

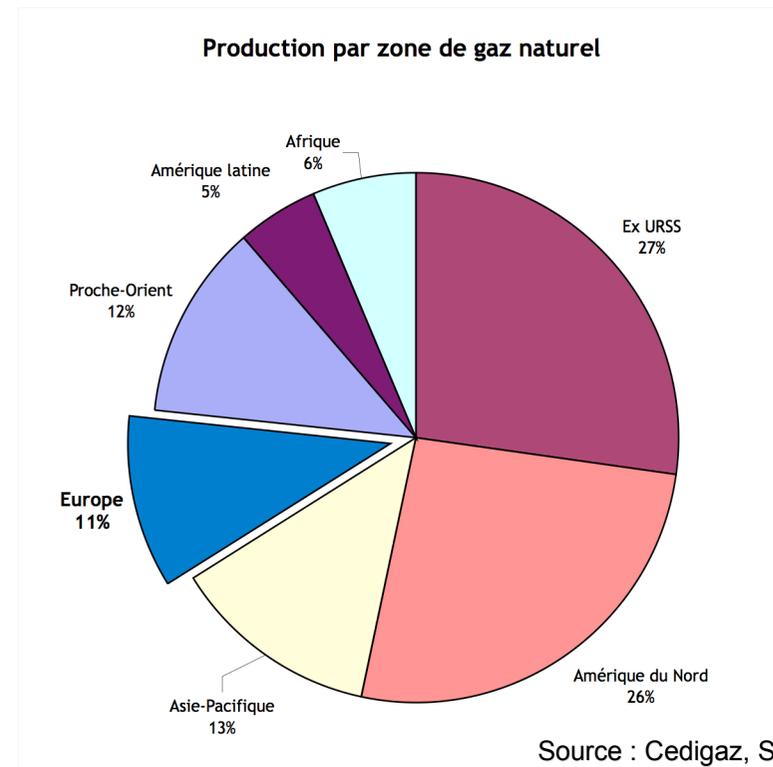
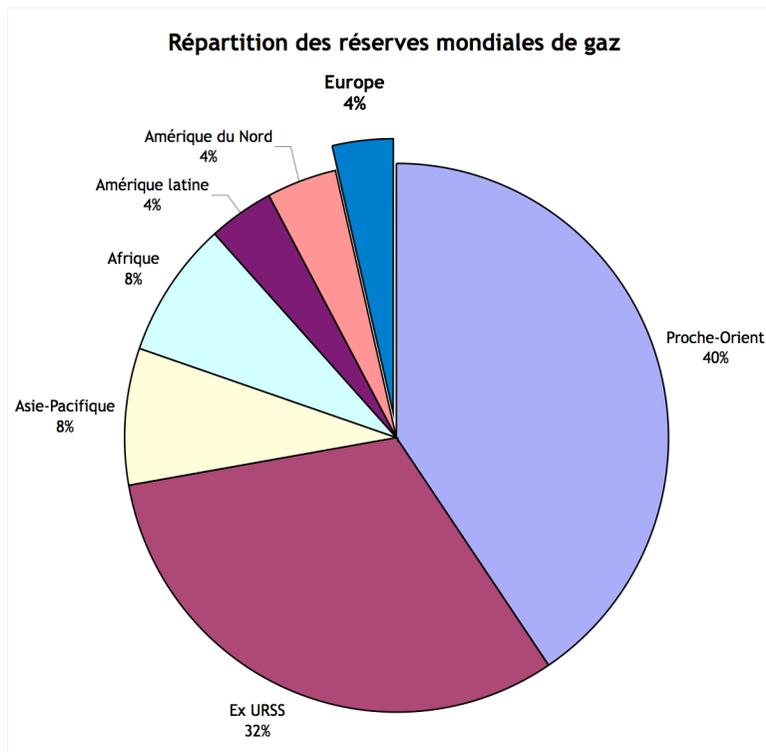


Future Developments in the European Gas Sector

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EPSU Eurogas EMCEF - 12 January 2011

➔ Worldwide reserves and production are predominantly located in a few countries



- ▶ Production : Russia and North America represent half of worldwide production, Qatar increasing quickly
- ▶ Reserves : Iran, Qatar and former USSR represent two thirds of the total

→ Gas production market is dominated by oil companies (international and national)

- ▶ 3 out of the 5 first producers of gas are international companies (majors)
 - This situation is different from oil, whose production is largely dominated by national oil companies
 - But reserves of gas are predominantly into national companies hands
- ▶ This can be explained by two main reasons
 - Gas needs a consumer to be produced, as markets are not as liquids as for oil. Major companies, located in consumer countries, have easier access to the consumers
 - Gas infrastructures in the global supply chain are very capital intensive which encourages producing countries to share the costs with partners
- ▶ Cooperation with producing countries and their national companies is a necessity for the international companies who want to play an important role in Upstream gas
 - Beyond the financial aspect, technological ability (and thus quality of workforce) is the key factor of success

➔ An excess of production has appeared since 2009

- ▶ A sizeable glut of global gas-supply capacity has developed, as a result of depressed gas demand (due to the economic crisis), together with unexpectedly strong growth in unconventional gas production in the United States in the last few years, and a surge in LNG capacity with new plants coming into production, especially in the Middle East

Figure 5.8 • Natural gas transportation capacity between major regions in the New Policies Scenario



Source : IEA - World Energy Outlook 2010

→ Disconnection between gas and oil prices on spot markets

- ▶ Gas prices traditionally followed oil prices evolutions, but this movement has been broken from the beginning of 2009
 - Oil price have started to recover while gas prices remained depressed in relations with the glut mentioned before
- ▶ Gas is now divided in two separate markets, with distinct levels of price
 - Spot markets (USA and the UK) where prices are low and disconnected from oil prices
 - Contractual markets, whose prices are still linked with oil because of their calculation formula
- ▶ This situation will last as long as the glut in gas will
- ▶ In the future, formulas for long term contracts will be more and more disconnected from oil price, and should move to coal prices, which is indeed the real alternative for gas, due to their substitutability to produce electricity

→ Unconventional gas and biogas

- ▶ Around a third of the increase in global gas production will come on next two decades from unconventional sources — mainly coal beds (coalbed methane), low-permeability reservoirs (tight gas) and shale formations (shale gas)
 - Their combined share of production should rise from around 12% in 2008 to about 19% in 2035 according to IEA
- ▶ Exploration drilling for shale gas and coalbed methane has begun in Europe, notably in Poland, and tight gas prospects have been identified in Poland, Hungary and Germany
- ▶ But production to remain low in Europe the medium term due to regulatory and environmental concerns : large volumes of water required and risks of groundwater contamination
- ▶ Biogas has a huge potential of increase but starting from a very low point, and should not represent large volumes before 2030, given actual rhythm of technologies deployment

→ Trends in consumption

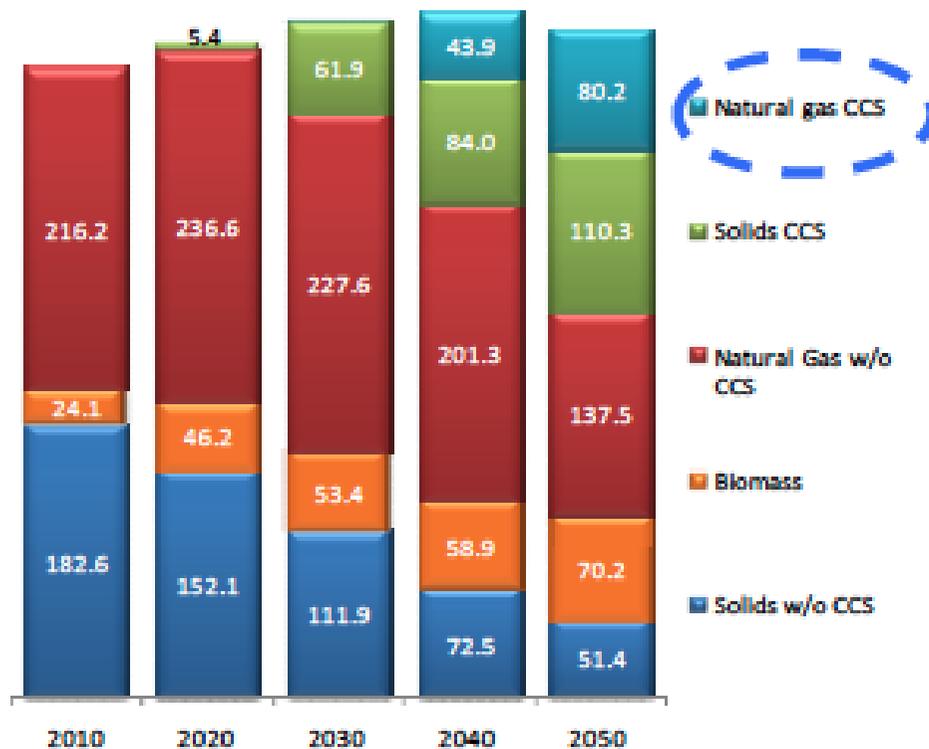
- ▶ Gas is the only fossil fuel for which demand is higher in 2035 than in 2008
 - In IEA Scenario (WEO 2010), demand in 2035 is 44% over 2008, with an average rate of increase of 1.4% per year
 - Non-OECD countries account for 84% of it: China's demand grows fastest, at an average rate of 6% per year, accounting for almost a quarter of the rise in global demand to 2035
- ▶ European Union demand would grow from 536 Bcm in 2008 to 598 Bcm in 2035, which represents an average rate of 0.4 % per year
- ▶ The power sector will be the leading contributor to growth in most regions, even if the rhythm is difficult to assess: depending of gas price and alternative fuels prices, environmental policies, carbon price, government policies in favour of alternatives like renewables or nuclear
- ▶ Potential developments of gas use are in GTL (Gas To Liquids) and as road transport fuel

→ Gas trade is reinforcing the role of GNL in the gas market

- ▶ Clear tendency to increase in gas trade, with exports already representing one third of production
 - Most of the trade is today realised by pipelines
 - GNL represented in 2007 around 230 Bcm, around 10 % of worldwide consumption, and around a quarter of exported volumes
- ▶ Inter-regional trade to increase strongly in next decades, thus strengthening the role of GNL
- ▶ Security of supply and energy independency to become major issues for the European Union in this future context

→ Role of gas in electricity generation in a decarbonised scenario

Power Choices: Installed thermal capacity in GW



Source : Eurelectric

- ▶ Gas to represent about 20% of electricity production in Europe in 2030 according Eurelectric scenario (Power Choices)
- ▶ Even in 2050, electricity produced by fossil fuels (gas and coal) still accounts for 30% of global production in Europe, but assuming that a majority of fossil power plants are CCS equipped
- ▶ This scenario from Eurelectric is based on the assumption of 75% reduction in GHG emissions in Europe in 2050

→ CCS issues

- ▶ Decarbonising electricity production can't be achieved without CCS
- ▶ Rhythm of deployment of economically viable CCS will influence the weight of gas in future electricity production mix
- ▶ Actual opinion of stakeholders is that CCS could be viable for coal power plants between 2020 and 2025...
- ▶ ... which means the technology could be viable for gas at least 5 years later, time required to improve efficiency and gain scale savings, given that CO₂ emissions are much lower in gas plants and thus investment returns harder to reach
- ▶ CCS could also be an opportunity for the gas industry, as most of the skills required are available, especially in transport and storage
- ▶ Social acceptance to be probably the major issue for developing the technology in the future

➔ Major effort has to be realised in new investments

Table 5.6 • Cumulative investment in gas-supply infrastructure by region and activity in the New Policies Scenario, 2010-2035
(\$ billion in year-2009 prices)

	Exploration and development	Transmission and distribution	LNG ^a	Total	Annual average
OECD	1 863	862	150	2 875	111
North America	1 263	459	24	1 746	67
Europe	419	320	11	751	29
Pacific	180	83	114	378	15
Non-OECD	2 680	1 074	397	4 152	160
E. Europe/Eurasia	797	383	33	1 213	47
Caspian	227	84	-	311	12
Russia	525	234	33	792	30
Asia	721	321	94	1 136	44
China	180	132	48	360	14
India	129	58	29	216	8
Middle East	261	221	104	586	23
Africa	583	60	122	764	29
Latin America	319	89	44	452	17
World^a	4 543	1 936	622	7 101	273
European Union	179	305	11	496	19

^a World total includes an additional \$74 billion of investment in LNG carriers.

- ▶ Major amounts of investment concern the Upstream sector for new fields and maintaining declining fields
- ▶ But large amounts are also required in Transmission and Distribution, and in LNG infrastructures
- ▶ In the EU, IEA estimates that around 500 B\$ would be to invest between 2010 and 2035, of which 60% in T&D

Source : IEA - World Energy Outlook 2010

→ Employment issues

- ▶ Demography: study and toolkit realised in 2009 (joint project EPSU EMCEF Eurogas) demonstrated EU workforce would decrease after 2020, in a context of higher competencies required. Attractivity for young workers and training for low skilled workers identified as major issues
- ▶ Smart metering: introduction will impact workforce. Additional workforce needed to implement but decrease after with withdrawal of meter readers
- ▶ Energy efficiency advice: positive effect on employment expected
- ▶ Potential skills gap ? Energy sector as a whole will face huge needs of skills and workforce in order to respond to increasing demand, in a context of climate change constraints and of replacement of old power plants / declining oil&gas fields

➔ A just transition is necessary to ensure the path towards a new economic model integrating climate change issues

- ▶ What is a “just transition”?
- ▶ It can be seen as :
 - the shift towards a more sustainable and environmentally friendly economy,
 - based on social dialogue between governments, employers and trade unions,
 - in a way that promotes high economic growth and investments in low-carbon technologies,
 - while ensuring a smooth social transition through adaptation and mitigation actions as well as through the development of skilling and reskilling programs (or just new skills) and the creation of quality jobs
- ▶ Concept of Just Transition, recognised by United Nations and ILO, has been introduced for the first time in Cancun declaration

→ Example of employment assessment for jobs in Operations & Maintenance, in electricity production sector

	2005	2030			2030 vs 2005 (absolute figure and % of annual change)					
		Baseline	NSAT Syndex	Eurelectric	Baseline		NSAT Syndex		Eurelectric	
Solids	85	86	26	51	1	0,1%	-59	-4,6%	-34	-2,0%
Solids CCS	0	0	46	34	0	NS	46	NS	34	NS
Oil	19	8	4	8	-11	-3,4%	-15	-6,0%	-11	-3,4%
Nuclear	45	35	37	45	-10	-1,0%	-8	-0,8%	-1	-0,1%
Gas	36	72	66	52	36	2,9%	30	2,5%	17	1,5%
Hydro	19	21	21	21	2	0,3%	2	0,3%	2	0,4%
Wind onshore	10	37	62	52	27	5,3%	52	7,5%	42	6,8%
Wind offshore	1			30					29	14,4%
Solar	0	2	4	8	2	NS	4	NS	8	NS
Other Renewables	0	2	2	2	2	NS	2	NS	2	NS
Biomass	4	12	29	12	8	4,3%	25	8,1%	8	4,4%
Total	219	274	297	314	55	0,9%	78	1,2%	95	1,5%

Data in 1000 FTE / year. Source : Syndex