

TECHNOLOGY CHOICE FOR A NEW ENERGY SYSTEM¹ (Notes)

*“We need to choose a plan that adds up.
It is possible to make a plan that adds up, but it’s not going to be easy.
We need to stop saying no and start saying yes.
We need to stop the Punch and Judy show and get building.”
– Prof. David Mackay*

In the first part of these notes I consider some desirable aspects of a resilient and low-carbon energy system. I argue that governments should permit and encourage multiple low-carbon energy technologies: including renewable electricity and, under certain conditions, nuclear (fission) power and carbon capture and storage (using fossil fuels and/or biomass as fuels).

Aspects of A Carbon Free Energy System

"Carbon Free"

- CO2 emissions "As Low As Reasonably Achievable" (ALARA) (Or "As Low As In Nature") (<1 tonne per person)
- Constrains Fossil Fuel use c.10% of current levels
- Everywhere has to decarbonize: excess low-carbon energy might be exported to other countries

Realistic Renewable Energy

- Integration of the grid <30% of total electricity
- Physical/Economic potential - Constrains UK renewable <20% of total energy

Resilience

- Fuel interruption / Technical Hiccups / Windiness or sunniness
- Load Following: Ability to follow peaks and troughs of demand
- Realistic: Some sectors need to use oil (10%)

Balanced Technology

- Use all technologies that can reduce emissions
- "Learning Effects"

Conclusions

- Domestic renewable can generate at maximum 20% of total energy demand and a maximum of 30% of electricity supply without storage.
- Oil will be needed for some applications such as aviation, military, emergency services, some industry.
- Coal/Gas will be probably be needed

Technology Choice

The Positive Principle

- Weak Positive Criterion: 'We need low-carbon electricity; and these sources fit that criterion'
- Stronger Positive Criterion: 'The market should be able to choose all low-carbon electricity options'

Why do we want more than one technology?

In the short term we need to prevent new coal construction. There is an argument for alternatives to coal, and in particular for cheap alternatives.

In the long term we need to have enough energy to power our country; without necessarily arguing for huge imports. Renewable energy is limited; so we can get other technologies.

Further Arguments

- Redundancy - if one technology doesn't work, we've got other options
- We haven't enough free land in the UK for renewable only
- Economic policy is better if we don't pick winners
- We need enough alternatives to coal
- There is no shortage of engineers within technology but between technologies
- The government could promote all technologies fairly easily
- Energy needed is huge
- Energy supply is likely to increase by 50pc to 2050
- Stop saying no start saying yes
- There is no 'low carbon electricity' lobby. There is a renewables and a nuclear one and an energy one; but no lobby that brings together low carbon options.

Multi-criteria analysis

- Cost
- Density
- Input Finiteness
- Waste
- Non-proliferation