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Energy Security and Climate Change in the 21st Century – who has the answers?

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JOAN MACNAUGHTON CB

DIRECTOR GENERAL
INTERNATIONAL ENERGY SECURITY
DEPARTMENT OF TRADE AND INDUSTRY

Challenges in 21st Century Energy Markets.

- Maintaining and enhancing security of long-term energy supply to developed economies.
- Squaring the energy-environment circle:
 - Development and deployment of clean technologies.
 - ..and remaining competitive.
- Meeting the growing demand from developing economies (India, China)
- Dealing with cartelisation and concentration of natural resources.

Plenty of Hydrocarbons

- But concentrated in a few countries/regions:
- MENA
 - 45%-65% of proven oil reserves
 - 45% of proven gas reserves
- Russia
 - 6 % of proven oil reserves (7th largest)
 - 26 % of proven gas reserves

Investment

- Both regions need huge investment:
 - MENA \$56bn/yr to 2030
- Russia
 - \$935bn over the period 2003 – 2030

➤ **Will that investment occur?**

The challenge for governments

- Making markets work better:
 - Creating the right frameworks:
 - For rational economic investment throughout the supply chain
 - For transition to a cleaner future
 - Balancing Government and Market roles
 - Data transparency and information provision
- Emergency Response:
 - Managing small probability/large impact events

Data Transparency and Information

- Joint Oil Data Initiative (JODI)
 - Monthly oil production, oil stocks and oil demand.
 - Fundamental technical work undertaken by IEA
- **Need to improve data quality and scope.**

Frameworks for rational investment

- Supply capacity is important. For oil
 - When spare capacity is large:
 - Strong relationship between inventories and price
 - When spare capacity is low:
 - Relationship breaks down; risk premium “fear” determines market price.
- Clear role for Government in setting framework:
 - Whole supply chain approach
 - Open investment regimes with clear property rights.
 - Transparent and stable regulatory regimes.

Investment keeps markets sane!

Chart a: US crude stock cover v real oil prices
Spare capacity > 3% (of world supply)

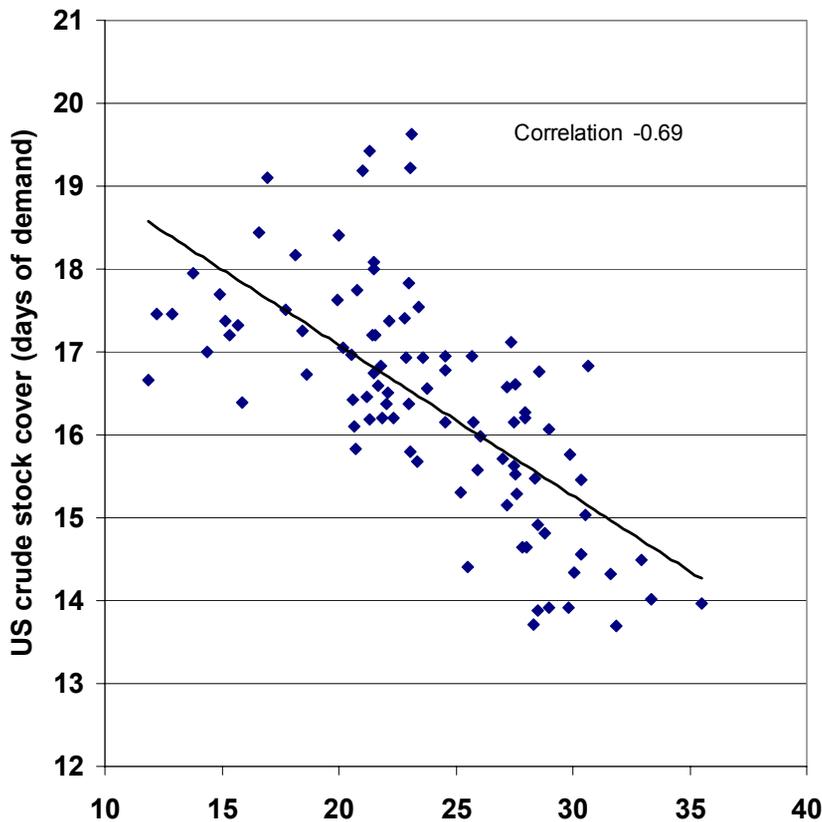
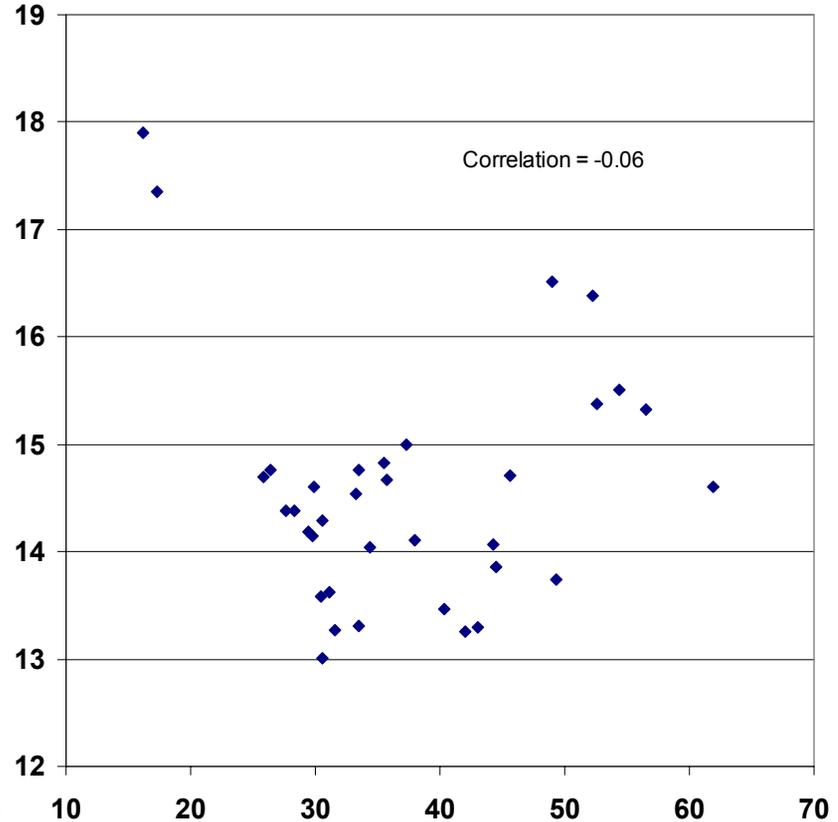


Chart b: US crude stock cover v real oil prices
Spare capacity < 3% (of world supply)



Illustrative analysis

Real (Jan 05) oil prices: US\$ a barrel

Government Versus Market: getting the balance right

- Governments set domestic frameworks
- Governments set international frameworks:
 - Energy Charter Treaty
 - Kyoto Protocol and ETS
 - European Union single markets
 - External EU energy policy: Hampton Ct
 - G8/G7 finance – wider influencing, enabling

The Energy White Paper set ambitious, complementary goals for the UK

- Getting on a path to cut the UK's CO2 emissions by 60% by 2050
- Maintaining the reliability of energy supplies
- Promoting competitive markets in the UK and beyond
- Ensuring that every home is adequately and affordably heated

Aim is to achieve these together

Energy Review launched

- Progress against 2003 Energy White Paper goals
- Look at energy security of supply given:
 - Growing oil and gas import dependency
 - Generation capacity replace 30% over next 15 years
- What more do we need to do on climate change?
- How to step up progress on energy efficiency
- Dealing with rising and volatile prices

Climate Change Programme Review Published

- EU Emissions Trading scheme
- Promoting Renewables
- Microgeneration
- Carbon Abatement Technology strategy

EU Emissions Trading Scheme

- Commenced in January 2005 – a World Leader
- Covers around 50% of total UK CO2 emissions
- A trading scheme is economically efficient and flexible:
 - Allows economically rational choices:
 - buy additional allowances or invest to cut emissions.
 - Sell excess allowances
- Businesses prefer trading schemes to inflexible environmental taxation.

Promoting Renewables

- Renewables Obligation (RO) is primary mechanism to promote renewable energy:
 - market-based mechanism
 - Technologically neutral
 - Governments don't pick winners!

Microgeneration Strategy

- Long-term Government commitment to microgeneration
- Vision of the energy system in 2020:
- “there will be much more local generation specifically, much more microgeneration”
- Important roles for:
 - Combined Heat and Power (CHP)
 - fuel cells or photovoltaics in buildings.

Carbon Abatement Technology Strategy

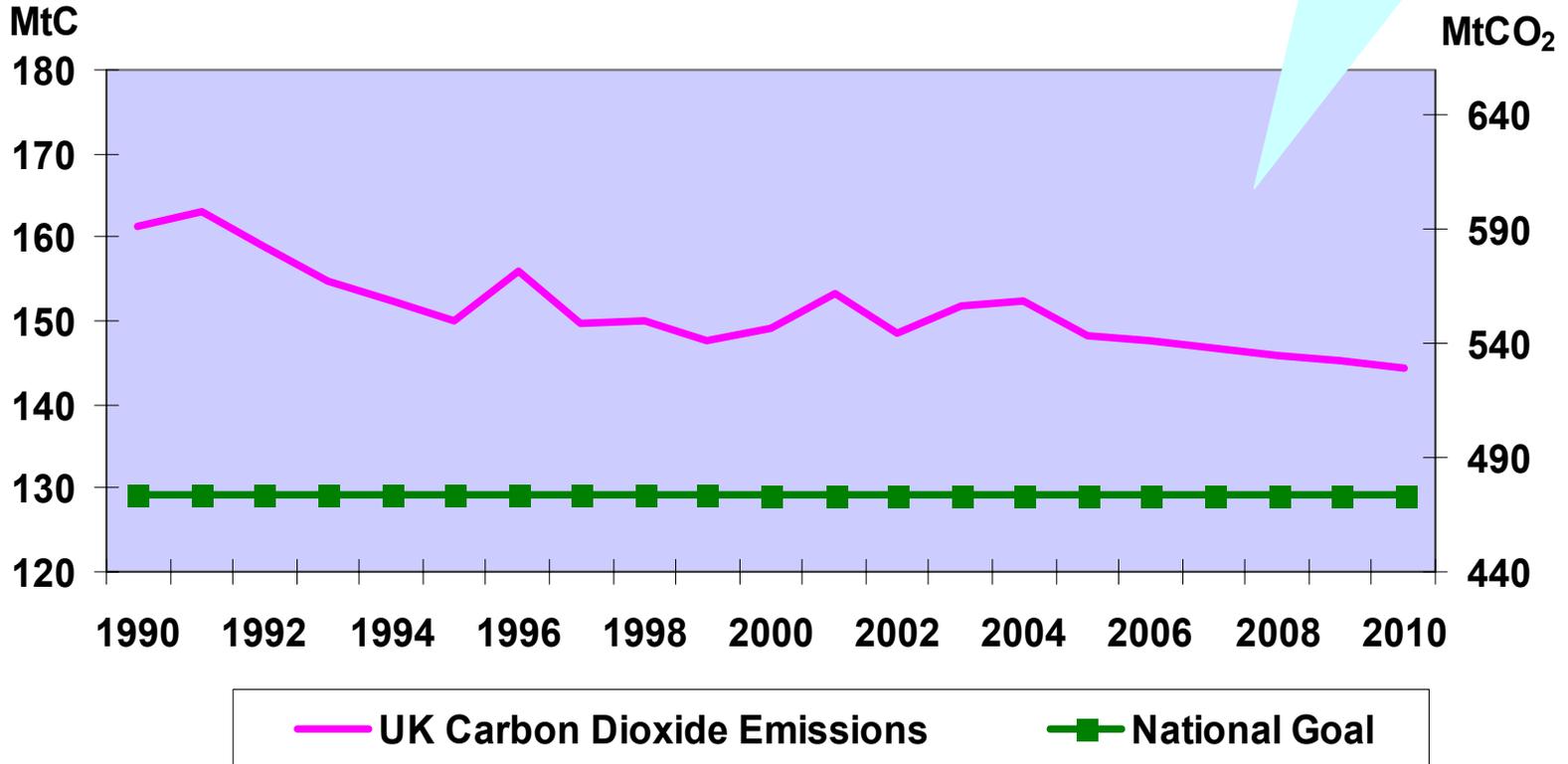
- “CAT” strategy: published in 2005
- R&D support to encourage:
 - more efficient coal-fired plants
 - coal with bio-mass
 - carbon capture and storage technologies.
- Government funding of £55m:
 - £35m for demonstration projects
 - £20m for R&D.

Emissions have declined, but reaching the 2010 goal may be a challenge

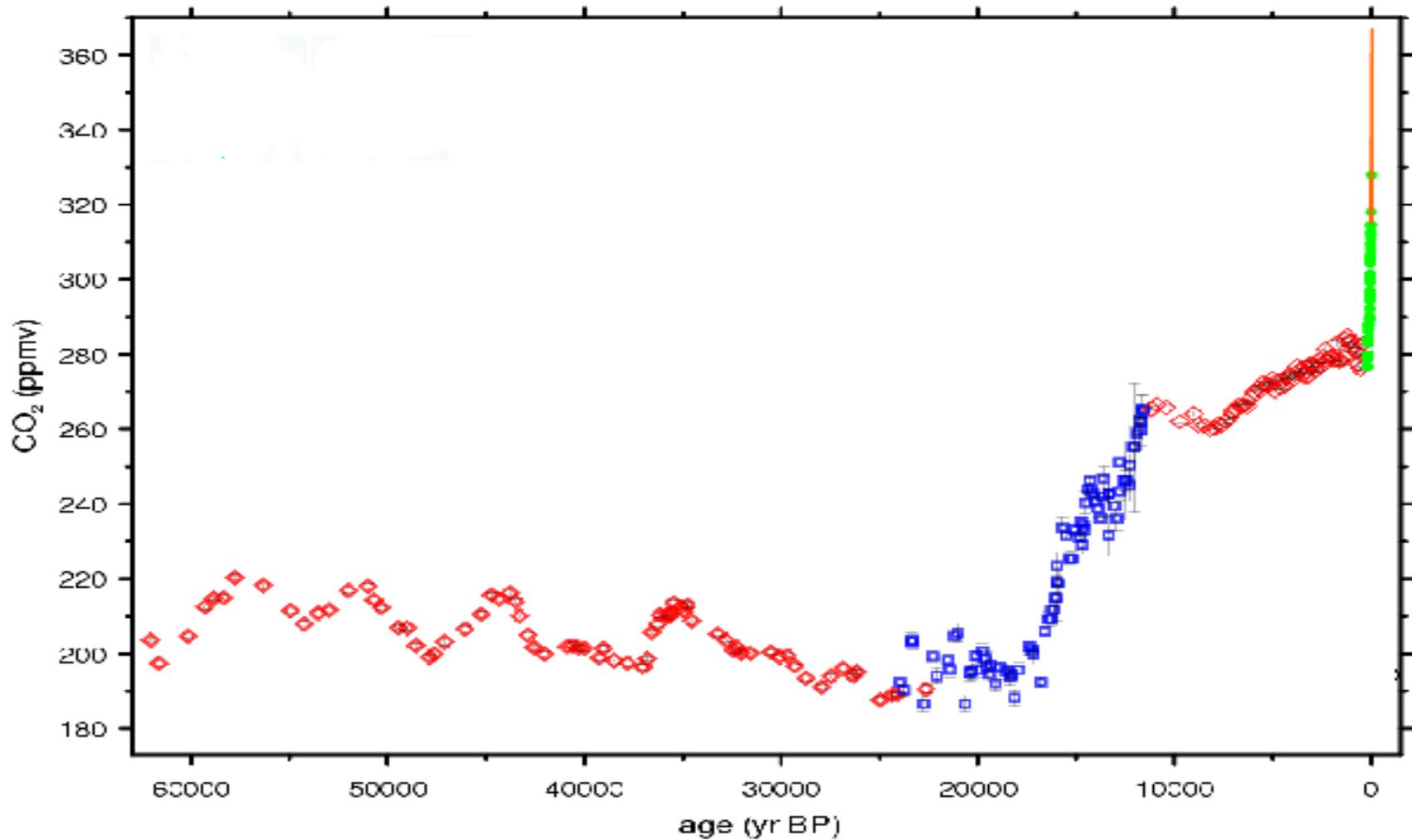
Historical and projected CO₂ emissions in the UK

MtC, MtCO₂

Current 'with measures' projections indicate a 15-18% reduction by 2010



Carbon dioxide levels over the last 60,000 years



The forward international agenda

- Convention process – long term co-operative action (all countries)
- Kyoto protocol – post 2012 commitments (Kyoto countries to discuss)
- G8 Gleneagles Dialogue – Mexico Ministerial
- G8 Summit – St Petersburg, July 2006
- EU – Energy Green Paper
- UK Stern Review, Energy Review, Climate Change Programme Review
- Tackling climate change can be a win-win

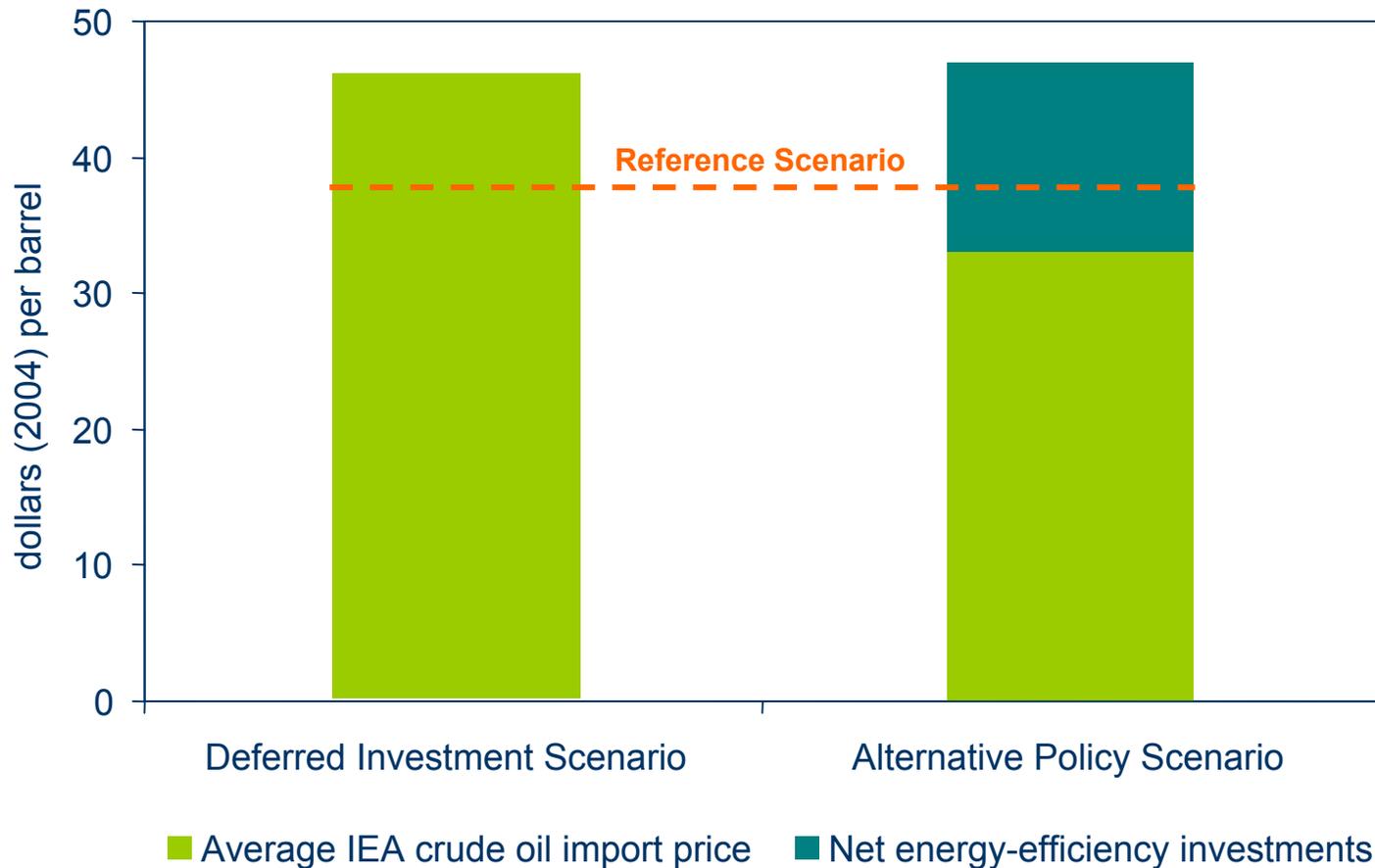
G8 Gleneagles Summit

- The Prime Minister made Climate Change one of his two key priorities
- Invited the five recently industrialised countries – Mexico, Brazil, India, South Africa and China
- Produced agreement on the science, a dialogue and a programme of action

Programme of Action

- Energy efficiency of coal fired power plant – best practice
- Most cost effective and efficient plant
- Work on potential of clean coal and carbon capture and storage technologies
- Work on definitions, costs, scope for ‘capture ready plant and economic incentives with IEA/CSLF

Squaring the energy, environment and security triangle



Alternative Scenario: Role of Energy Efficiency

- 12.8mb/d reduced demand by 2030
- 60% of CO₂ emission reductions
- Energy Efficiency – important contribution
 - ½ of global savings from developing countries alone
 - 13% saving from power generation
 - 11% saving from residential use
- Saving Energy enhances energy security.

- Who has the answers: Government, Markets, Environmentalists?

➤ **All of the them**