EU policies and instruments in the coal sector, clean coal technologies and CCS

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Coal & Oil Unit
Ioannis Samouilidis

Astana, 30/09/2010

OUTLINE

- Coal in figures
- Current initiatives on coal
- The environmental challenge
- Funding instruments
- Looking ahead

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The role of coal

- EU is the third largest consumer behind China and US
- Coal represents 18% of EU-27 total energy consumption; 30% of the power generation is based on coal
- EU coal production in 2008:
  - » 146 Mt hard coal (43 % of total EU hard coal consumption)
  - » 434 Mt lignite (99 % of total EU lignite consumption)
- Coal scores high on SoS and competitiveness. The environmental sustainability of coal use remains a challenge

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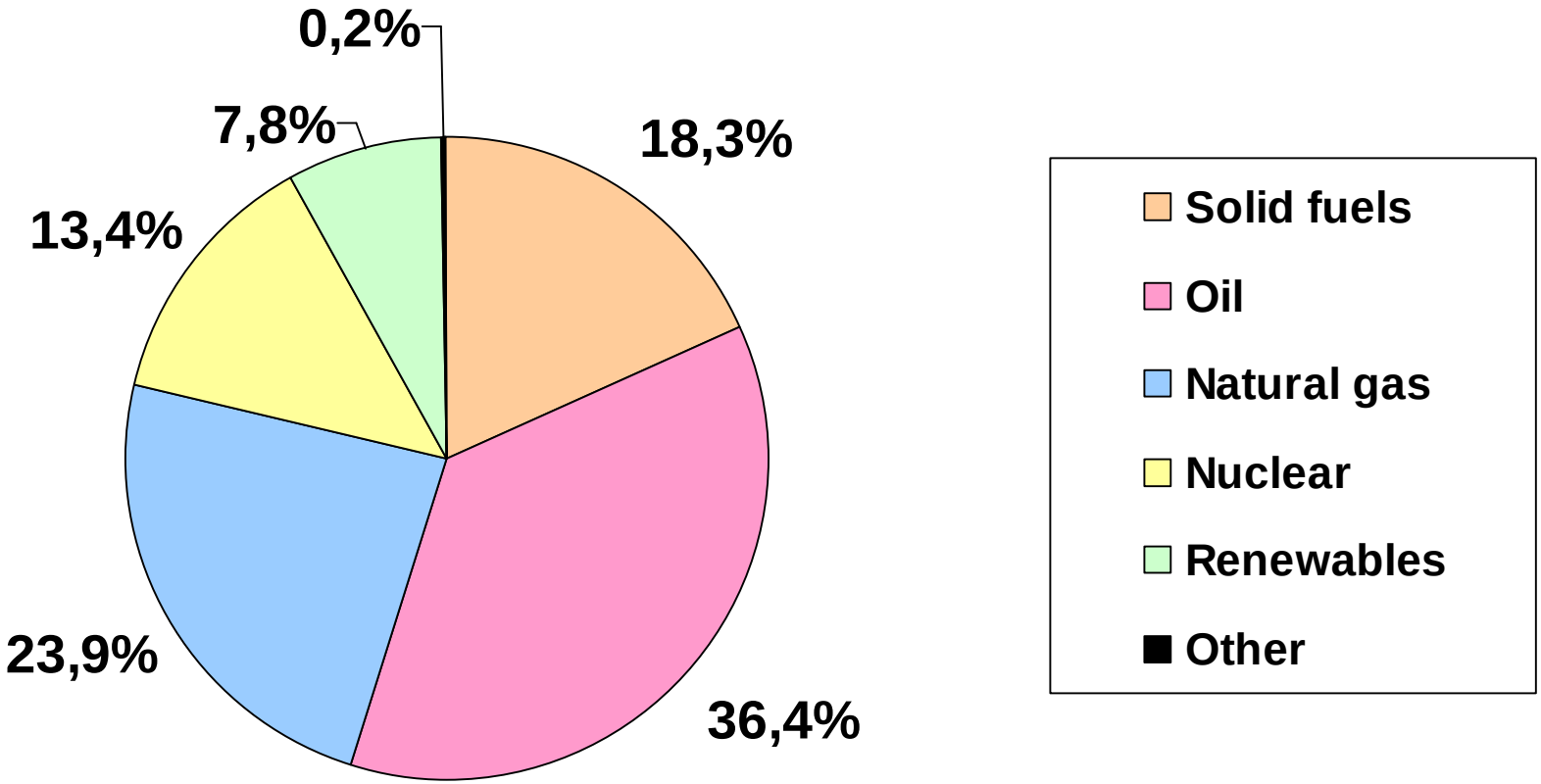
Primary Energy Consumption in the EU



Source: EU energy and transport in figures. Statistical pocket book 2010 (data for EU-27 in 2007)

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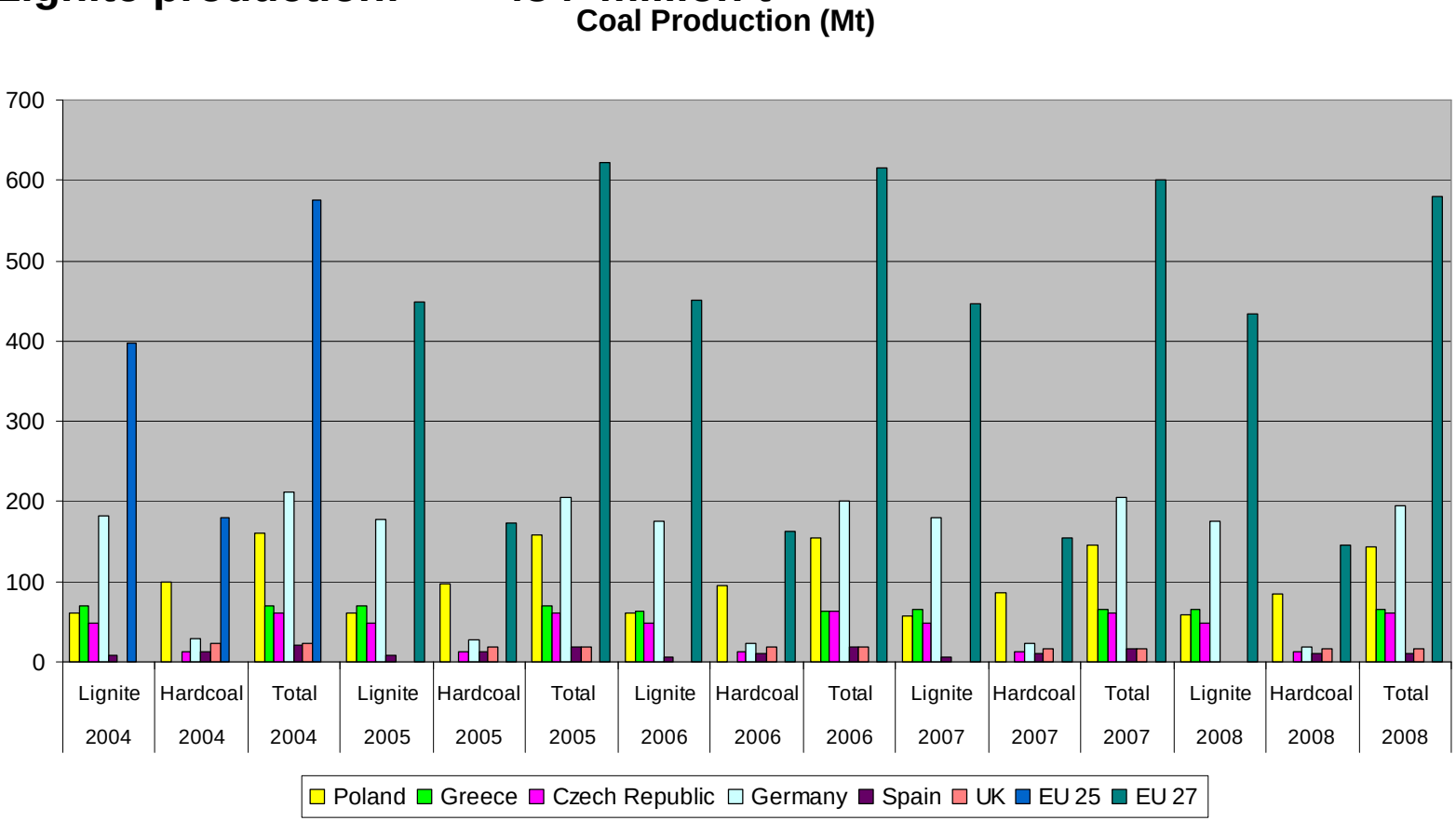
EU Coal Production: 580 million t in 2008

Hard coal production: 146 million t
Lignite production: 434 million t



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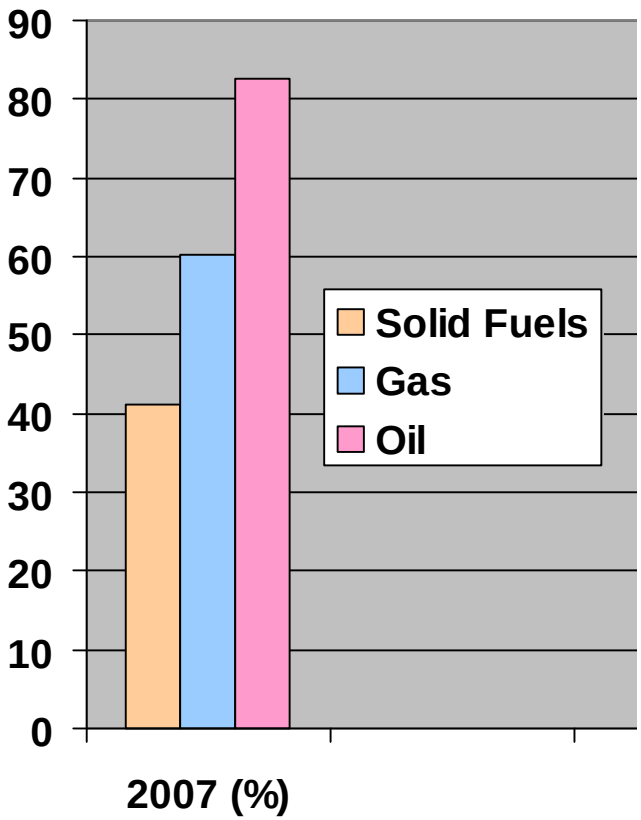
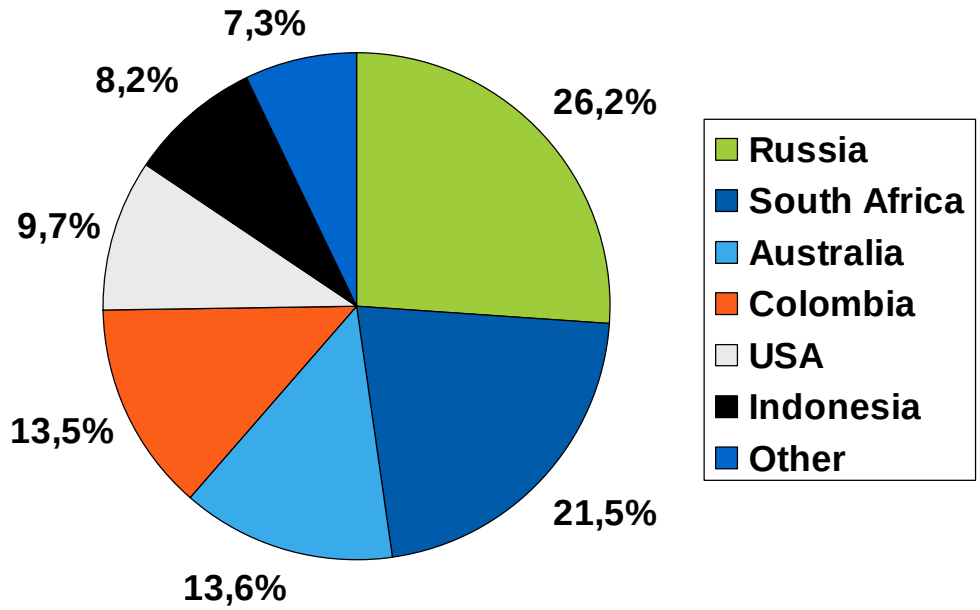
Import Dependency & Coal Suppliers





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Second Strategic Energy Review – indigenous fossil fuels

- It recognised the potential contribution of EU's indigenous energy resources to energy security
- Role of coal in the domestic energy supply as an important complement to oil, gas as well as renewables
- Long-term use of coal requires:
  - » Highly-efficient plants and wide availability of CCS
  - » Efficient management and production of resources
- Berlin Fossil Fuel Forum tasked to look at cost-effective measures and environmentally-compatible access to indigenous fossil fuels

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Best use of indigenous fossil fuels
Key activities and areas identified with stakeholders

- Transparency of the EU coal inventory
- Sharing best practices in Berlin Fossil Fuel Forum
  - » Land use planning and environmental impact management
  - » Public awareness and acceptance
- Research and innovation, continued availability of a skilled workforce
- Unconventional coal: coal bed methane, underground coal gasification, coal to chemicals

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International Cooperation

- EC engaged in multilateral and bilateral initiatives to exchange best practices, policies and technologies
  - Coal value chain efficiency (from production to use)
  - Carbon capture and storage (CCS)
  - Methane to markets: Coal mines and oil & gas
  - Co-financing studies/ projects
- Bilateral:
  - China (NZEC and CCT WG)
  - India (Coal WG and CCT WG)
  - South Africa (WG on CCT & CCS)
- Multilateral: CSLF, Global CCS Institute, IEA Clean Coal Centre, methane to markets partnership

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Lowering emissions from coal power plants

- Two relevant legal acts:
  - Integrated Pollution Prevention and Control (IPPC) Directive
  - Large Combustion Plants (LCP) Directive
- Aim to limit the emissions of pollutants including dust, SO2 and NOx
- BATs reference documents (BREFs) developed under the IPPC directive
- The COM has proposed a directive on industrial emissions which recasts in one single act several directives - currently under discussion in the Council and EP

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Obstacles to CCS / EC Action

- **Legislative Hurdles**
  - **CCS Directive**

- **Non-legislative Hurdles**
  - » Long term economic viability
    - **Emission Trading System (ETS)**
  - » Financing CCS research and demonstration
    - **Recovery package**
    - **NER300 funding under the ETS**
    - **FP7 (EU Research & Development programme)**
    - **Research Fund for Coal and Steel (RFCS)**
  - » Knowledge sharing to speed up technology development
  - » Public Awareness/Acceptance
    - **CCS Project Network**
    - **International cooperation (multilateral and bilateral)**
  - » Infrastructure needs
    - **Infrastructure package**
    - **TEN-E revision**

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EU funded CCS projects 1b€ EU funding

Hatfield

Rotterdam

Compostilla

Be•chatów

Jaenschwalde

Porto Tolle

Financing CCS Demonstration: Allowances under the ETS

- **ETS as a source of CCS support**
  - » 300 mil of allowances for large-scale CCS and innovative RES (NER 300)

- **Timeframe & Principles**
  - » Call expected to be launched summer 2010
  - » Funding decision by end of 2011
  - » Combined EEPR/NER300 funding can not exceed 50% of additional costs for CCS

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CCS Activities under FP 7 so far

- ***1st Call (2007): focus on capture***
  - Advanced capture techniques
  - EC funding 17.4 M€

- ***2nd Call (2008): focus on storage***
  - Storage capacity emerging economies and deep saline aquifers
  - Transport infrastructure
  - Public acceptance
  - EC funding:10 M€

- ***3rd Call (2009): focus on capture & storage***
  - Advanced capture technologies
  - Storage safety and transport infrastructure
  - Budget: 23 M€

- ***4th Call (2010): focus on storage***
  - Advanced capture techniques
  - Storage site characterization and decommissioning
  - Cooperation network on geological storage
  - Budget: 19 M€ (incl. Smart energy networks)- Call closed 15 October 2009

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CCT Activities under FP 7 so far

- ***1st Call (2007): focus on gasification and value chain CCT/CCS***
  - ü Gasification technologies suitable for CCS
  - ü CCT for Polygeneration
  - ü 6M€ EC funded; **projects ECCO and COMETH**

- ***2nd Call (2008): focus on combustion & gasification***
  - ü Fluidized bed, oxyfuel combustion and gas turbines for gasification
  - ü Feasibility studies for CCT plants with integrated CCS
  - ü Recovery and use of methane
  - ü 16 M€ EC budget; **projects H_2-IGCC; FLEXI BURN CFB**

- ***3rd Call (2009): focus on combustion***
  - ü Pulverised coal combustion – Increase plant efficiency
  - ü 6 M€ EC budget: **project NextGenPower**

- ***4th Call (2010): focus on combustion and methane recovery***
  - ü Demo sites for oxyfuel combustion; recovery & use of methane
  - ü 20 M€ EC budget: Call closed and evaluated. **Currently under negotiation**

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CCT ongoing projects in FP 7

- ***ECCO*** aims to provide recommendations and strategies for the use of CO2 from power plants and industry in Europe incl. enhanced hydrocarbon production (EOR/EGR) in a value-chain context. **5.3M€.** Ends in Aug 2011. **http://www.sintef.no/Projectweb/ecco/**

- **COMETH** investigates means for reducing coal mine methane (CMM) emissions to the atmosphere and will explore suitable schemes for its energetic use. Targeted to PL, CZ, RU, UA, RO, KZ and UK. **4.6M€.** Ends in Oct 2010. **http://www.cometh.info**

- **H2-IGCC** aims to develop a gas turbine capable of burning Hydrogen-rich Syngas.**17.2M€.** Ends in Oct 2013.**http://www.h2-igcc.eu**

- **FlexiBurn** aims to develop highly efficient CFB technology to provide flexible air/oxy operation for power plant with CCS. **11M€.** Ends in Aug 2012. **http://www.vtt.fi/sites/flexiburncfb**

- **NextGenPower** aims to demonstrate new alloys and coatings in boiler, steam turbine & the interconnecting pipework, for operation under ultra supercritical conditions, in combination with CCS, and still with a net efficiency of 45%. **10.3M€.** Ends in Apr 2014

2011 FP 7 Energy Call: CCT and CCS
Deadline: 7.04.11

16M€

- CCS: Post-combustion solvent based CO_2 capture
- CCS: CO_2 storage
- CCT: IGCC for high ash coal content

20M€

- CCT/ CCS: Optimisation of the capture process in power plants
- CCT/ CCS: CO_2 capture for industries other than power generation
- CCT/ CCS: Support to the European CCS demonstration project network

- All details on: http://cordis.europa.eu/fp7/dc/index.cfm

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Other relevant instruments

- **Research Fund for Coal and Steel (RFCS)**
  - » Annual calls with deadlines each 15 Sept and a budget of 55 M€/y (~15 for coal)
  - » Covers coal mining (47M€*), conversion (25M€*) and combustion/CCS (48M€*)
  - » Participants from third countries are welcome but not eligible for funding
  - » Flagship projects include COMPTES700 (test facility for 700C power plant; 15M); ECLAIR (emission free chemical looping; 6.4M) and HUGE (underground coal gasification; 3.1M)
  - » More details on: http://cordis.europa.eu/coal-steel-rtd/

- **EuropeAid Call on CCT/CCS (EuropeAid/129199/C/ACT/Multi)**
  - » Capacity building and studies on CCT & CCS in India, Indonesia, Kazakhstan, the Russian Federation, South Africa and Ukraine
  - » Call with a budget of 3M€ closed in mid June
  - » Proposals currently under evaluation
  - » Projects expected to start implementation in 2011
  - » Future Calls might follow

(*) provisional funding figures in the period 2003-2010

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Looking ahead

- Role of coal, CCT and CCS under the current EU policy developments
  - » Energy Strategy 2011-2020
  - » Energy roadmap 2050
  - » Energy Infrastructure package
- FP8: Financing research and demonstration of CCT and CCS
- Public acceptance
- International cooperation: policies, best practices and technologies

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