of 0.9Mt (2009: 0.4Mt)
- Do not expect full utilisation (1.5Mt) at current ROC support



(1) Drax estimate based on Ofgem Renewables and CHP Register data, adjusted for banding

Biomass at Drax

Co-firing Facilities

World's biggest co-firing facility

- Burning coal and biomass together in a single unit
- £85m investment; commissioned in Q2 2010
- 500MW renewable electricity capacity; or 12.5% Drax output
- At full capacity saves > 2.5Mt CO₂ pa



Biomass at Drax

Straw Pellet Plant

Complementary >100kt per annum straw pellet plant



Biomass at Drax

Port Storage and Rail Wagons

80kt port storage and rail loading facility; commissioned H2 2010

- Port of Tyne – exclusive purpose built biomass storage facility for panamax ships
- Additional UK port access secured



New biomass rail wagons now in operation

- Automatic covers
- Increased storage capacity
- Faster loading and discharge rates (1 train every 90 seconds)



Biomass at Drax

Sustainability and Carbon Savings

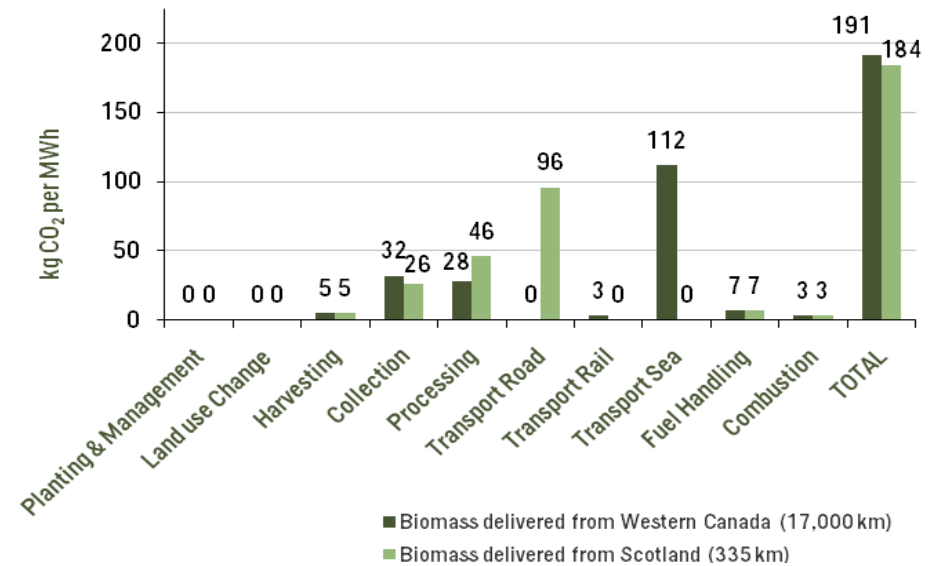
All Drax biomass procured against robust sustainability policy, including:

- GHG ⁽¹⁾ emission reduction requirements across entire supply chain
- Habitats and biodiversity protection
- Socio-economic considerations in source areas

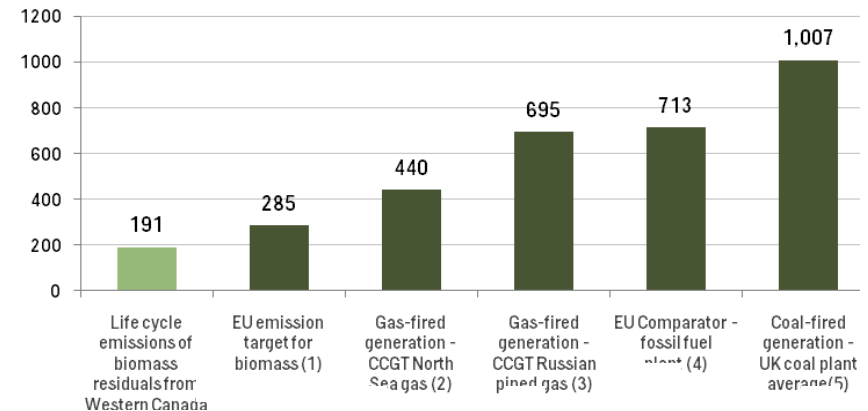
All Drax biomass meets EU/UK GHG emission reduction targets

- 2010: Drax saved c. 1.5Mt of CO₂ – 80% GHG reduction vs. coal
 - 2013 UK legislation requires 60% GHG saving

Greenhouse Gas Comparison of Imported vs. Domestic biomass



Fuel Life Cycle Emissions (in kgCO₂/MWh)



(1) GHG = greenhouse gas

Biomass at Drax

Renewables Obligation

Renewables Obligation consultation

DECC position on biomass firing in coal plants evolving

- Sustainability standards introduced
 - Mandatory from 2013
- Recognition dedicated biomass should be grandfathered
- Consideration being given to supporting:
 - Investment in higher levels of co-firing
 - Fossil fuel conversion to biomass

Accelerated Renewables Obligation banding review

DECC timetable accelerated

- Consultation on proposed support in H2 2011
- Implementation April 2013

Drax working to secure appropriate regulatory support

- Existing co-firing capability 500MW, or 12.5%
- Target to be co-firing at c. 25% by 2013/14 and c. 50% by 2015/16



“We remain of the opinion that the conversion of co-firing generation to dedicated biomass generation has a great deal of potential to help us meet our renewable targets.”

“An additional option might be to change the levels of support for co-firing depending on the proportion of generation from biomass”

**DECC Response to 2011
Renewables Obligation
Consultation**

December 2010

Biomass at Drax

Strategy and Future Developments



Ahead of regulatory clarity – continue biomass R&D work

Explore higher levels of co-firing and unit conversion options at Drax

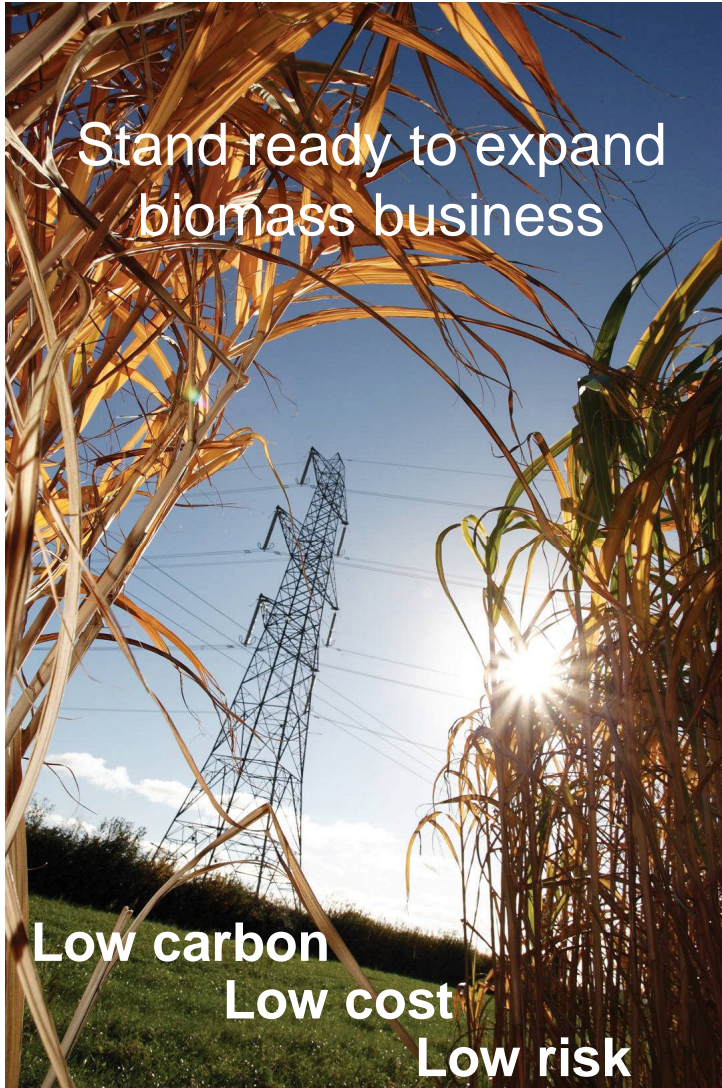
- Design and cost logistics, storage, materials handling and engineering solutions
- Operate one unit at > 50% co-firing for sustained period
- Cost of R&D work c. £10m

Working with Siemens Project Ventures to progress dedicated biomass developments

Will only commit to further significant investment with appropriate regulatory support



Conclusion



Biomass has a significant role in meeting UK CO₂ reduction targets

- The world's fourth largest energy source after coal, oil and gas
- A cost effective source of renewable power
- A low carbon fuel which can be sustainable
- A secure, reliable and flexible form of generation

Continuing to progress biomass operations;
highest renewable output from single UK facility

Stand ready to expand renewable capacity
with appropriate regulatory support

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