# Overview of the Energy Industries



# Overview of the Energy Industries

**We use energy to provide:**

- **Electricity**
- **Heat**
- **Light**
- **Transport**

**From:**

- **Fossil fuels**
  - **Oil**
  - **Gas**
  - **Coal**
- **Nuclear**
- **Large-scale hydroelectricity**

## Overview of the Energy Industries

- Rising energy demand
- Need to stabilise atmospheric $CO_2$ at 550ppm
- Aging fleet of coal & nuclear plant
- Concerns about storage of nuclear waste
- Declining oil & gas reserves 30- 50 years
- Only 70 years of uranium left
- Reduce reliance on hydrocarbons

Policy drivers:

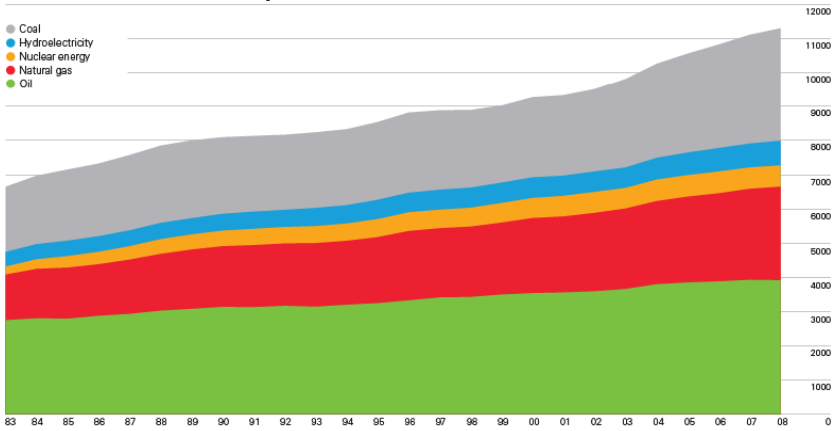
- Low Carbon Society
- Security of Supply
- Fuel Poverty

***Gives greater emphasis on renewable sources of energy***



## World primary energy consumption patterns 2008

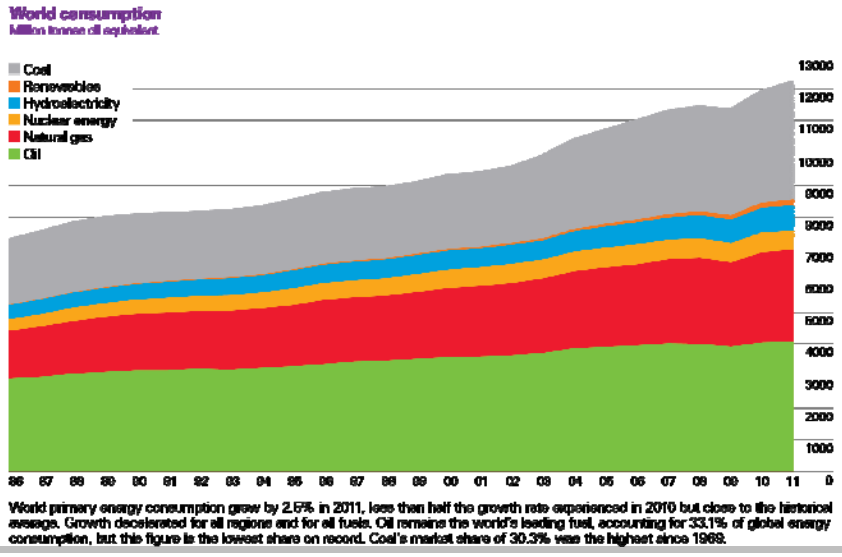
**World Consumption**
**Million tonnes oil equivalent**




World primary energy consumption grew by 1.4% in 2008, below the 10-year average. It was the weakest year since 2001. Oil remains the world's dominant fuel, though it has steadily lost market share to coal and natural gas in recent years. Oil's share of the world total has fallen from 38.7% to 34.8% over the past decade. Oil consumption and nuclear power generation declined last year, while natural gas and coal consumption, as well as hydroelectric generation, increased.

Source: BP Statistical Review of World Energy June 2009

# World primary energy consumption patterns 2011




World primary energy consumption grew by 2.5% in 2011, less than half the growth rate experienced in 2010 but close to the historical average. Growth decelerated for all regions and for all fuels. Oil remains the world's leading fuel, accounting for 33.1% of global energy consumption, but this figure is the lowest share on record. Coal's market share of 30.3% was the highest since 1968.

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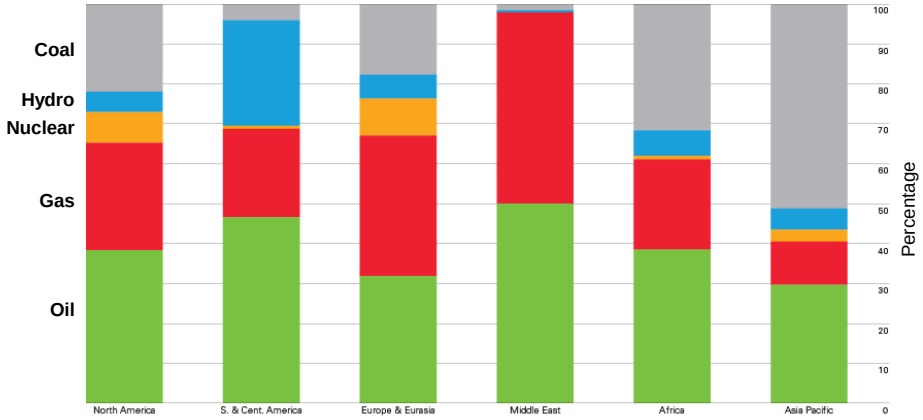
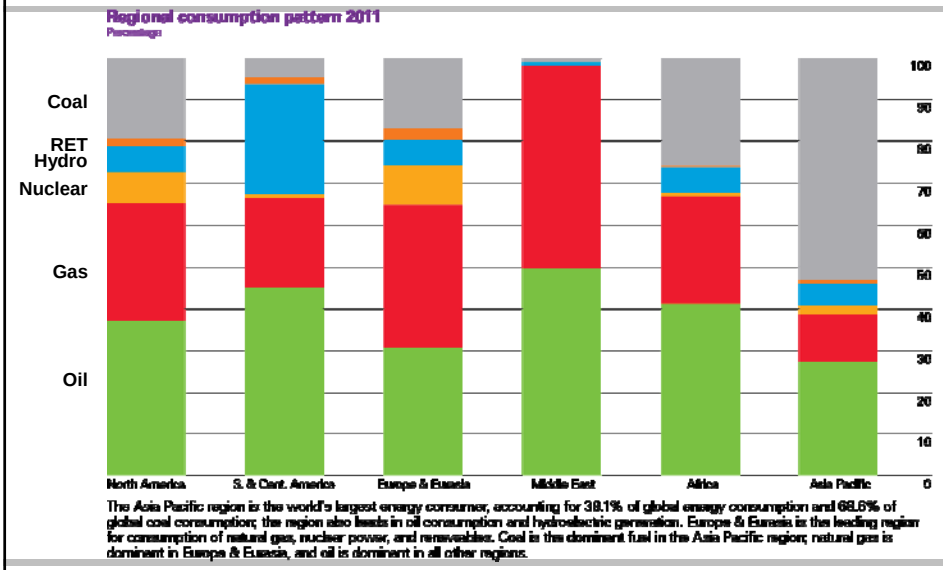
# Regional primary energy consumption patterns 2008




Oil remains the world's dominant fuel, holding the leading share of consumption in all regions except Europe and Eurasia, and Asia Pacific. Coal is the dominant fuel in Asia Pacific and continues to increase its market share; the region accounts for 61.5% of global coal consumption, the largest global share for any fuel in any region. Natural gas remains the leading fuel in Europe and Eurasia.

Source: BP Statistical Review of World Energy June 2009

## Primary energy consumption by region 2011

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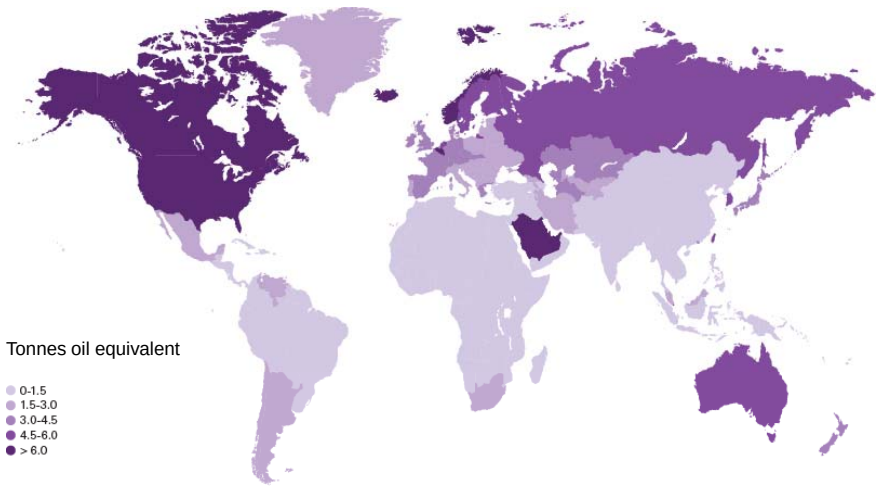
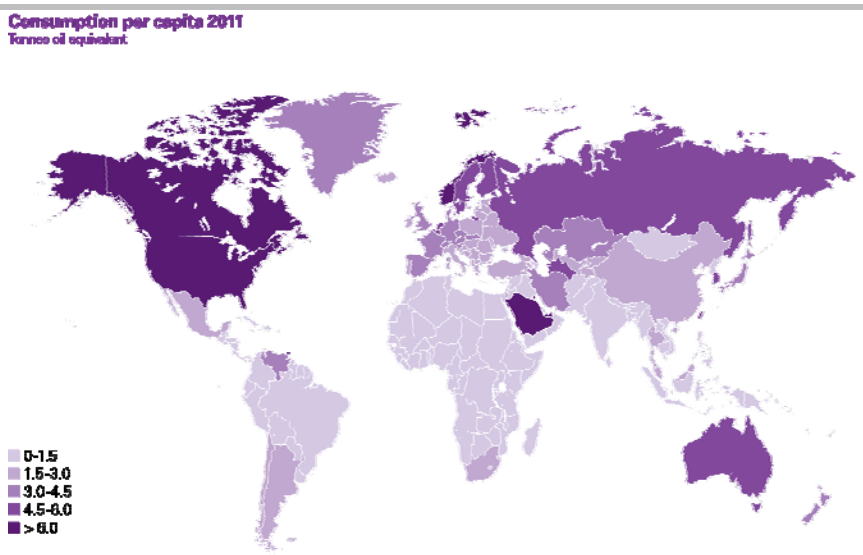
## Primary energy consumption per capita 2008




Source: BP Statistical Review of World Energy June 2009

## Primary energy consumption per capita 2011

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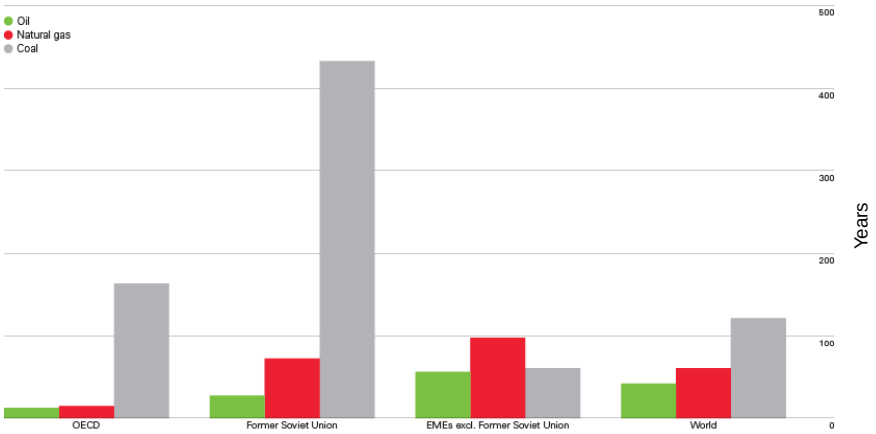
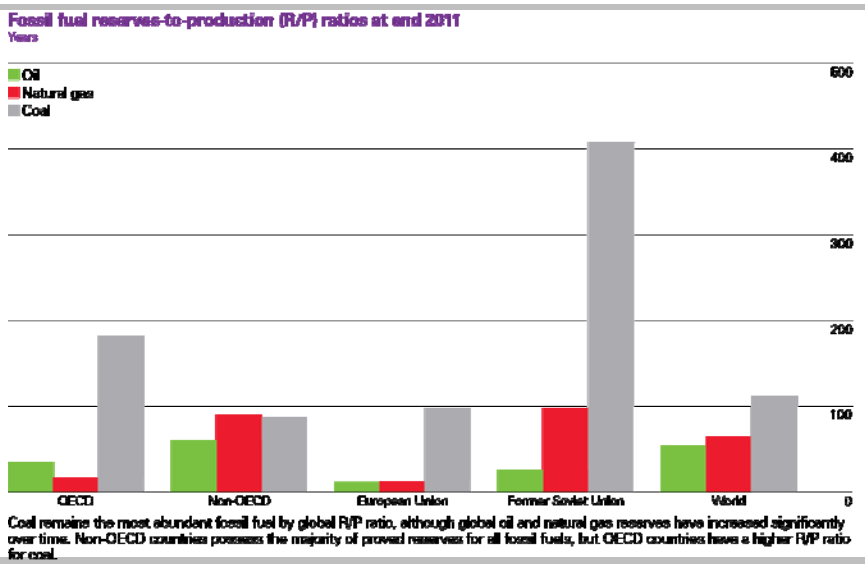
## Fossil fuel reserves-to-production (R/P) ratios at end 2008




Coal remains the world's most abundant fuel, with a global R/P ratio of more than 120 years. Among fossil fuels, coal reserves remain the most closely co-located with key consuming centres in Asia Pacific and North America. Oil's global R/P ratio has tended to rise over time, and has remained above 40 years since 1998.

Source: BP Statistical Review of World Energy June 2009

## Fossil fuel reserves-to-production (R/P) ratios at end 2011




Coal remains the most abundant fossil fuel by global R/P ratio, although global oil and natural gas reserves have increased significantly over time. Non-OECD countries possess the majority of proved reserves for all fossil fuels, but OECD countries have a higher R/P ratio for coal.

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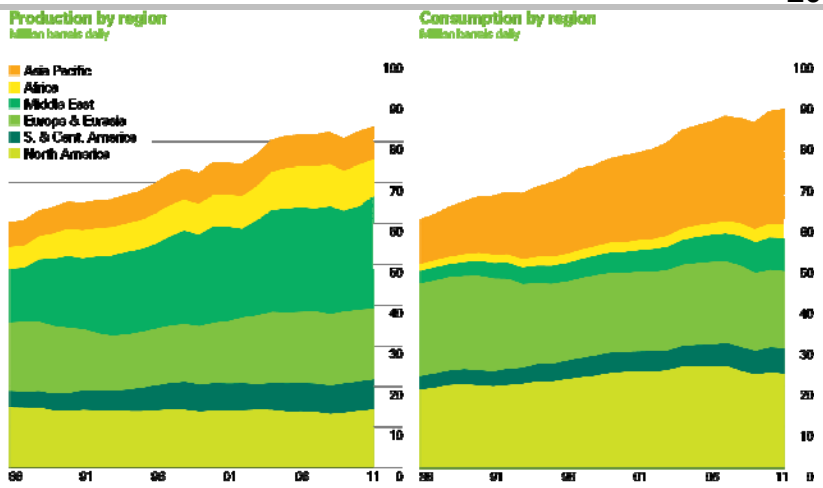
## Oil

## Oil production/consumption by region 2011




World oil production increased by 1.1 million b/d in 2011, with OPEC accounting for nearly all of the increase despite a 1.2 million b/d reduction in Libyan production. The US had the largest growth in non-OPEC supply for a third consecutive year. World oil consumption increased by roughly 600,000 b/d. All of the net growth came from emerging economies in Asia, South & Central America, and the Middle East, offsetting declines in Europe and North America.

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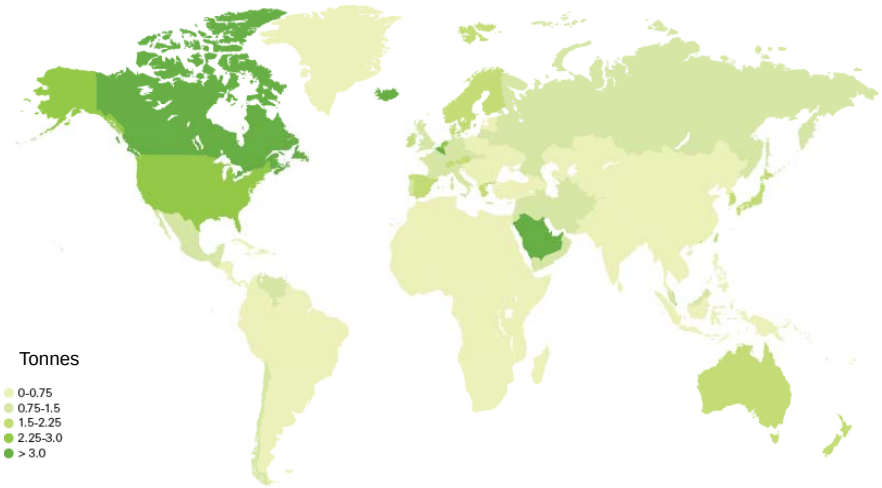
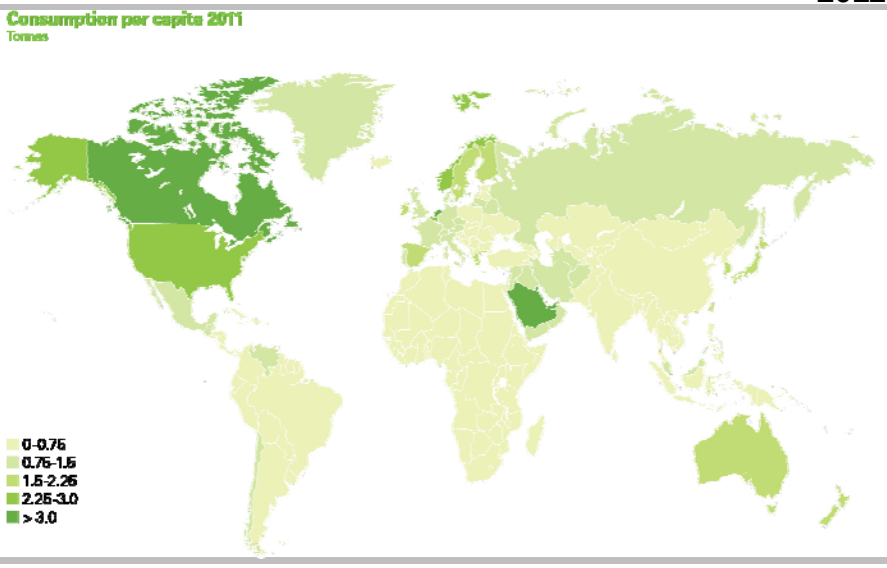
## Oil consumption per capita 2008




Source: BP Statistical Review of World Energy June 2009

## Oil consumption per capita 2011

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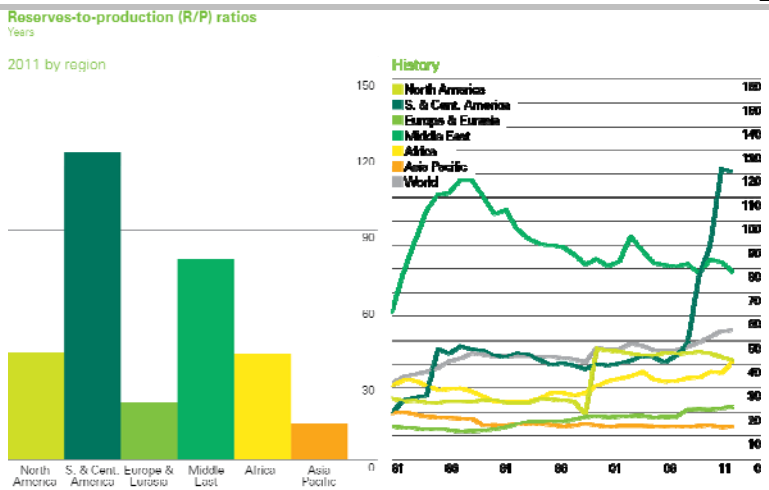
## Oil reserves-to-production (R/P) ratios 2011




World proved oil reserves at the end of 2011 reached 1852.8 billion barrels, sufficient to meet 54.2 years of global production. The continuing increase in official Venezuelan reserves pushed the South & Central American R/P ratio above 100. The large increase in Middle Eastern production reduced the region's R/P ratio despite an increase in reserves; the region holds 48.1% of global proved reserves.

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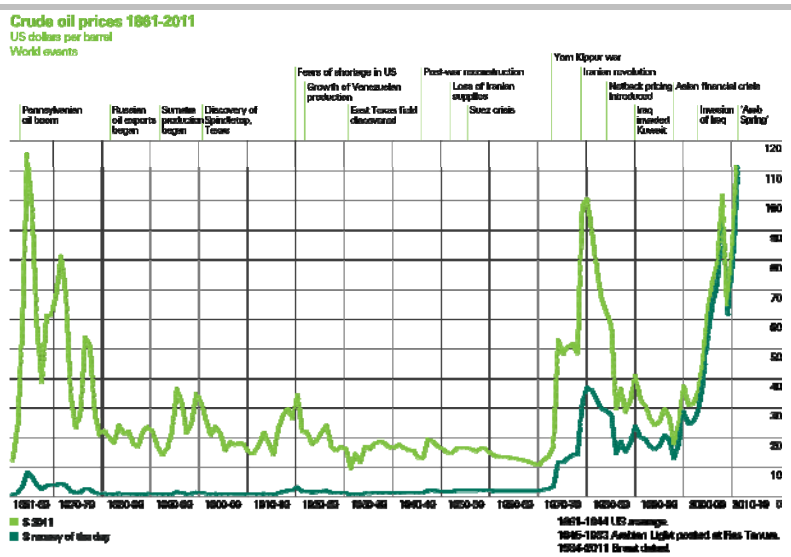
## Chart of crude oil prices since 1861

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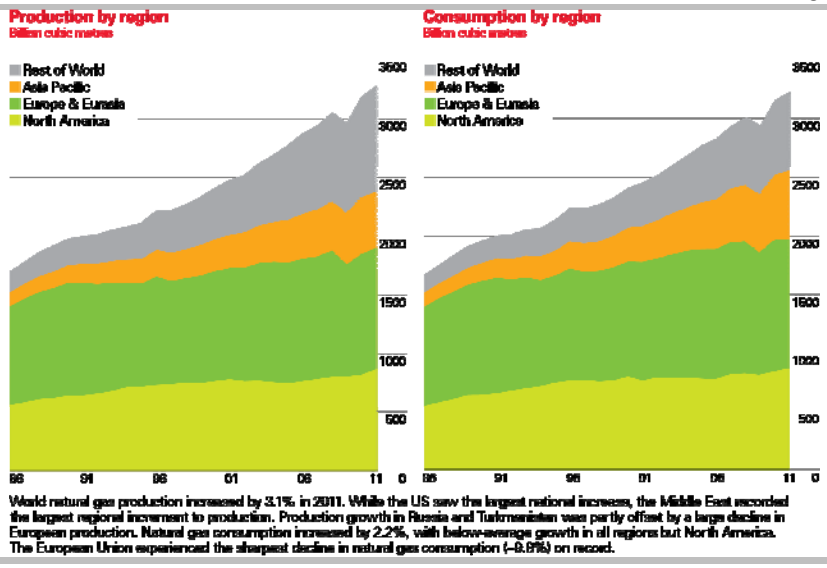
## Natural Gas

## Natural gas production/consumption by region 2011




World natural gas production increased by 3.1% in 2011. While the US saw the largest national increase, the Middle East recorded the largest regional increment to production. Production growth in Russia and Turkmenistan was partly offset by a large decline in European production. Natural gas consumption increased by 2.2%, with below-average growth in all regions but North America. The European Union experienced the sharpest decline in natural gas consumption (–9.8%) on record.

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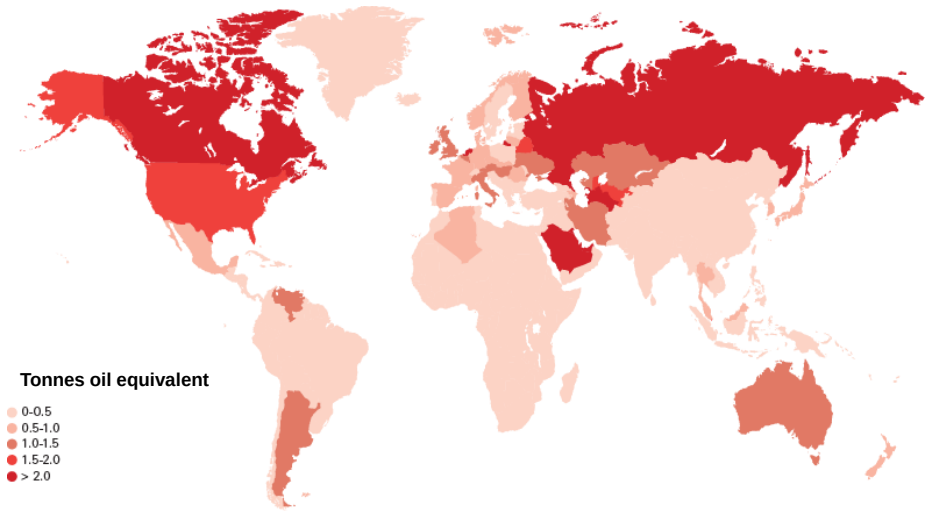
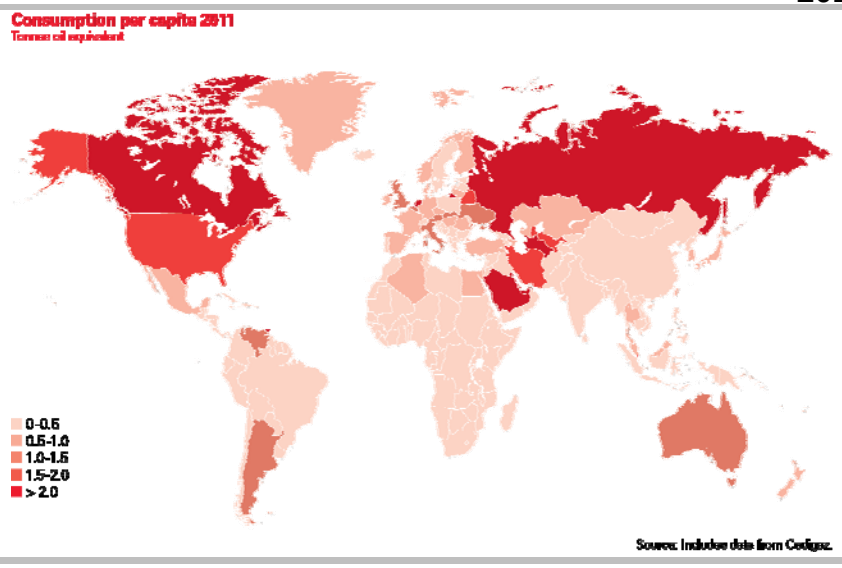
## Natural gas consumption per capita 2008




Source: BP Statistical Review of World Energy June 2009

## Natural gas consumption per capita 2011

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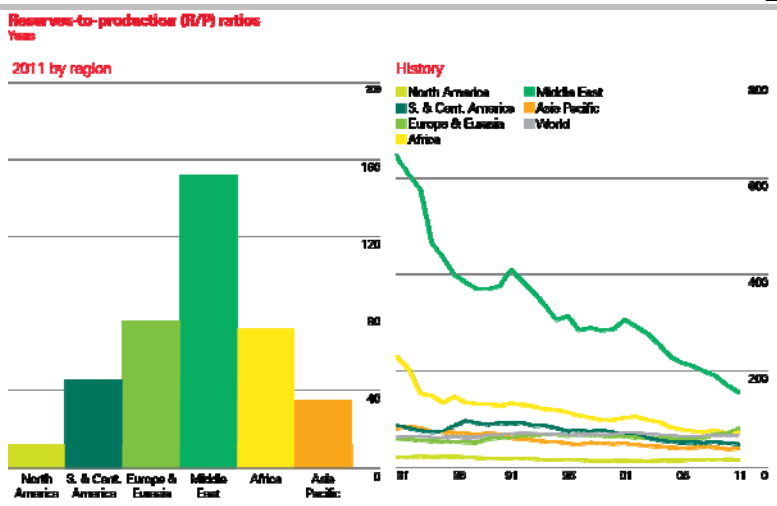
## Natural gas reserves to production ratio 2011




World proved natural gas reserves at end-2011 were sufficient to meet 63.6 years of production. A large increase in Turkmen reserves pushed the R/P ratio for Europe & Eurasia to 76.9 years. The Middle East still holds the largest reserves (38.4% of the world total, compared with 37.8% for Europe & Eurasia) and has an R/P ratio of over 150 years.

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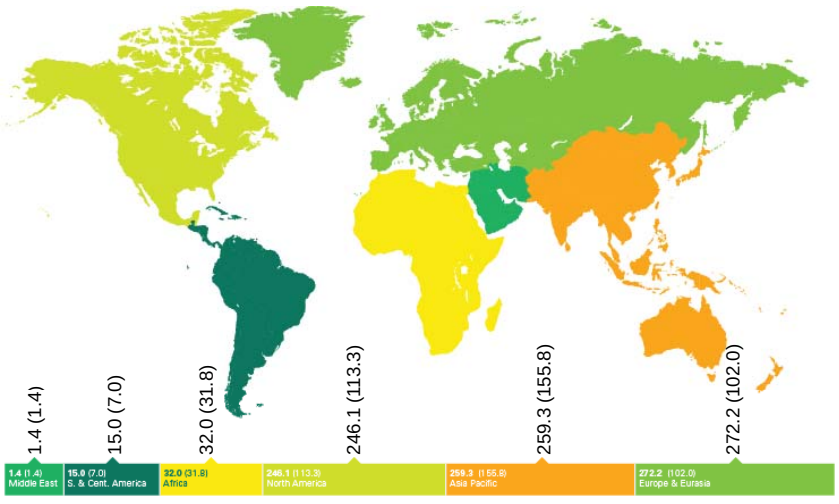
# Coal



# Proved coal reserves 2008

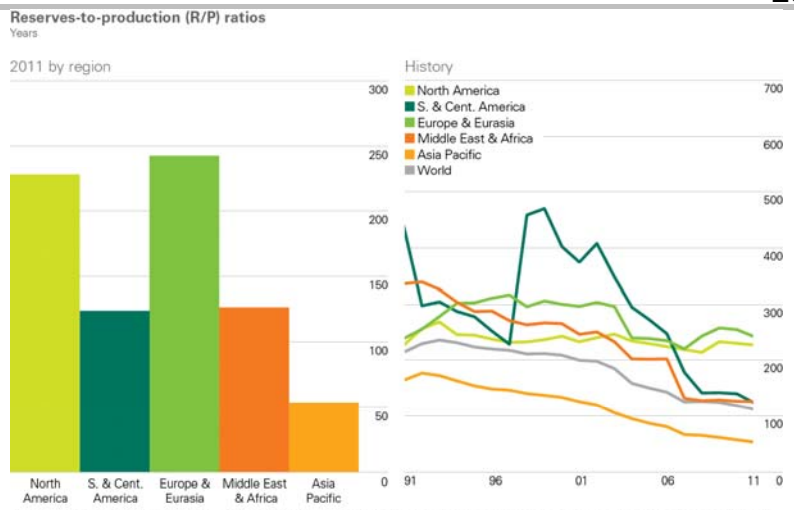



Source: BP Statistical Review of World Energy June 2009

**Thousand million tonnes (anthracite & bituminous coal in brackets)**

EG 5066 Energy Technologies: current issues & future directions

## Coal reserves-to-production ratios 2011




World proved reserves of coal in 2011 were sufficient to meet 112 years of global production, by far the largest R/P ratio for any fossil fuel. Europe & Eurasia holds the largest regional reserves and has the highest R/P ratio. The Asia Pacific region holds the second-largest reserves, while North America has the second-highest R/P ratio.

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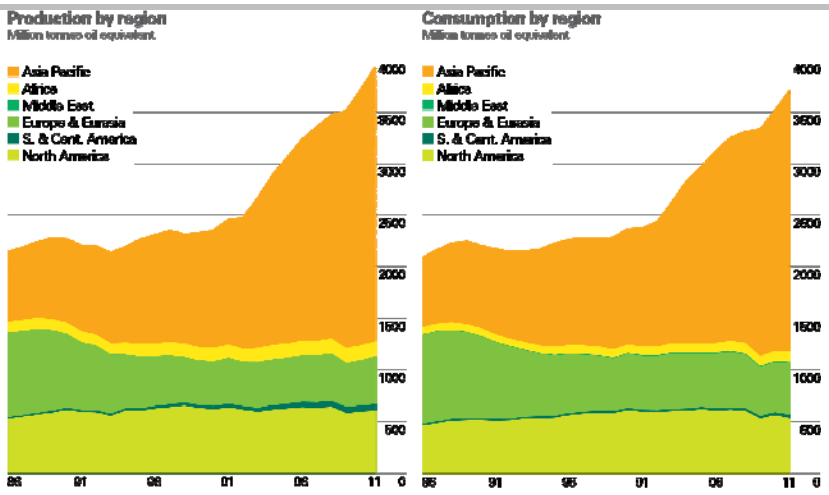
## Coal production/consumption by region




Coal was again the fastest-growing fossil fuel. Global production grew by 6.1%. The Asia Pacific region accounted for 85% of global production growth, led by an 8.8% increase in China, the world's largest supplier. Global coal consumption increased by 5.4%, with the Asia Pacific region accounting for all of the net growth. Elsewhere, large declines in North American consumption were offset by growth in all other regions.

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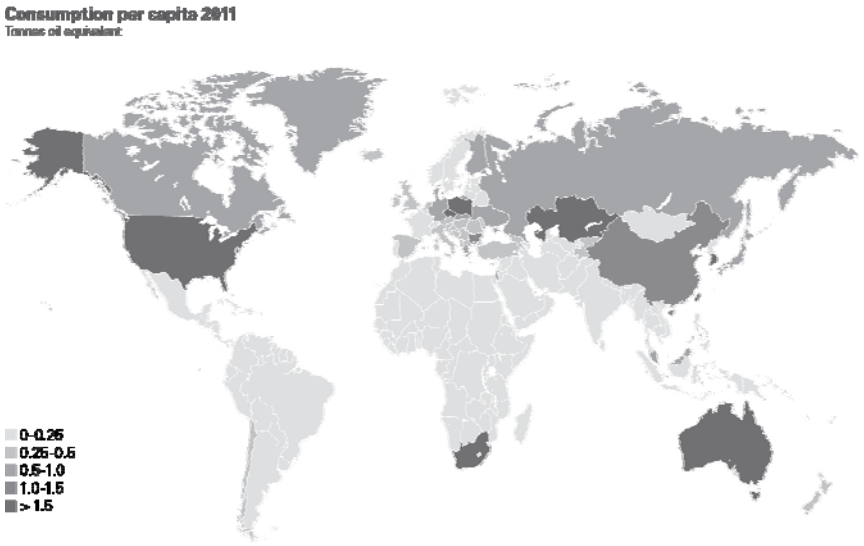
## Coal consumption per capita 2011

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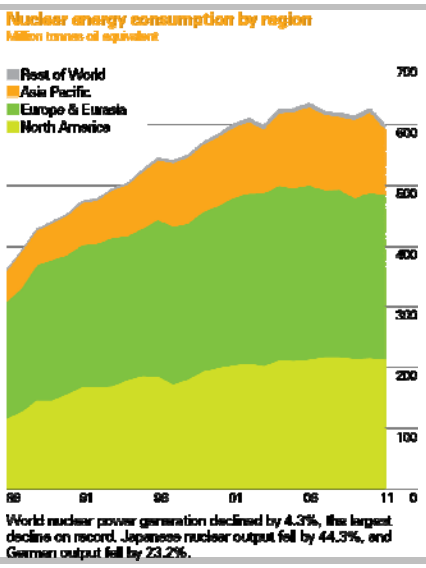
## Nuclear

## Nuclear energy consumption by region 2011

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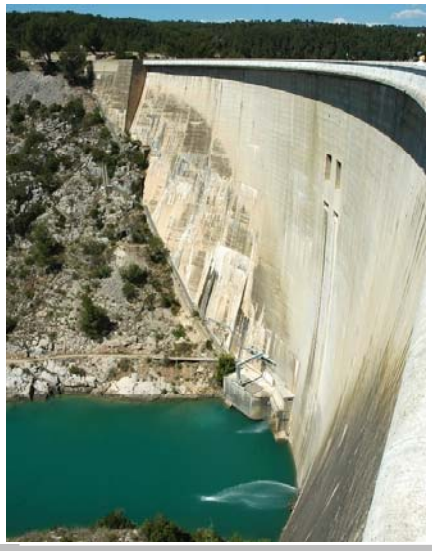
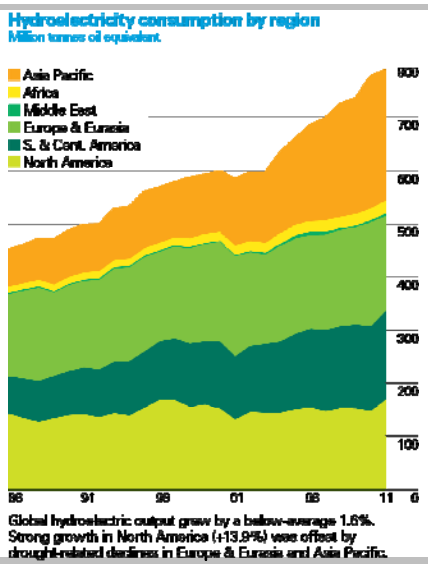
## Hydroelectricity



## Hydroelectricity consumption by region 2011

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## Renewable Energy Technologies

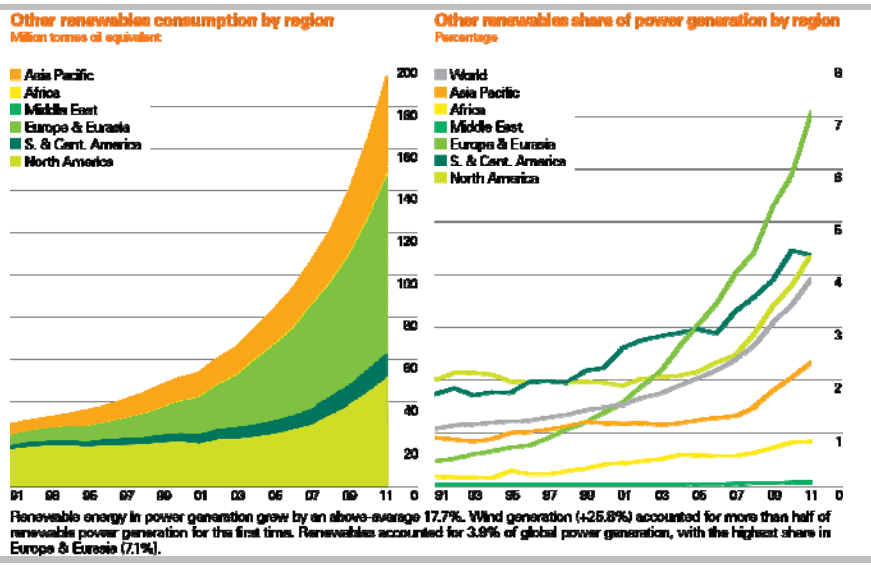
## Renewable Energy Technologies

Mainly concerned with producing electricity from sustainable sources:

- Biomass
- Fuel Cells
- Geothermal
- Hydro-electricity
- Solar photovoltaics (PV)
- Tidal
- Wave
- Wind power
  - Onshore
  - Offshore



## Renewable energy consumption/share of power by region

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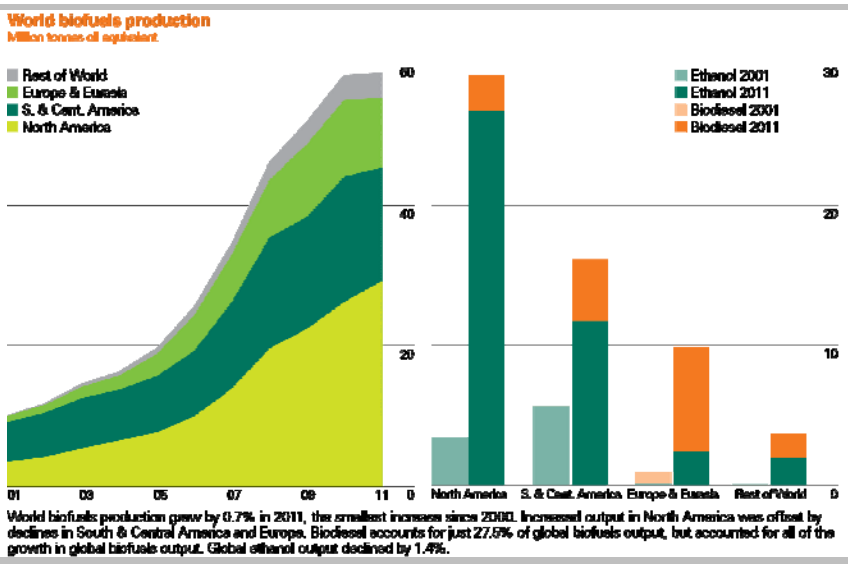
## Renewable energy production by region - biofuels

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## Energy in UK