Conférence
Sauvons le Climat

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Géopolitique de l’énergie

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World primary commercial energy consumption

Sources: Schilling & Al. (1977), BP Statistical 2014
Energy vs. GDP (2012)

Source: World Bank and IFP Training

* Sub-Saharan Africa excluding South Africa
Energy intensity trends per region

Source: IEA, WEO 2012
Which energy mix in 2050?
World reserves (Gtoe) - 2014

(1) Quantities which can be recovered for less than 130 $/kg
(2) Quantities which can be recovered for less than 260 $/kg
(3) Present technology (Pressurized Water Reactor)
(4) R/P: Proven Reserves/Production ratio

Yet to be discovered

Enhanced recovery

Including Non-conventional

Proven

Possible

R/P = 53y. 

R/P = 55

R/P = 113

R/P = 93

Proven

Proven

Proven

Proven

Proven

Yet to be discovered

Yet to be discovered

Yet to be discovered

Yet to be discovered

R/P = 50

R/P = 15

Source: BP Statistical Review 2014, CEA, FP/DEE, EIA
Oil resources (Gtoe)

Conventional Resources

- Cumulative production: 145
- Proven reserves: 238
- Next discoveries: 140

Non Recovered Oil: 675

Recovery Ratio Increase

- Actual Average Ratio
- Possible Average Ratio (around 2020)

Source: IFPEN
Unconventional gas basics: what it is, how and why it grew

• Natural gas (methane) produced using “new” techniques that enable production from sources previously considered un-commercial
  – Horizontal wells, hydraulic fracturing at multiple intervals and acidizing
• This includes today:
  – Tight gas: gas contained in low permeability rock
  – Coal bed methane (CBM): gas contained and trapped in coal beds
  – Shale gas: gas in low-permeability “shale”, typically source rock
• Conditions in the US that made it possible:
  – Techniques available, good economics, entrepreneurs
US Oil & Gas production today and tomorrow

U.S. petroleum and other liquid fuels supply by source, 1970-2040 (million barrels per day)

Natural gas production by source, 1990-2040 (trillion cubic feet)

Sources: US EIA Annual Energy outlook 2013 and 2014
Canadian oil sands

Proved Reserves = 173 Gb.
Probable reserves = 1800 Gb.

Source: CERI, BPSR, Canada National Energy, Bloomberg
Venezuela Extra - Heavy Oil

Proved Reserves = 297 Gb.
Probable reserves = 1300 Gb.

Source: BPSR, PDVSA
Energy today, energy tomorrow

Source: IEA, WEO 2012
Crude oil production

Source: BP Statistical Review 2014
Worldwide gas flows: 2011

Mtoe
Worldwide coal flows: 2011

Mtoe

[Map of worldwide coal flows for 2011 showing major coal-producing and consuming regions.]
Crude price variation

(1875) Rockefeller

(1911) Dissolution of Standard Oil

Period of control by Rockefeller

(1928) Achnacarry agreement

(1960) Foundation of OPEC

(1973) Yom Kippur war

(1979) Iranian revolution

(1990) Iraq/Kuwait war

(2011) Arab spring

Source: BP Statistical Review 2014
Crude oil price

Source: IMF

- Crude Oil (petroleum), West Texas Intermediate 40 API, Midland Texas, US$ per barrel

Events:
- Nationalization of oil fields
- 1st OIL SHOCK: Yom Kippur war
- OPEC domination
- 2nd OIL SHOCK: Iran/Iraq war
- 3rd OIL SHOCK: Kuwait crisis
- Speculation
- Katrina Rita hurricanes
- Arab Springs
- Staff attacks in S. Arabia
- Eco crisis
- Iraq events
- OPEC Quotas

Periods:
- 1970M01 - 2014M01
- US dollars per barrel
Dated Brent price (monthly) – 1996-2015

USD per barrel

Source: IMF
2014 oil price drop

-35% between mid-June and December

Source: EIA
Natural gas price evolution

Source: BP Statistical Review 2014
Coal price evolution

Source: BP Statistical Review 2014
• First public estimate of the petroleum resources north of the Arctic Circle: 90 billion barrels of oil and 1,670 trillion cubic feet of natural gas. (U.S. Geological Survey)
• Arctic Seabed contains up to 25% of the world's oil and natural gas reserves.
• Alaska’s offshore waters hold 26.6 billion barrels of oil that are technically recoverable, and that nearly 90 percent of it is in the Arctic.
Geopolitics of Energy
Part 2 - North America

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Energy balance in North America
Main areas for shale gas production in the US
Oil and gas pipelines in North America
Energy supply in the USA

![Map of energy supply in the USA](image)

- **Coal (Mtoe/y)**
- **Natural gas (Gm³/y)**
- **Oil (Mb/d)**

Key figures:
- Canada: 92.4
- Mexico: 0.8
- 27.3 Europe
- 0.8 Norway
- 1.3 Europe/CIS
- 1.6 West Africa
- 1.7 Middle East
- 0.4
- 2.3 Trinidad & Tobago
- 17.3 South America
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Part 3 - South America

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Energy balance in South America
Energy reserves in South America
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Part 4 - Europe

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Energy balance in Europe
Oil and gas flows between EU and Russia

46% of exports

49% of exports

42% of imports

29% of imports
Main oil and gas pipelines in Europe
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Part 5 - CIS

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Energy balance in the CIS

For electricity, consumption is supposed to be equal to the production.
Oil and gas pipelines in the CIS
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Part 6 - Africa

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Destinations of energy exports from Africa
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Part 7 - Asia

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Energy balance in Asia
Origin of Asian oil imports
Trade routes for the Asia energy supplies
Territorial claims by the People’s Republic of China
Geopolitics of Energy
Part 8 - Middle East

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Middle East exports – by country