

Low Carbon Economy: science/evidence base to inform future agenda

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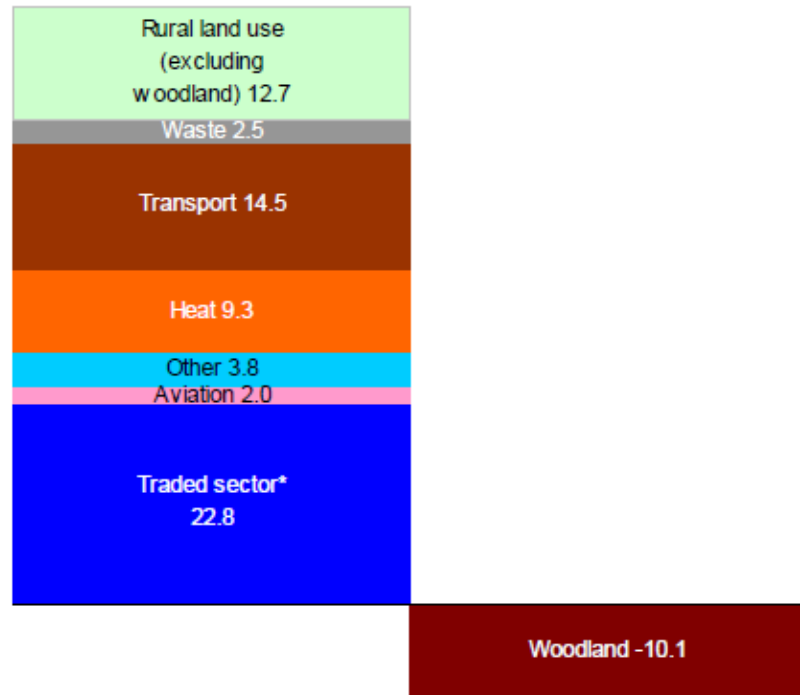
Current (2006) situation

Scotland's emissions:

- 70 MtCO₂e in 1990
- 58 MtCO₂e in 2006

(Including international aviation and shipping and EU ETS)

2006 emissions (MtCO₂e)



*Electricity generation and energy intensive industry



Transformational Outcomes

1. Decarbonised electricity generation sector by 2030
2. Decarbonised heat sector by 2050, with significant progress by 2030
3. Almost complete decarbonisation of road transport by 2050, with significant progress by 2030
4. Comprehensive approach to ensure that (cost of) carbon is factored into decisions about rural land use





~100% by 2030



~46% by 2020

~10% by 2020



~32% by 2020



The electricity sector: 50% renewable

Intended outcome by 2020	Science/evidence base
50% gross electricity consumption from renewable sources	Carbon accounting issues: ETS vs actual emissions...
>1GW marine (wave/tidal)	Strategic understanding to better understand impact of deploying marine technology
>6 GW offshore wind / 8 GW onshore [1.8 installed; 3 with planning permission; 3 in pipeline]	Offshore: As marine. Onshore: lifetime carbon accounting / peatland soils
675MW small scale hydro	Balancing regulatory / other interests in waterways (WFD/CAR)
Carbon Capture & Storage on all fossil fuelled power stations by 2030	Long term monitoring / measuring transport/storage facilities



The “heat” sector:

~46% emissions reduction; 11% renewable

Intended outcome by 2020	Science/evidence base
11% heat from renewables (~6400 GWh, equiv. to 2GW installed capacity)	New business models; social / individual behaviour / uptake; heat maps
Biomass primary combustion	Fuel supply chains – maximising resource / opportunity costs / land area conflicts / air quality
Bioenergy	Advanced conversion for next generation biofuels; marine biomass; anaerobic digestion (AD)
Microrenewables	Integrated local & regional community energy partnerships



The transport sector: ~32% emission reduction by 2020

Basic measures

- Eco-driving, smarter choices, demand management
- BIOFUELS

Advanced

- Social behaviour / cultural



Transformational

- Wholesale switch to ELECTRIC cars and vans by 2030



Land use, agriculture and forestry: ~10% emission reduction by 2020

Basic measures

- Livestock genetics and diet
- Nutrient regimes
- Anaerobic digestion
- Protecting high carbon soils
- Afforestation of 10,000 ha/yr

Advanced

- Greater agricultural uptake (90%!)
- Afforestation of 15,000 ha/yr



Transformational outcomes

- Fully incorporate carbon value into land use decision-making; ecosystems service value; land use options;



Challenges and opportunities



Challenges for science / evidence base

- Answering specific questions posed by rapid and radical changes in production & use of energy and use of land
- Traditional (easy) “disciplinary” science not fit for purpose
- “Good enough” science, not perfect science – policy won’t wait
- Making it real! What is technically possible, politically feasible [i.e. culturally acceptable] and economically viable...
- A long way outside comfort zone of standard research projects [working across disciplines; with different cultures]



But...also opportunities

- CAMERAS
- Universities
 - “Impact” / KE agenda
 - Research pools are breaking institutional barriers in Scotland
 - Next step to tackle more thematic problems
 - **E.g. ENERGY / CLIMATE**
 - But need to work much better with other research institutes
- Edinburgh Centre on Climate Change (2010)
 - Hub to bring users and researchers together
 - Skills training

