World Energy Outlook 2010

Nobuo Tanaka
Executive Director
International Energy Agency

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The context: A time of unprecedented uncertainty

- The worst of the global economic crisis appears to be over – *but is the recovery sustainable?*
- Oil demand & supply are becoming less sensitive to *price* – *what does this mean for future price movements?*
- Natural gas markets are in the midst of a revolution – *will it herald a golden era for gas?*
- Copenhagen Accord & G-20 subsidy reforms are key advances – *but do they go far enough & will they be fully implemented?*
- Emerging economies will shape the global energy future – *where will their policy decisions lead us?*
Overview of WEO-2010 scenarios

- **New Policies Scenario** is the central scenario in WEO-2010
  - assumes cautious implementation of recently announced commitments & plans, even if yet to be formally adopted
  - provides benchmark to assess achievements & limitations of recent developments in climate & energy policy

- **Current Policies Scenario** takes into consideration only those policies that had been formally adopted by mid-2010
  - equivalent to the Reference Scenario of past Outlooks

- The **450 Scenario** sets out an energy pathway consistent with the goal of limiting increase in average temperature to 2°C
The age of cheap oil is over, though policy action could bring lower international prices than would otherwise be the case.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>CO₂ price in 2035 ($/tCO₂)</th>
<th>International oil price in 2035 ($/bbl)</th>
<th>Effective oil price in 2035 ($/bbl)</th>
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<tbody>
<tr>
<td>Current Policies</td>
<td>42 in EU</td>
<td>135</td>
<td>152 in EU</td>
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<tr>
<td>New Policies</td>
<td>50 in OECD</td>
<td>113</td>
<td>134 in OECD</td>
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<td>450 Scenario</td>
<td>120 in OECD</td>
<td>90</td>
<td>139 in OECD</td>
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Fossil fuels maintain a central role in the primary energy mix in the New Policies Scenario, but their share declines, from 81% in 2008 to 74% in 2035.
Recent policy commitments, if implemented, would make a difference.

Global energy use grows by 36% in 2008-2035, with the OECD share of world demand falling from 44% today to 33% in 2035.
Total primary energy demand in China grows at 2.1% per year on average in 2008-2035, an overall increase of 75%
Emerging economies dominate the growth in demand for all fuels

Demand for all types of energy increases in non-OECD countries, while demand for coal & oil declines in the OECD
Fossil-fuel subsidies are distorting price signals

Economic value of fossil-fuel consumption subsidies by country, 2009

Fossil-fuel consumption subsidies amounted to $312 billion in 2009, down from $558 billion in 2008, with the bulk of the fall due to lower international prices.
Booming demand for mobility in the emerging economies drives up oil use

The global car fleet will continue to surge as more & more people in China & other emerging economies buy a car, overshadowing modest growth in the OECD
Global oil production reaches 96 mb/d in 2035 on the back of rising output of natural gas liquids & unconventional oil, as crude oil production plateaus.
More oil from fewer producers

Incremental oil production by key country in the New Policies Scenario, 2009-2035

Production rises most in Saudi Arabia & Iraq, helping to push OPEC’s market share from 41% today to 52% by 2035, a level last seen prior to the first oil shock of 1973-1974.
A golden age for gas?

- Gas is set to play a key role in meeting the world’s energy needs
  - *demand rises by 44%, led by China & Middle East*
- Unconventional gas accounts for 35% of the increase in global supply to 2035, with new non-US producers emerging
- Gas glut will peak soon, but may dissipate only very slowly
- The glut will keep pressure on gas exporters to move away from oil-price indexation, notably in Europe
- Lower prices could lead to stronger demand for gas, backing out renewables & coal in power generation
Coal remains the backbone of global electricity generation.

A drop in coal-fired generation in the OECD is offset by big increases elsewhere, especially China, where 600 GW of new capacity exceeds the current coal-fired capacity of the US, EU & Japan.
Renewables enter the mainstream...

The use of renewable energy triples between 2008 & 2035, driven by the power sector where their share in electricity supply rises from 19% in 2008 to 32% in 2035
....but only if there is enough government support

Government support remains the key driver – rising from $57 billion in 2009 to $205 billion in 2035 – but higher fossil-fuel prices & declining investment costs also spur growth
China becomes the market leader in low-carbon technologies

Given the sheer scale of China’s market, its push to expand the role of low-carbon energy technologies is poised to play a key role in driving down costs, to the benefit of all countries.
Caspian energy riches could enhance global energy security

Kazakhstan drives an increase in Caspian oil production to 5.2 mb/d by 2035, while Turkmenistan & Azerbaijan push up gas production to over 310 bcm
Today, there are 1.4 billion people lacking access to electricity. Based on current trends, 1.2 billion people – or 15% of the world’s population – will still lack access in 2030.
The 450 Scenario sets out an energy pathway consistent with limiting the increase in temperature to 2°C

Assumes vigorous implementation of Copenhagen Accord pledges to 2020 & much stronger action thereafter

The failure of the Copenhagen Accord pledges:

> As many lack transparency, there is 3.9 Gt of uncertainty over the level of abatement pledged to 2020

> As many lack ambition, the cost of achieving the 2°C goal has increased by $1 trillion in 2010-2030 compared with WEO-2009
In the 450 Scenario, compared with the Current Policies Scenario, efficiency measures provide 53% of the necessary abatement, but renewables, CCS & nuclear are also crucial.
In moving from the New Policies Scenario to the 450 Scenario, more expensive abatement options such as CCS play a growing role.
In the 450 Scenario, compared with the Current Policies Scenario, China & the US account for 48% of the cumulative emission abatement that is needed in 2010-2035.
Achieving the 2°C goal will require rapid decarbonisation of global energy

Carbon intensity would have to fall at twice the rate of 1990-2008 in the period 2008-2020 & almost four times faster in 2020-2035
A fundamental change is needed in power generation

Low-carbon technologies account for over three-quarters of global power generation by 2035 in the 450 Scenario, a four-fold increase on today

Share of world electricity generation by type and scenario

- Low-carbon generation in the NPS
- Additional low-carbon generation in 450 Scenario
- Fossil-fuel fired generation in the 450 Scenario
... and also in transport

Sales of plug-in hybrid and electric vehicles in the 450 Scenario & CO2 intensity of the power sector

Plug-in hybrids & electric vehicles reach 39% of light-duty vehicle sales by 2035, making a big contribution to CO2 abatement, thanks to a major decarbonisation of the power sector.
Will peak oil be a guest or the spectre at the feast?

Oil demand peaks at 88 mb/d before 2020 & falls to 81 mb/d in 2035, with a plunge in OECD demand more than offsetting continuing growth in non-OECD demand.
Combating climate change will bring economic benefits as well as costs.

In the 450 Scenario, annual spending on oil imports in 2035 by the five largest importers is around $560 billion, or one-third, lower than in the New Policies Scenario.

Oil-import bills as share of GDP in selected countries

- European Union
- United States
- Japan
- China
- India

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<td>European Union</td>
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China in the 450 Scenario
In the 450 Scenario, compared with the Current Policies Scenario, efficiency measures account for 53% of China’s abatement in 2010-2035.
In moving from the New Policies Scenario to the 450 Scenario, China starts to rely more on CCS as room for further abatement from lower-cost options becomes limited.
Low-carbon technologies account for 78% of China’s power generation by 2035 in the 450 Scenario, up from 19% today.
Sales of plug-in hybrid and electric vehicles in the 450 Scenario & CO2 intensity of the power sector in China

In China, plug-in hybrids & electric vehicles reach 45% of new light-duty vehicle sales by 2035
Summary & conclusions

- Recently announced policies can make a difference, but fall well short of what is needed for a secure & sustainable energy future.

- Lack of ambition in Copenhagen has increased the cost of achieving the 2°C goal & made it less likely to happen.
  
  > *Unless commitments are fully implemented by 2020, it will be all but impossible to achieve the goal.*

- The age of cheap oil is over, though policy action could bring lower *international* prices than would otherwise be the case.

- Renewables are entering the mainstream, but long-term support is needed to boost their competitiveness.

- Getting the prices right, by phasing-out fossil-fuel subsidies, is the single most effective measure to cut energy demand.
Implications for China

- China's role in global energy is set to expand & its policies will significantly impact global energy trends & prospects for limiting climate change.

- A golden age of gas led by China in the interest of diversifying the fuel mix can contribute greatly to reducing CO2 and other emissions.

- Continued energy pricing reforms in China is a triple-win for enhancing energy security, reducing emissions & immediate economic gains.

- China's role as leader in developing, manufacturing & deploying low-carbon technologies can drive down costs, to the benefits of all countries.

- Growing interconnectedness & China's increasing weight in the energy market links its energy security to global energy security.