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Current and expected LNG supply-demand balance

LNG , a tool to mitigate potential risks linked to pipe gas transport

Agenda

- LNG has already demonstrated it is an effective tool to mitigate supply shortfall / demand spikes, e.g. :
 - ▶ Japan post Fukushima
 - ▶ Chile post curtailment of imports from Argentina
 - ▶ Brazil to face droughts impacting hydro-based power production
 - ▶ Israel & Jordan post curtailment of imports from Egypt
- Recent past
 - ▶ LNG demand worldwide
 - ▶ European gas balance
- Scenario for the future
 - ▶ LNG supply
 - ▶ LNG demand
 - ▶ European gas balance
 - ▶ LNG price
- Takeaways



LNG as a balancing tool

- LNG has already demonstrated it is an effective tool to mitigate supply shortfall / demand spikes
 - ▶ Japan
 - Following the Fukushima tragedy, Japan has decreased nuclear power production down to zero
 - This has triggered a decrease in power demand and an increase in thermal power generation
 - LNG consumption for power generation has increased from 41 to 56.5 MT/y
 - ▶ Chile
 - Argentina has decided unexpectedly to stop exports of natural gas to Chile mid-2007
 - Chile initially replaced the missing imported natural gas by gasoil
 - Chile then replaced gasoil by LNG (LNG imports = 2.6 MT/y)
 - ▶ Brazil
 - Brazil has recently faced a decrease in the hydro contribution for power generation
 - Missing hydro is replaced by oil and gas based thermal power generation
 - Corresponding gas supply is based on LNG (competition with oil products)
 - LNG imports = 5 MT in 2014
 - ▶ Israel
 - Israel has temporarily imported LNG to compensate for the decline in domestic production (Mary Field) and the shortfall in imports of gas from Egypt, while waiting for the start of a new field (Tamar)
 - ▶ Jordan
 - Jordan will mitigate the shortfall in imports from Egypt by importing LNG (from 2015)

Recent past

Over 2011 – 2014 , LNG trade has been stable around 240 MT but with different evolution per importing area :

WORLD LNG Trade , MT	2011 to 2014 Evolution			Comments
	2011	2014	Evolution	
Asia	140	165	25	(Japan 10 / China 8)
Middle East / India	15	18	3	
South America	6	13	7	(Brazil 5,5 / Argentina 1,5)
North America	13	10	-3	
Europe	64	32	-32	
Bcm	86	43	-43	
Sum	238	238	0	

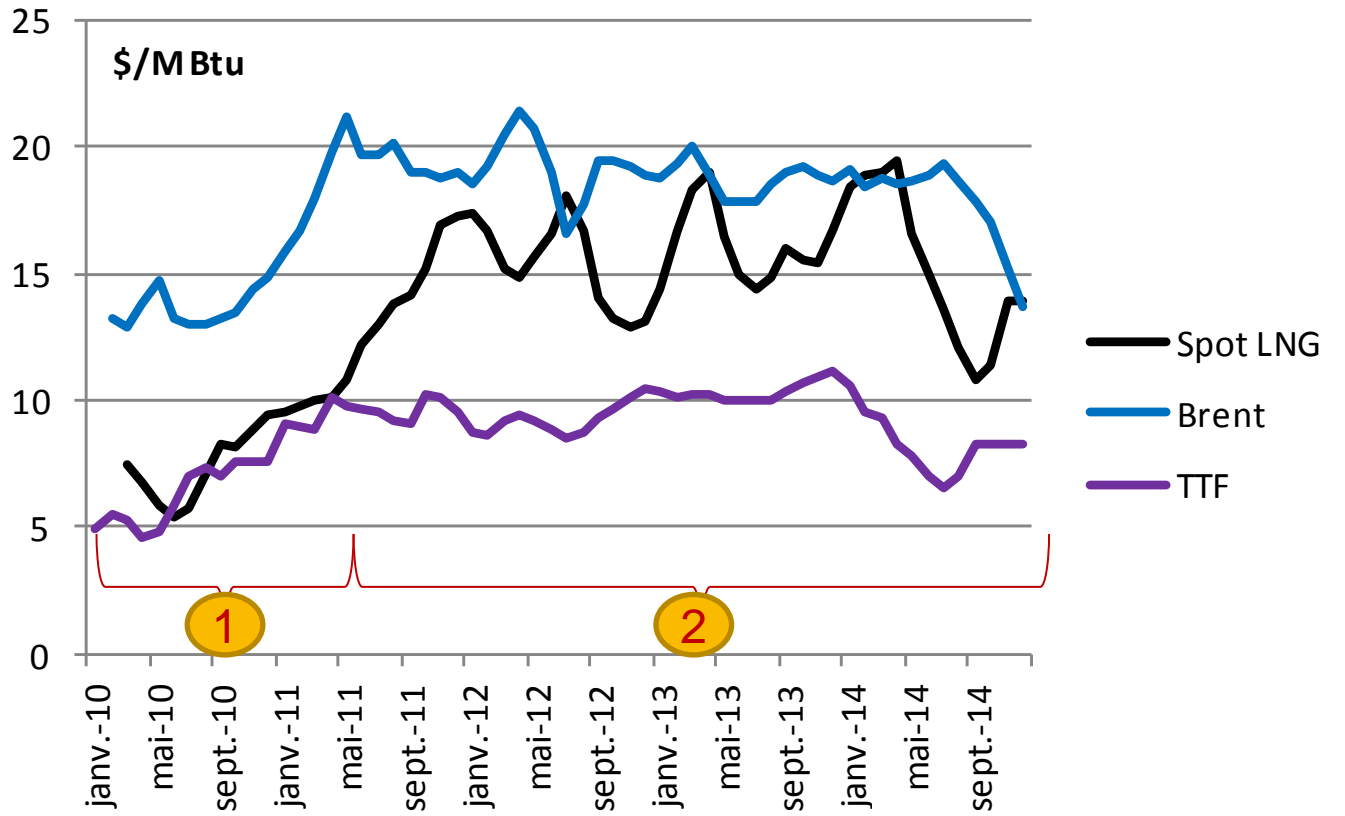
← LNG competing with oil

← Market driven price

EUROPEAN GAS SUPPLY		2011	2014	Evolution
NORVEGE		94	104	11
				0
RUSSIE	Via Ukraine	99	57	-42
157	Via Belarusse	36	41	5
152	Direct	21	53	32
ALGERIE		31	23	-9
LIBYE		2	7	4
AZERBAIJAN		4	6	2
IRAN		8	9	1
SOMME PIPE		296	301	4
GNL		86	43	-43
SOMME		382	343	-39

In Europe including Turkey , demand has decreased due to mild weather and loss in power generation while non-LNG supply has been stable :

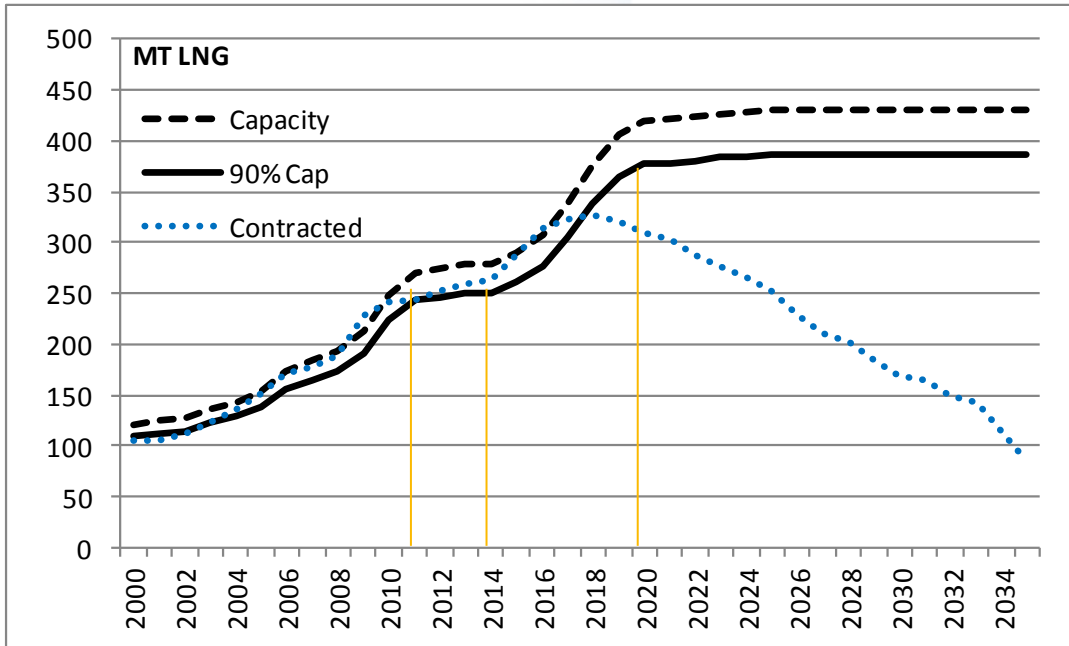
LNG Prices , delivery month



1 Pre Fukushima – LNG Market long – Spot LNG = TTF

2 Post Fukushima – LNG Market short – Spot LNG = Brent driven

Scenario for LNG production



LNG production capacities = Existing + Final Investment Decision taken
LNG Contracted = Firm contracts

LNG production is expected to increase from 240 MT (2011-2014) to about 380 MT in year 2020 thanks to new projects commissioned in Australia and USA
>> + 140 MT available

Considering regasification capacities (see next slide), a possible scenario is that world LNG demand excluding Europe is around 325 MT. This would then leave for Europe 55 MT, about 20 MT more than the volume it imports today

In this scenario, if Europe needs more than 20 MT/year additional demand, it will have to organize the supply and be ready to compete with other LNG buyers on the international market.

The price could be – in this scenario – The European market price if additional demand is lower than 20 MT and the international price if demand is higher than 20 MT.



Example for Regasification

Country	Regasification capacities , MT				Load factor (scenario)	LNG imports
	Existing	Under Construction	Under Development	TOTAL		
Japan	184,0	9,2	0,0	193,2	50%	97
Korea	97,5	2,0	0,0	99,5	50%	50
China	39,5	28,3	0,0	67,8	75%	51
India	22,0	13,6	13,0	48,6	75%	36
Indonesia	5,6	3,0	0,0	8,6	75%	6
Malaysia	3,8	0,0	0,0	3,8	75%	3
Singapore	6,0	0,0	0,0	6,0	75%	5
Taiwan	13,0	0,0	0,0	13,0	75%	10
Thailand	5,0	0,0	5,0	10,0	75%	8
Pakistan	0,0	2,3	0,0	2,3	75%	2
Philippines	0,0	1,0	0,0	1,0	75%	1
Kuwait	5,8	0,0	0,0	5,8	75%	4
UAE	3,0	0,0	9,0	12,0	75%	9
Egypt	0,0	0,0	3,8	3,8	75%	3
Israel	3,0	0,0	0,0	3,0	75%	2
Jordan	0,0	3,8	0,0	3,8	75%	3
Europe	147,6	16,4	3,0	167,0		REMAINING VOLUMES
Norway	0,0	0,0	0,0	0,0		
USA	131,8	0,0	0,0	131,8	0%	0
Canada	7,5	0,0	0,0	7,5	50%	4
Mexico	16,7	0,0	0,0	16,7	50%	8
Puerto Rico	1,2	0,0	3,8	5,0	75%	4
Dom Rep	0,0	0,0	0,0	0,0	75%	0
Haiti	0,0	0,3	0,0	0,3	75%	0
Argentina	7,6	0,0	0,0	7,6	75%	6
Brazil	5,7	0,0	0,0	5,7	75%	4
Chile	4,2	1,3	4,0	9,5	75%	7
Uruguay	0,0	2,7	0,0	2,7	75%	2
SUM	710,5	83,9	41,6	836,0		324



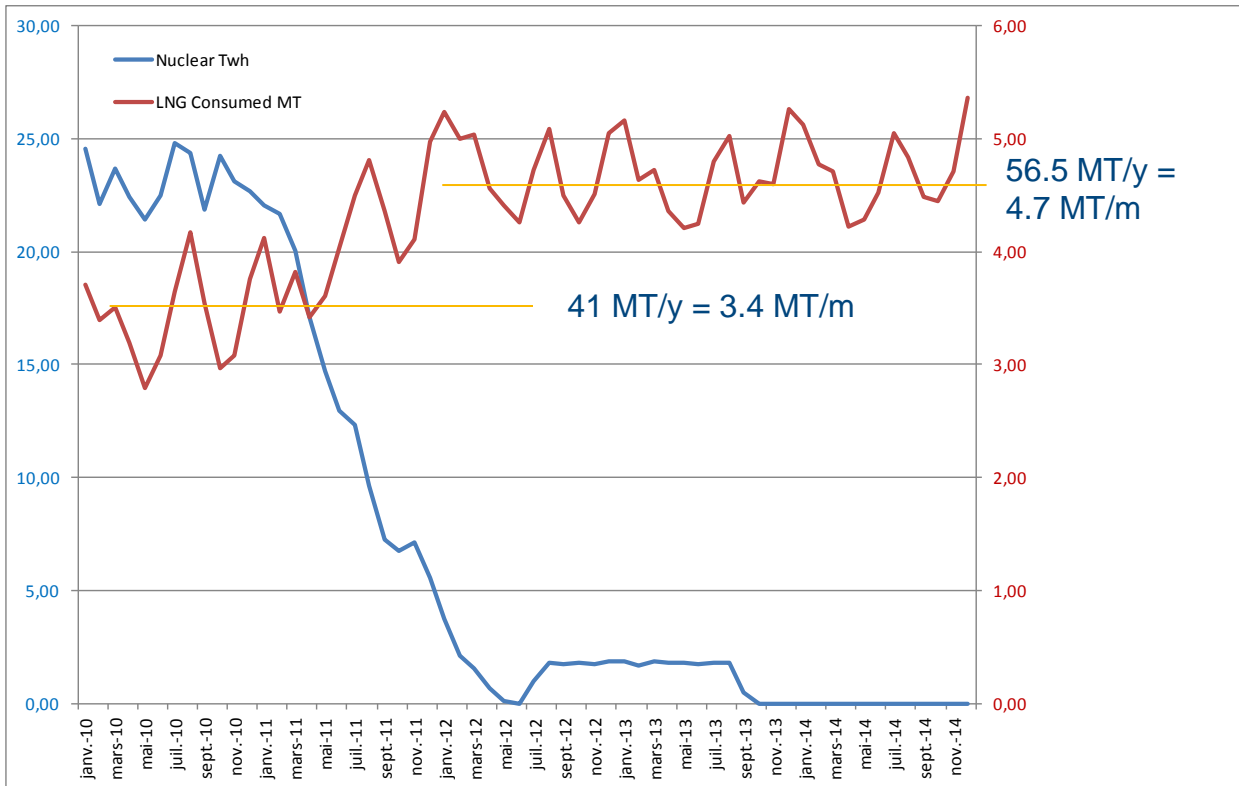
TAKEWAYS

- LNG has already been used worldwide and is an effective tool to mitigate shortfall in gas supply and spikes in gas demand
- Crisis have been sometimes mitigated (i) first by oil product consumption in power generation and (ii) then by LNG replacing oil products
- Floating Storage & Regasification Units (FSRUs) allow for faster deployments and are naturally suited to face initial and/or temporary import requirements.
- LNG procurement is organized through
 - ▶ tenders in illiquid markets and
 - ▶ through the market in liquid ones such as in Europe .
- Short term supply and prices depend on the supply-demand situation . The price will need to be attractive for suppliers , be it portfolio players or LNG producing countries .
- Such procurement requires typical commercial and technical pre-conditions such as third party assessment, master agreements audit of LNG receiving terminal ,....

BACK-UP INFORMATION

Back-up

JAPAN – LNG DEMAND POST FUKUSHIMA Monthly picture



LNG demand for power generation has increased by **15.5 MT** from 41 MT (Y2010) to 56.5 MT (Y 2014) as nuclear contribution went down to zero.

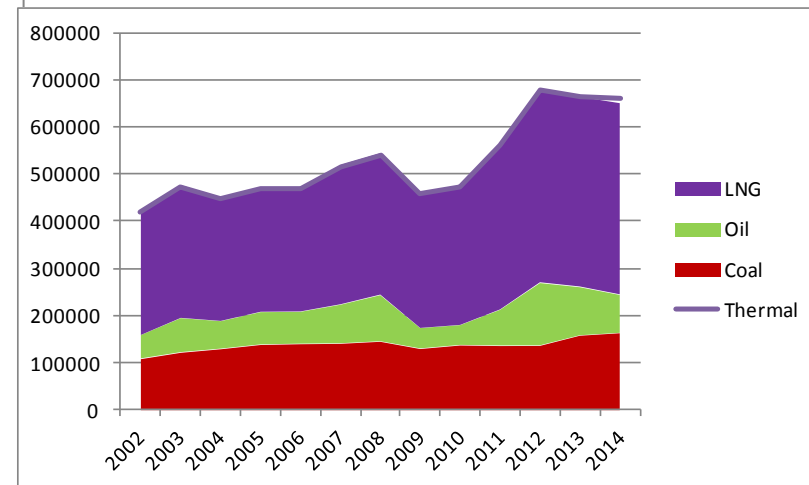
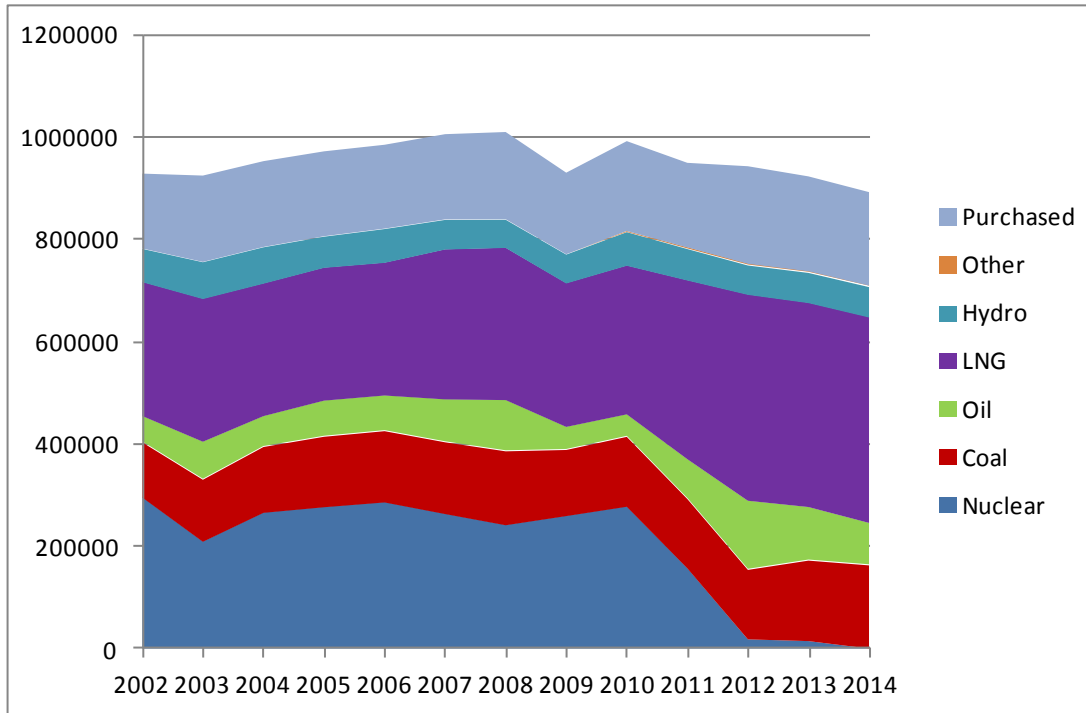
Japan has replaced nuclear contribution (260 TWh el) by a decrease in power demand (-60) and increase in thermal power production , coal (30 , not very flexible) Oil (60, very flexible) and LNG (110, very flexible) .
110 TWh <> 15.4 MT LNG

LNG competes with Crude oil and Oil products

Source = FEPC , Japan



JAPAN

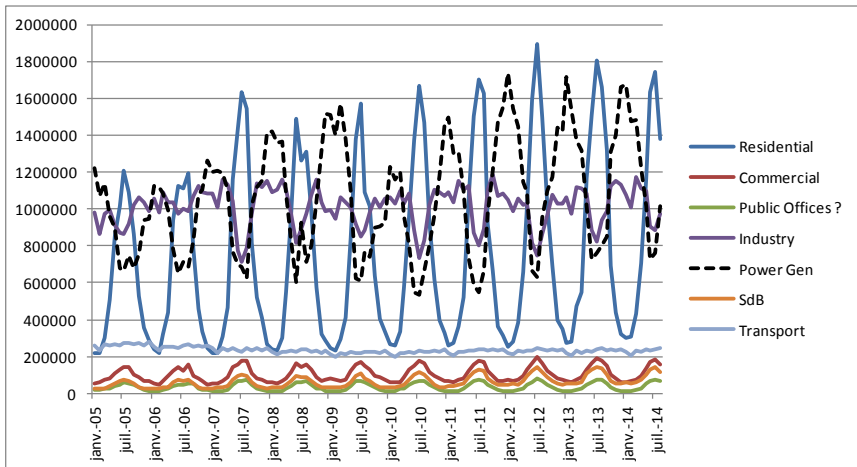
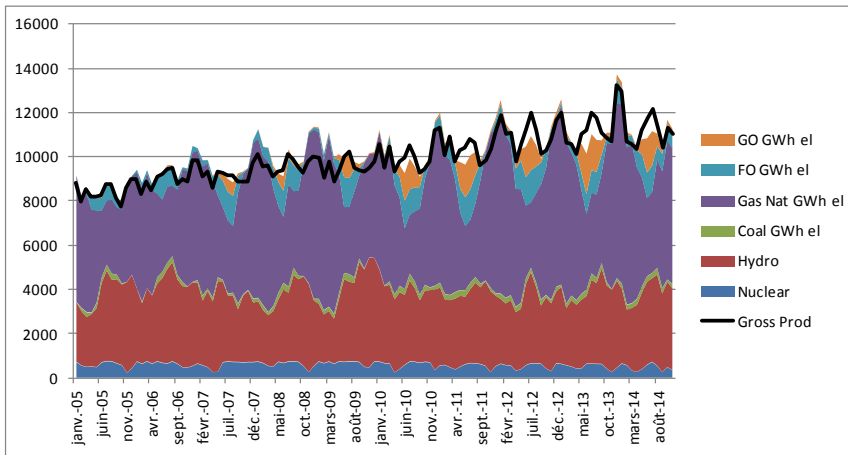
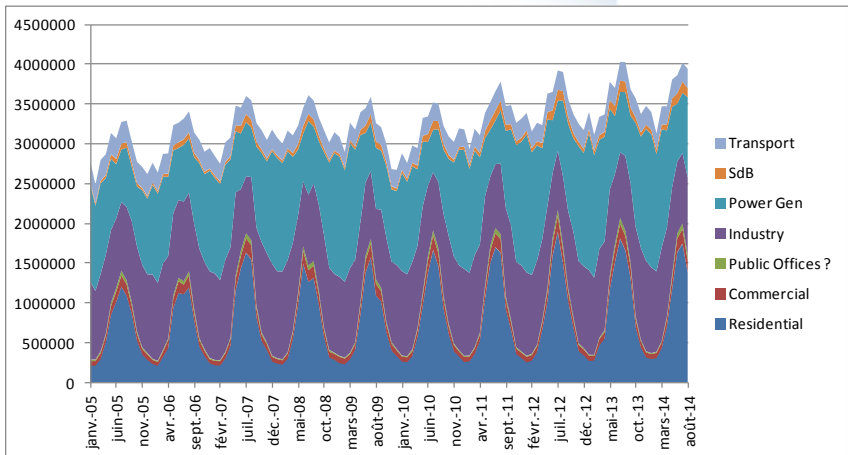


Japan . Power generated and purchased by 10 major power companies (MWh el / month)
LNG competes with crude oil and Heavy fuel oil (Oil)

Source = FEPC , Japan



ARGENTINA



Gas demand in Argentina , 1000 m3/ month

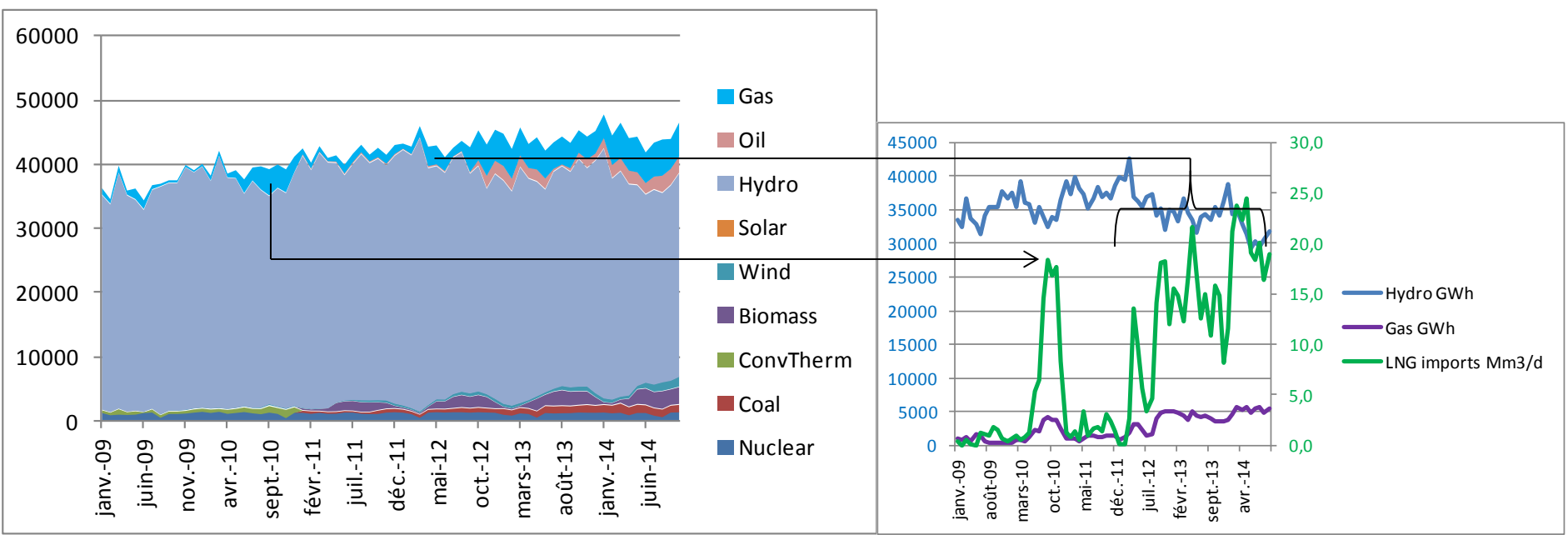
Power generation in GWh el/month

Missing gas storages led Argentina to rely on Heavy fuel oil and Gas oil at winter time to free gas for the residential sector .
 LNG is imported on a regular basis since 2010 as a substitute to the oil products and plays the role of a storage



BRAZIL

GWh el / month

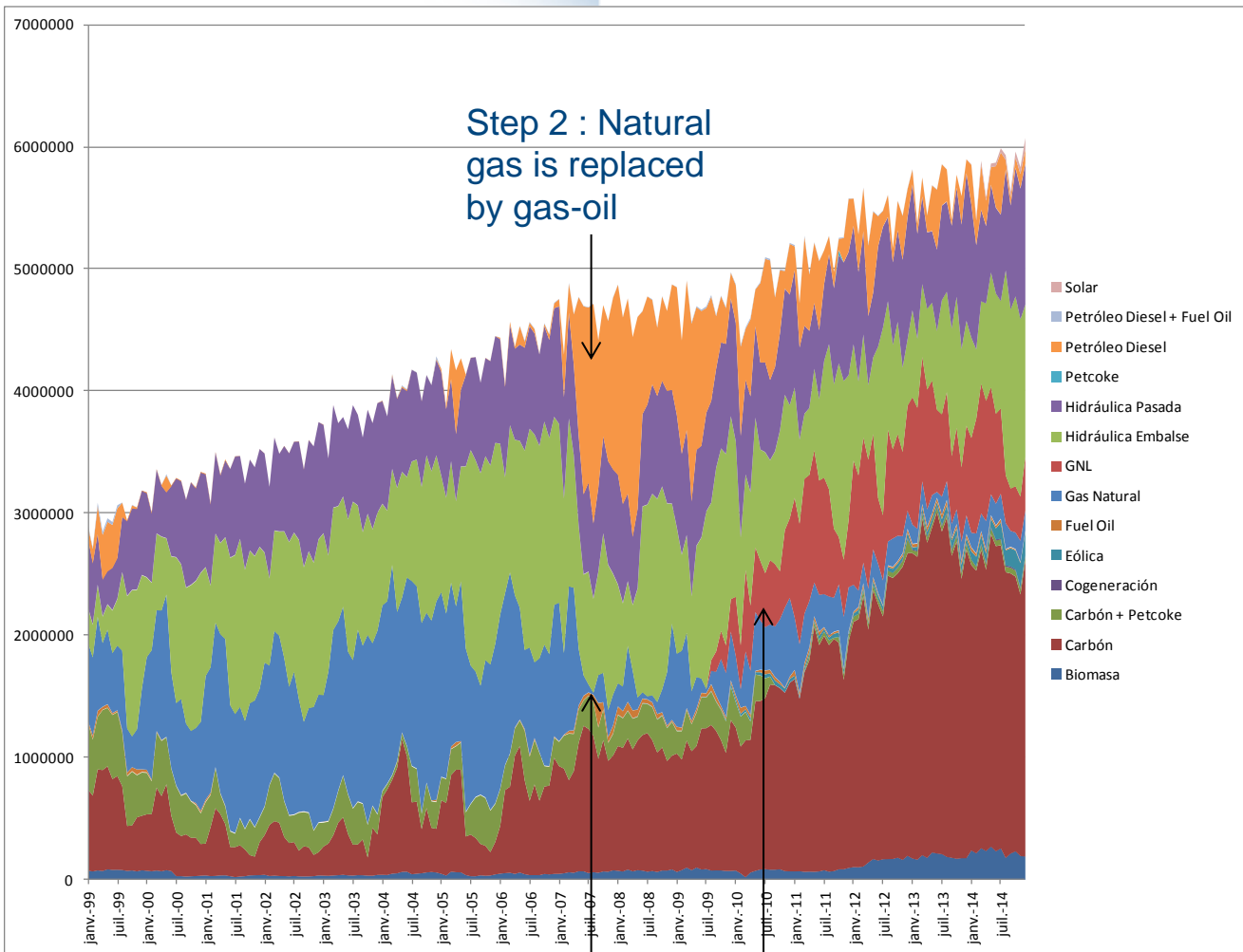


Brazil compensates lower contribution from Hydro by gas based power generation. As hydro contribution is difficult to anticipate , it relies on LNG for gas supply

Source = MME, Brazil



CHILE



Step 1 : Sharp decrease in natural gas imports from Argentina

Step 3 : Gas-oil is replaced by LNG

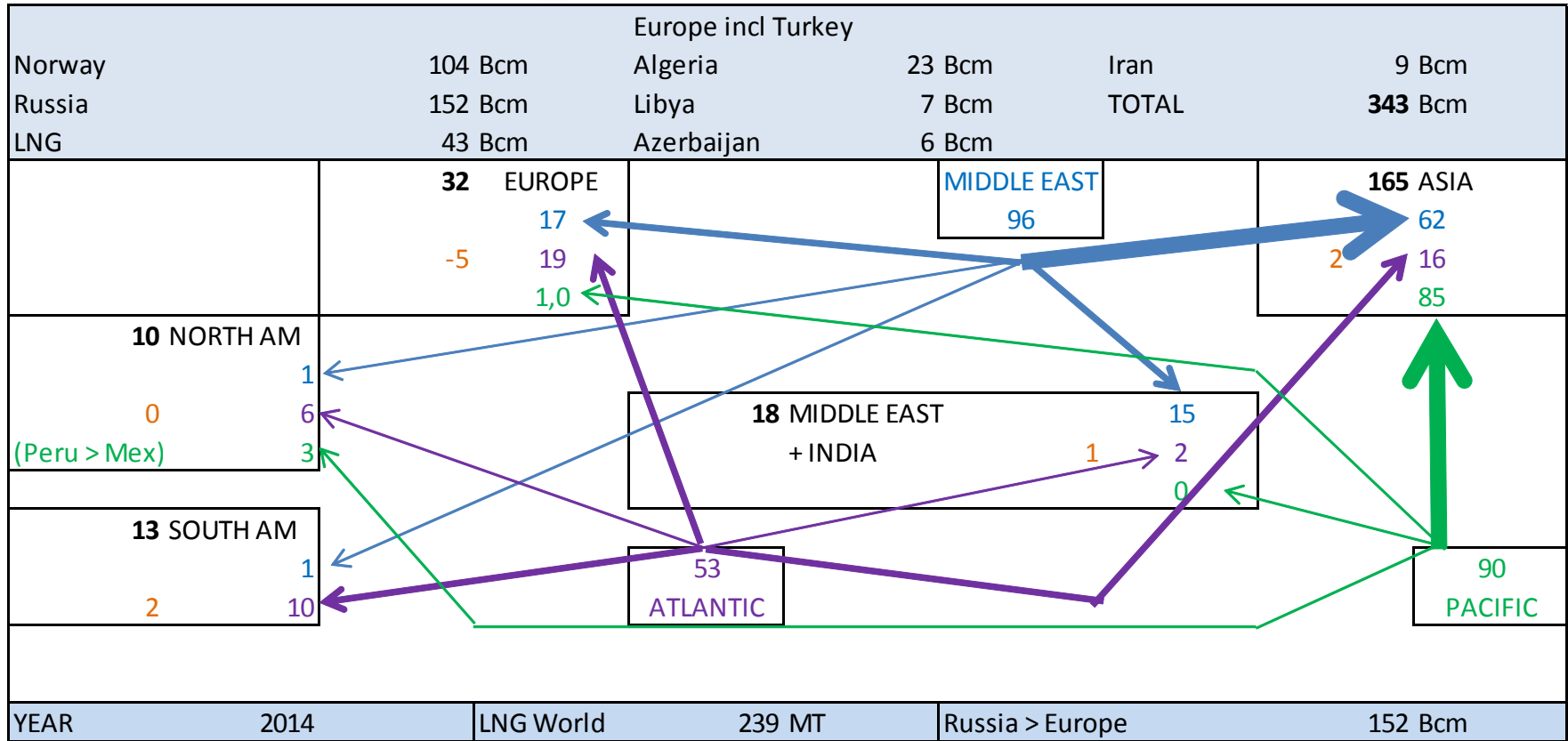
Power production in MWh el per month .

Following curtailment in natural gas flows from Argentina (Step1) , Gas-oil has been used first (Step2) and then replaced by LNG (Step3)

LNG volume = 2.6 MT/yr



Recent past (LNG world balance and Europe supply) – Y2014 - MT



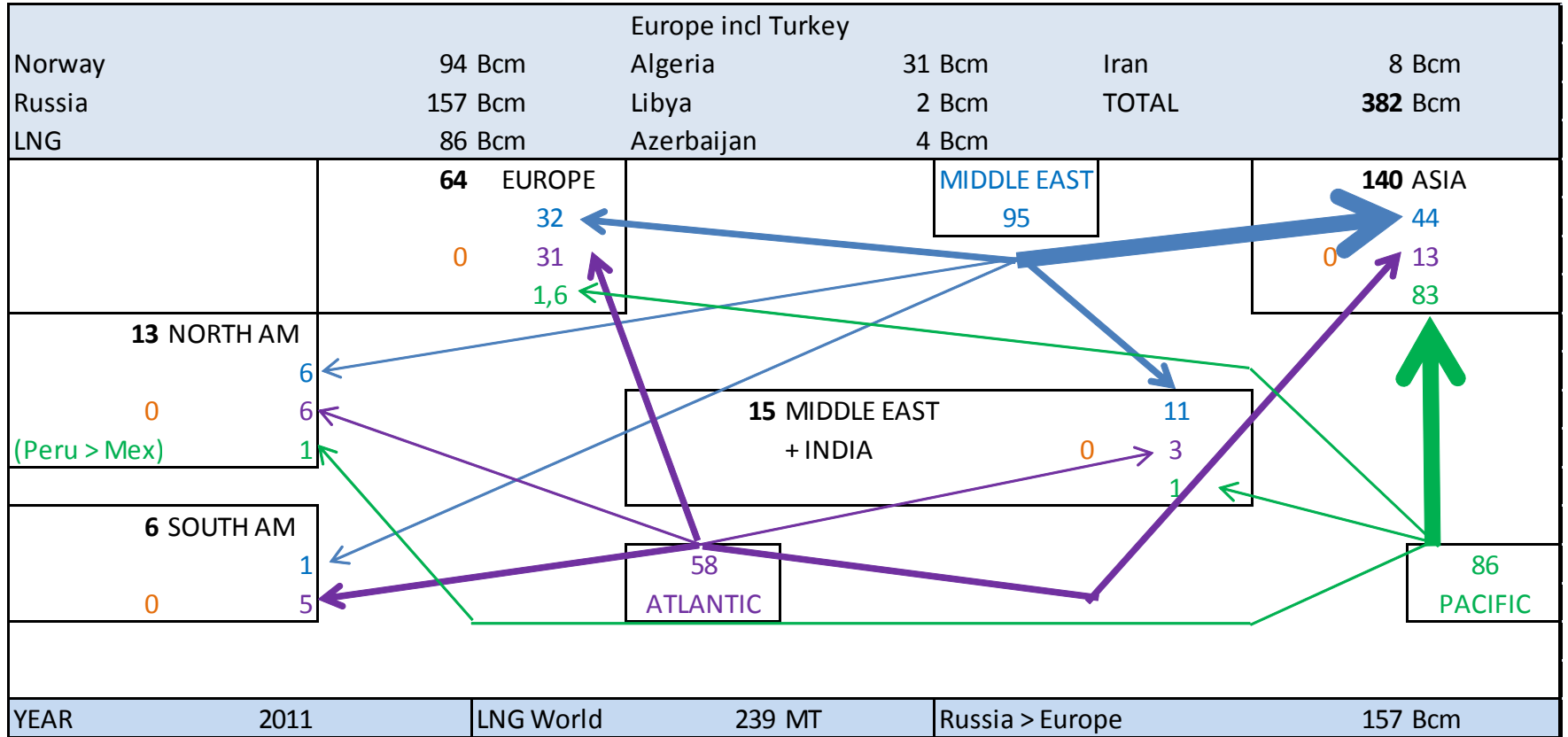
In Y2014 , Europe has attracted 13% of world LNG production .

Source = IEA, internal

Europe is currently often perceived as the market of last resort for LNG

Europe is currently balanced by russian flows

Recent past (LNG world balance and Europe supply) – Y2011- MT



Source = IEA, internal

QATAR LNG YEARLY EXPORTS

Exporting country	Qatar										
Somme de Volume (MT)	Exporting Country										
Importing Country	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Japan	6,7	6,8	6,3	7,5	8,2	8,2	7,7	7,6	11,9	15,7	16,1
Korea, Republic of	5,7	5,8	6,2	6,5	8,0	8,7	7,0	7,4	8,2	10,3	13,4
Taiwan, Province of China				0,4	0,4	0,8	1,2	2,8	3,9	6,0	6,4
China							0,4	1,2	2,3	5,0	6,8
Thailand									0,3	0,2	1,0
Malaysia											0,1
Singapore											0,1
India		1,7	4,3	5,2	6,3	6,6	6,4	8,0	9,3	11,1	10,9
Kuwait									1,1	1,0	1,5
United Arab Emirates								0,1	0,6	0,9	0,8
United Kingdom				0,1	0,2	0,1	4,1	10,2	15,5	9,9	6,4
Italy				0,0			1,1	4,3	4,3	4,1	3,1
Spain	1,4	3,1	3,7	3,6	3,5	3,9	3,3	4,1	3,5	2,8	2,7
Belgium			0,1	0,3	1,8	2,2	4,7	4,3	4,0	2,9	2,2
France				0,3			0,2	1,6	2,4	1,1	1,3
Turkey							0,3	1,3	0,4	0,9	0,1
Portugal		0,1						0,1	0,1	0,1	0,2
Greece								0,0	0,1		
Netherlands (the)									0,2		
Mexico				0,1		0,1	0,1	0,8	1,2	1,2	1,1
United States	0,3	0,2	0,1		0,4	0,1	0,3	1,0	1,9	0,7	0,2
Canada							0,1	0,3	1,5	0,8	0,5
Dominican Republic										0,1	
Argentina								0,2	0,5	0,4	1,2
Brazil								0,4	0,2	0,8	0,2
Chile							0,1	0,2	0,4		0,1
SUM	14,1	17,7	20,6	23,9	28,8	30,7	37,0	55,9	73,8	76,0	76,2
SUM	14,1	17,7	20,6	23,9	28,8	30,7	37,0	55,9	73,8	76,0	76,2
FAR ASIA	12,4	12,6	12,5	14,3	16,6	17,8	16,3	19,1	26,5	37,1	43,8
ME/INDIA	0,0	1,7	4,3	5,2	6,3	6,6	6,4	8,2	11,0	13,0	13,2
EUROPE	1,4	3,2	3,7	4,2	5,5	6,2	13,7	25,9	30,6	21,8	16,0
NORTH AM	0,3	0,2	0,1	0,1	0,4	0,1	0,4	2,0	4,6	2,8	1,7
SOUTH AM	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,8	1,1	1,3	1,5



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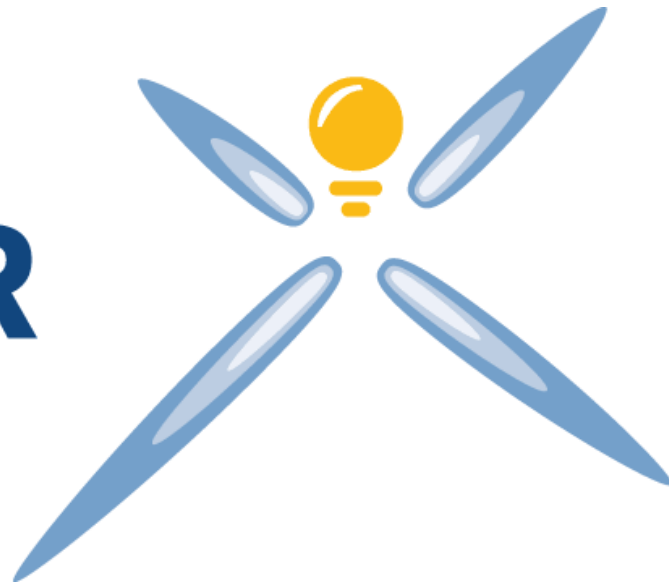
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