The Energy White Paper

A Routemap to a Sustainable Energy Future

6 January 2003

Structure

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Energy Policy Objectives

Four objectives for UK energy policy:

- **security**: maintaining secure supplies at stable prices in the long term
- **environment**: primarily climate change
- **competitiveness**: industrial energy costs stay comparable to key competitors
- **social**: eliminating fuel poverty and achieving Millennium Development Goals

UK energy policy has mainly been driven by economic imperatives in the last two decades

Near energy self-sufficiency meant past UK energy policy was nationally focused

New Energy Policy Challenges

Two main drivers for future UK energy policy:

- **Growing Oil and Gas Import Dependency**:
  - By 2020 80% of UK oil and 84% of UK gas will be imported - 75% of UK energy use
  - A rising proportion will come from regions with a significant risk of political instability
  - Rapidly growing demand for oil and gas in industrialising countries (China; SE Asia)

- **Climate Change**:
  - Global stabilisation of CO2 concentrations at a maximum of 550 parts per million - and perhaps lower - needed to prevent dangerous climatic change
  - Requires global reductions in emissions of at least 60% from 1990 levels by 2050

Future UK energy policy must be formed inside an international framework

International Framework for UK Energy Policy

- climate change requires global action - most emissions growth in US and Asia
- new low carbon technologies (nuclear, sequestration) will be developed globally
- cost of key technologies (renewables, fuel cells) driven by global market growth
- economic and social development in current (and potential) energy producers will impact the diversity and reliability of fossil fuel supplies
- energy efficiency in industrialising economies will impact price and competition for fossil fuel supplies and global GHG emissions growth
- poverty reduction targets require modern energy access for 1 billion by 2015

UK part of the global energy network - need to impact network to achieve aims

Policy Responses

- **Growing Oil and Gas Import Dependency**

  • **Diversity** - increase diversity of oil and gas suppliers by liberalising EU markets, improve investment in existing suppliers and bring new producers on-stream

  • **Alternatives** - increase global and UK use of non-fossil energy supplies

  • **Efficiency** - reduce oil and gas use - especially in transport sector

  • **Stability** - promote sustainable development in major producers and consumers

- **Climate Change**

  • **UK takes a leadership role** to move world to 60% GHG reductions by 2050

  • This includes committing to put the **UK on a path to 60% reductions**

  • International credibility/leverage requires **concrete polices** to achieve this now

All low carbon futures are consistent with maintaining energy security

Trade-Offs and Conflicts

Modelling suggests there are few fundamental conflicts between objectives:

- **Economic Growth: the total cost of reaching 60% reductions will be in the range of 0.5-1.5% GDP in 2050 - which itself will be over 3 times higher**

- **Competitiveness: minimal impacts compared to "normal" impact of exchange rates - even in the most sensitive industries (max 2% cost increase) - and these can be softened through other policy measures (investment tax credits etc).**

- **UK Fuel Poverty: minimal or positive impacts - if current policy targets achieved**

- **Development: global promotion of low carbon technologies should allow continued poverty reduction without excessive increases in GHG emissions**

But …. energy security concerns may justify faster reductions in oil dependence in transport (fuel cells and hydrogen) than for a least-cost carbon reduction path

Energy Security and Climate Change

Concerns over conflict between climate change and energy security objectives:

- **Path to 60% reductions may mean gas is 100% of fossil-fuel generation in 2020**
- **Concern over concentration of gas supplies in Russia, Algeria, Iran**

But….

- **Diversity of reliable suppliers (Norway, LNG) limits major supply disruptions**
- **Diversity of gas supply routes into EU means low impact of conflict/terrorism**
- **EU strategic gas reserves minimise any short run (1-2month) disruption**

Key is coordinated EU policy/action on Energy Security and Liberalised Markets

Why Unilateral UK Action on 60% Cuts Now?

- Need to reverse rise in global emissions by 2040 to hit 550 ppm
- Cannot be done without US & developing countries in a global agreement
- No guarantee will have agreement on Kyoto II targets even by 2012

So…..

- UK can just wait for Kyoto II process to set future targets, or we can work with other countries (especially in EU) to build momentum for cuts beyond Kyoto

- UK/EU can grasp opportunity for co-operation with both US and developing countries outside Kyoto (e.g. REEEP, Global Village Energy Partnership)

But…..

- vague UK/EU commitments not credible - need to show through real action that future reductions are technically feasible and low cost

- real action now will stimulate markets and R&D - lowering global CO2 emissions

Costs and Benefits to the UK

- Planned actions are low cost and do not harm competitiveness

- Pathway approach leaves options open - so no costly lock-in from early action

and….

- early action lowers transition costs, gives insurance against climate surprises and any greater cuts to respond to equity issues (UK target -90% in 2050?)

- any UK “over-abatement” can be sold on global carbon markets or banked

- gives real opportunities for UK firms to export, and growing global markets now reduces everybody's costs in the future

Not credible that UK will stop domestic climate programme if Kyoto II delayed

Defining a Low Carbon Pathway

Clear and credible **least-cost** policy direction in the near term

Robust and **Flexible** policies to respond to uncertainties - clear "**hedging strategies**"

Incentives to invest in the **critical system technologies** needed in all scenarios

Options which remain open in future - preventing expensive "**lock-in**"

Innovation to develop additional options and new solutions

Strategic framework must clearly incorporate and handle uncertainty

Not All Futures are Equal

The future might be uncertain - but some scenarios are more likely than others:

- **some technologies will penetrate less quickly than expected**
- **new scientific evidence is likely to show climate change will be more damaging**
- **this will probably imply the need for steeper and quicker emissions cuts**
- **but unexpected new technologies will lower the cost of reaching these targets - these will be determined mainly by activity in global markets - not UK R&D**
- **emissions growth in developing countries may jump with personal car use**

Hedging strategies should take into account this bias in future uncertainties

A Low Carbon Pathway for the UK

2002 - 2010	**Current climate change and fuel poverty policies - if delivered - put UK on track to reaching 60% by 2050**
2010 - 2020	**Need to reduce from 134 mt Carbon to 110-115 mt in 2020. Least cost strategy uses energy efficiency and renewables (20%) and EU emissions trading. No technology lock-in.**
2020 - 2050	**Need to reduce to 85mt Carbon. Energy efficiency remains main strategy. No clearly dominant low cost energy supply technology - renewables, nuclear and coal plus sequestration all possible choices. Should delay any technology lock-in choice until information improves.**

Uncertainty implies need to invest in developing alternative technologies <u>now</u>

and that the <u>option</u> to delay lock-in to one technology is valuable

Pathway 2002 - 2010

Key Risks	**Failure to meet UK targets**
Key Uncertainties	**Impact of renewables planning reforms** **Rate of CHP penetration** **Funding for Fuel Poverty Programmes**
Least Cost Hedging Strategy	**If underperforming then accelerate fuel poverty and energy efficiency measures**
	Accelerate international renewables and efficiency markets to lower costs
Key Enabling Policy	**NETA/OFGEM supports renewables and CHP**
Option strategy	**Path has no lock-in to particular technology**

Pathway 2010 - 2020

Key Risks	**Failure to meet UK targets** **Sharper GHG cuts required (scientific surprise)**
Key Uncertainties	**Impact of business energy efficiency programme** **Impact of EU emissions trading** **Build rate of offshore wind**
Least Cost Hedging Strategy	**Accelerate implementation of business efficiency, onshore wind and/or energy crops**
Key Enabling Technology	**Distributed generation and intelligent grids**
Option Strategy	**Pathway keeps renewable option open** **No lock-in to any particular technology**

Nuclear not a least cost hedging strategy for any shortfall in this period

Pathway 2020 - 2050

Key Risks	**Premature investment in costly technology** **Sharper cuts needed (science or burden sharing)** **Surprise technology emerges**
Key Uncertainties	**Cost reductions in renewables** **Feasibility, safety and cost of nuclear** **Environmental integrity and cost of sequestration** **Innovation in new technologies**
Hedging Strategy	**Invest in innovation through international collaboration**
Key Enabling Technology	**Fuel cells and hydrogen economy**
Option Strategy	**Accurate information on feasibility and cost of all low carbon supply options must be available at latest by 2015**

Pathway 2020 - 2050 - Technology Uncertainty

Uncertainty around technological solutions under development….

Wind Energy	**rate of cost reductions as global markets grow**
Solar Energy	**rate of cost reductions as global markets grow**
Biomass Energy	**cost-effectiveness of next generation technology**
Nuclear Energy	**cost-effectiveness and safety of next generation technology**
Carbon Sequestration	**cost effectiveness and environmental integrity**

and potential surprises…….

Solar Technology	**appearance of ultra-cheap solar technology**
Biotechnology	**development of high efficiency cellulose conversion**
Nanotechnology	**development of ultra-efficient energy use technologies**

Energy Security and Hydrogen Economy

- For least cost CO2 reduction only use zero-carbon electricity to generate hydrogen for transport once electricity system is carbon free

- WP argues mass market fuel cell cars will only appear in 2020

But…..

- energy security concerns suggest that fuel cell vehicles should be developed faster - even using fossil fuels - as can use diverse (fossil) energy sources

- energy security driving international work on fuel cells (e.g. US Freedom Car) - so with international collaboration early market penetration likely

- move to intelligent distributed electricity system allows static fuel cells to be used for high efficiency CHP - a key stepping stone to the mass vehicle market

Key decisions/policies needed in White Paper (1)

Policies to keep UK on the path to 60% by 2020:

- **Policies to ensure 2010 targets are met - with hedging strategies**

- **Policies for shifting to "smart" distribution and transmission system by 2010**

- **Clear signals to private sector on aim to increase penetration of energy efficiency and renewables in 2010-2020 period**

- **Strategy to accelerate global use of low carbon technologies - especially efficiency and renewables - outside climate change agreements**

- **Investment in developing renewable energy options for 2010 to 2020 period**

- **Development of clear hedging strategy for 2010 - 2020 if policies underperform**

Key decisions/policies needed in White Paper (2)

Preparing the ground for policies to reach 60% (and beyond):

- **Strategy for ensuring all existing major low carbon options - renewables, nuclear and coal plus sequestration - are available for a decision in 2015-2020**

- **Clear strategy for ensuring fuel cells/hydrogen systems available by 2020 at latest - energy security issues may drive faster timetable**

- **Investment in fundamental innovation, "surprise" and far-from-market technologies for 2020-50 - particularly through international collaboration**

Should not make decisions <u>now</u> beyond 2020 - but need to lay foundation for future decisions by investing in options and system technologies

Key decisions/policies needed in White Paper (3)

Maintaining UK Energy Security:

- Improved systems for monitoring and measuring UK energy security

- Commitment to deepening engagement with major fossil fuel producers and consumers

- Enhanced programme of engagement with potential developing country oil and gas producers over a broad range of development issues

- Increased UK involvement in international collaboration to develop alternative transport fuels and systems

Public Spending on White Paper Proposals

White Paper and departmental bids include (maximum) new spending proposals of:

- £1530 million over FYs 2003-2005
- £1720 million over FYs 2006-2008
- Energy efficiency gives over 60% of reductions and uses 43% of new money
- Renewables gives under 20% of reductions and uses 30% of new money
- Reductions are mainly driven by regulatory, fiscal and market instruments which raise energy prices (though total costs to consumers may drop)

Function of Public Spending Proposals

Function	2003-5	2006-8
Meeting 2010 targets	**813m**	**1022m**
Funding Enabling Technologies		
2010 (distributed grid)	**101m**	**8m**
2020 (hydrogen and fuel cells)	**49m**	**49m**
Developing New Technological Options		
2010 (biomass, wind, efficiency)	**293m**	**398m**
2020 (nuclear, sequestration, PV, tidal/wave)	**271m**	**241m**

Over 40% of spending focused on innovation and changing energy system

Principles for Prioritising Spending Proposals

Key announcements in White Paper are:

- 60% GHG reduction target by 2050
- 20% Renewables and 20% efficiency increases by 2020

therefore need credible set of policies which shifts UK towards these new targets:

- need to meet existing 2010 renewables, CHP and efficiency targets

- begin the shift towards the type of energy system needed in 2010-20

- invest in technologies which will meet the 60% target

Public spending should focus on market failures and structural/system issues

Conclusions - WP Spending Proposals

- Rationale for prioritising spending between technologies unclear

- Efficiency and system technologies seem underfunded given their importance and lack of international support

- Merit in having consistent long-term funding for achieving targets - including using earmarked revenue from a consumer levy and environmental taxation

Also need to ensure adequate bid in SR2004 to fund White Paper targets

- SEPU should coordinate and assess bids in SR 2004 against WP targets

- SEPU should audit and oversee UK energy innovation spend

Spending Package Proposal (2003-05)

Hitting 2010 targets	**Package of new fiscal measures in 2003 budget to promote switch to energy efficient goods** **Raise £100m pa from new fiscal measures to fund efficiency and renewables programmes**
System Changes	**£100m pa for system modernisation from new consumer levy on electricity and capital grant**
R&D for 2010-2020	**Fund biomass from rural development funds** **Fund solar PV from government procurement**
R&D for 2020-2050	**Extra £100m for international R&D collaboration** **Revise differential VED to raise £30m pa for hydrogen/alternative fuels R&D**
Stimulating Global Markets	**£10-£15m from FCO Global Opportunities Fund**

Key Regulatory Changes

Without changes to electricity system regulation it will be more expensive, and perhaps impossible, to reach the White Paper targets:

- **the duties of the Gas and Electricity Markets Authority should be changed so that protection of the environment is made a principal objective alongside protection of the consumer**

- **OfGEM along with the industry develop a transparent and consistent pricing code to calculate the price paid to embedded generation**

- **OfGEM should administer the system modernisation fund raised from a consumer levy. Developers would bid for resources on the basis of cost per carbon saved. This would be introduced for 20?-20? price review**

Annex: Keeping the Nuclear Option Open (1)

Some argue that the risk of not meeting 2010 - 2020 targets with energy efficiency and renewables means nuclear must be available to fill gap - and so need decision in 2007 on new build given delays in planning process, but….

Nuclear depends on new untested designs which will not even be approved by 2006/7

Nuclear new build may only deliver near 2020 given timing uncertainties - so would not meet any 2010-2020 shortfall anyway

Nuclear costs not be certain in 2006/7 - expensive relative to alternatives (efficiency, onshore wind or crops) which could quickly come on stream to meet any shortfall

No information by 2006/7 on performance of renewables or new efficiency policies

A decision - either way - on new nuclear build in 2007 is not needed or useful

Annex: Keeping the Nuclear Option Open (2)

If underperforming in early part of 2010-2020 period have quick options to:

- accelerate energy efficiency in industry (-£80 to -£30 tC) or domestic (-£300 to -£50 tC)

- invest in onshore wind (£10- £70 tC) and/or energy from crops (£130-£170 tC)

New nuclear build is an inflexible and expensive (£75 to £125 tC) option but…..

- **can begin licensing and planning without committing to new nuclear build**
- **go/no go decision on nuclear comes at earliest in 2010, at latest in 2014**
- **HMG could guarantee to pay costs of preparation (£400m?) if decide no go**