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Market Trends and Projections to 2018
World energy demand by fuel

- Oil
- Coal
- Gas
- Biomass
- Nuclear
- Other renewables
- Hydro
Change in world energy demand by fuel & scenario, 2011-2035

Mtoe 2,000

-1,500 -1,000 -500 0 500 1,000 1,500 2,000

Coal Oil Gas Nuclear Hydro Bioenergy Other renewables

CPS NPS 450S
Coal use grows further albeit at a slower pace than in the past.

Incremental world coal demand, historical & by scenario:

- **1987-2011**
  - 1987-2001
  - 2001-2011

- **New Policies Scenario**
  - 2011-2020
  - 2020-2035

- **Current Policies Scenario**

- **450 Scenario**

Mtce
Fossil energy resources by type

- **Coal**
  - Total remaining recoverable resources: 3,050 years
  - Proven reserves: 142 years
  - Cumulative production to date: 5 years

- **Natural gas**
  - Total remaining recoverable resources: 233 years
  - Proven reserves: 61 years
  - Cumulative production to date: 5 years

- **Oil**
  - Total remaining recoverable resources: 178 years
  - Proven reserves: 54 years
  - Cumulative production to date: 5 years
Electricity generation in non-OECD countries has only begun to rise

Electricity generation by source

<table>
<thead>
<tr>
<th>Year</th>
<th>OECD</th>
<th>Non-OECD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>2000</td>
<td>2000</td>
</tr>
<tr>
<td>2011</td>
<td>4000</td>
<td>4000</td>
</tr>
<tr>
<td>2035</td>
<td>8000</td>
<td>8000</td>
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</tbody>
</table>

- Coal
- Renewables
- Gas
- Nuclear
- Oil
China is the main driver of increasing energy demand in the current decade, but India takes over in the 2020s as the principal source of growth.
The centre of coal trade is shifting to developing Asia

Major net importers of coal

The role of key OECD coal importers declines further, while Asian importers gain in importance, with India becoming the largest net importer early in the next decade.
The power sector is fundamental to the energy outlook of Southeast Asia

ASEAN incremental electricity generation by fuel, 2011-2035

- Coal
- Renewables
- Gas
- Nuclear
- Oil

TWh
Cumulative energy-related CO₂ emissions

Non-OECD countries account for a rising share of emissions, although 2035 per capita levels are only half of OECD.
Coal demand knows only one direction: up
BAU: China leading the (coal) world

COAL DEMAND IN CHINA AND IN THE REST OF THE WORLD

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0 500 1000 1500 2000 2500 3000 3500
China Rest of the world
What happened in China in 2012?

COAL DEMAND GROWTH IN CHINA (y-o-y)

Historical trend

2012

coal growth  lower GDP  power elasticity  big hydro
OECD countries are not reducing coal use

COAL DEMAND PROJECTIONS

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- United States
- OECD Europe
- OECD Asia Oceania
Growth led by Asia

COAL DEMAND TRENDS AND PROJECTIONS

![Coal Demand Trends and Projections Graph](chart.png)
But who is more coal-dependent?

Note: 2011 Data
Gas is far from fighting coal

GAS AND COAL VARIABLE GENERATION COSTS IN EUROPE

€/MWh

- 10 20 30 40 50 60 70 80 90

Jan-08 Apr-08 Jul-08 Oct-08 Jan-09 Apr-09 Jul-09 Oct-09 Jan-10 Apr-10 Jul-10 Oct-10 Jan-11 Apr-11 Jul-11 Oct-11 Jan-12 Apr-12 Jul-12 Oct-12 Jan-13 Apr-13

gas coal switching range Gas generation cost
And this will not change soon
European gas power is not just about cheap coal

Decomposition of European gas fired power generation: 2007 and current IEA expectations for 2015

<table>
<thead>
<tr>
<th>Category</th>
<th>TWh</th>
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<tbody>
<tr>
<td>2007 expectation</td>
<td>950</td>
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<tr>
<td>Impact eurozone crisis</td>
<td>850</td>
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<tr>
<td>Impact renewable policies</td>
<td>750</td>
</tr>
<tr>
<td>Impact unfavorable sparkspreads</td>
<td>700</td>
</tr>
<tr>
<td>Current expectation</td>
<td>650</td>
</tr>
</tbody>
</table>
And it is not the golden age of coal
Displacing coal in Asia will not be that easy

COAL AND GAS PRICES. IMPLIED CO2 PRICE TO TRIGGER FUEL SWITCHING

CO2 price triggering fuel switch  
Coal marker price Asia  
LNG Asia average
Coal trade: growing faster, moving East

Global thermal seaborne trade 1131 Mt (2018) (+244 Mt 2012-18)
South African coal changed destination

DEVELOPMENT OF SOUTH AFRICAN EXPORT DESTINATIONS, 2003-12
Asia pays the premium

DEVELOPMENT OF COAL STEAM COAL PRICES IN EUROPE AND ASIA
Colombia is King in Europe

DEVELOPMENT OF EXPORTS TO EUROPE FROM COLOMBIA AND SOUTH AFRICA AND PRICES
Prices going down for all types of coal

SPOT PRICE OF THERMAL, COKING AND PCI COAL (AUSTRALIA-FOB)

Evolution of fossil fuel prices
Debunking myths: US shale gas and coal price

Incremental thermal coal exports 2012 vs. 2011

- Indonesia
- Australia
- United States
- Russian Federation
- South Africa
- Colombia
- Others
Economics of coal gasification do make sense

AN ESTIMATE OF COAL-BASED SNG

$/MBtu

Capex  Opex  Minemouth coal  Traded coal  LNG

Range
Wrapping up

- Coal demand will grow at average 2.3% per year to reach almost 9 billion tonnes in 2018.
- Despite some policy changes, China will lead the way, absorbing roughly 60% of that growth.
- OECD consumption remains flat.
- Indonesia and Australia will lead export growth.
- Coal conversion in China emerges as a driver of demand growth.
Thank you

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