GAS & LNG OUTLOOKS: A SHELL PERSPECTIVE

European Commission, DG Energy, May 26th 2015

Shell

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Reserves: Our use of the term "reserves" in this presentation means SEC proved oil and gas reserves.
Resources: Our use of the term "resources" in this presentation includes quantities of oil and gas not yet classified as SEC proved oil and gas reserves. Resources are consistent with the Society of Petroleum Engineers 2P and 2C definitions.
Organic: Our use of the term Organic includes SEC proved oil and gas reserves excluding changes resulting from acquisitions, divestments and year-average pricing impact.
Resources plays: our use of the term 'resources plays' refers to tight, shale and coal bed methane oil and gas acreage.

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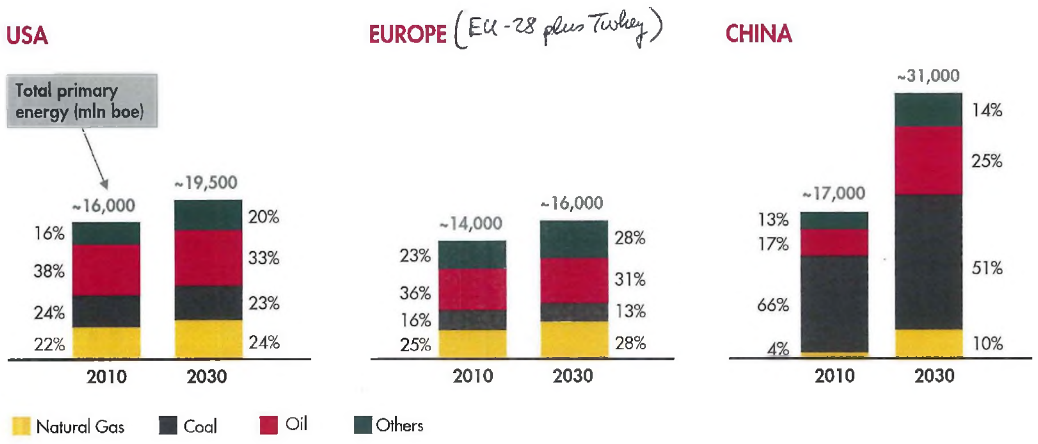
AGENDA

1. **Gas & LNG Market Outlook**
   - 1.1 Global outlook
   - 1.2 European outlook and infrastructure capacity
2. **LNG technology development**
   - 2.1 LNG for transport
3. **The role of gas in meeting the Energy Union & 2030 objectives**
   - 3.1 Carbon pricing & integration with renewables
   - 3.2 Internal Energy Market
   - 3.3 Potential Barriers

1.1 GLOBAL MARKET OUTLOOK

SHARE OF GAS IN PRIMARY ENERGY MIX



THE SHARE OF NATURAL GAS IN THE PRIMARY ENERGY MIX IS EXPECTED TO INCREASE IN THE 3 LARGEST GAS MARKETS (MODERATE INCREASE IN OECD)

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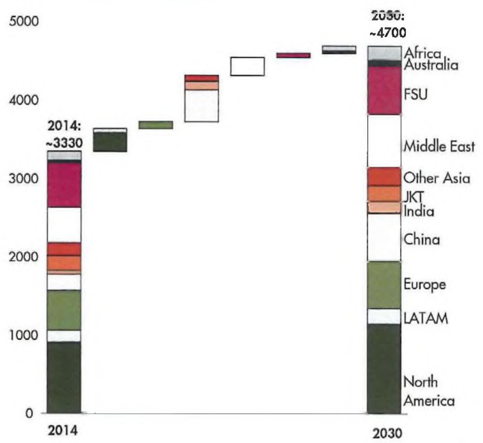
Source: WoodMac for USA and Europe, WoodMac and Shell analysis for China

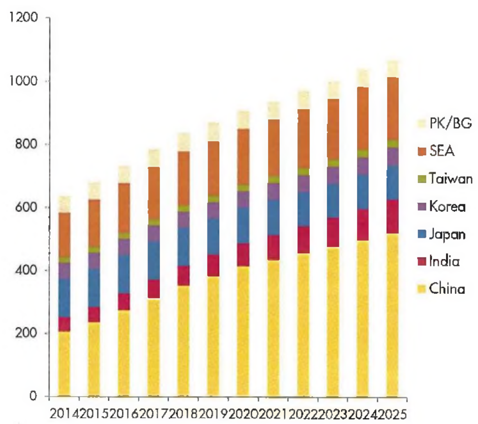
GAS DEMAND GROWTH

GAS DEMAND GROWTH TO 2030 (BCM)
10 bcm/y = 1 bcf/d



- Gas demand will grow at ~2% pa in coming 20 years

ASIA GAS DEMAND BY COUNTRY (BCM)
10 bcm/y = 1 bcf/d



- ~40% of the demand growth from Asia

South East Asia: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam, PK/BG: Pakistan and Bangladesh

Source: Shell Analysis

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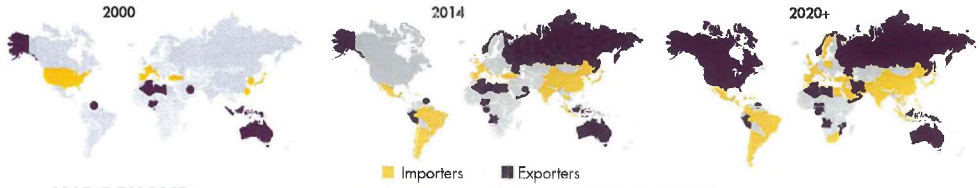
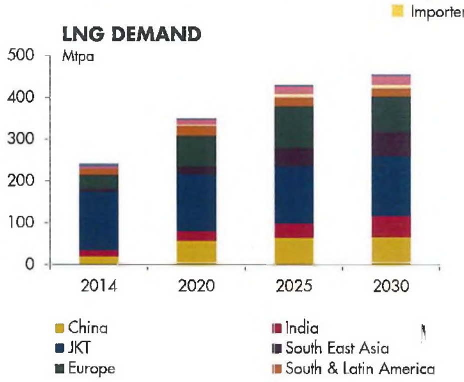
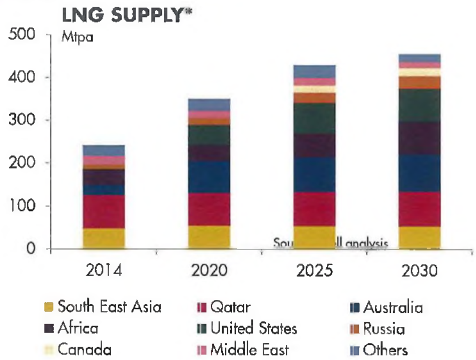
LNG SUPPLY / DEMAND

INCREASING NUMBER OF IMPORTERS AND EXPORTERS





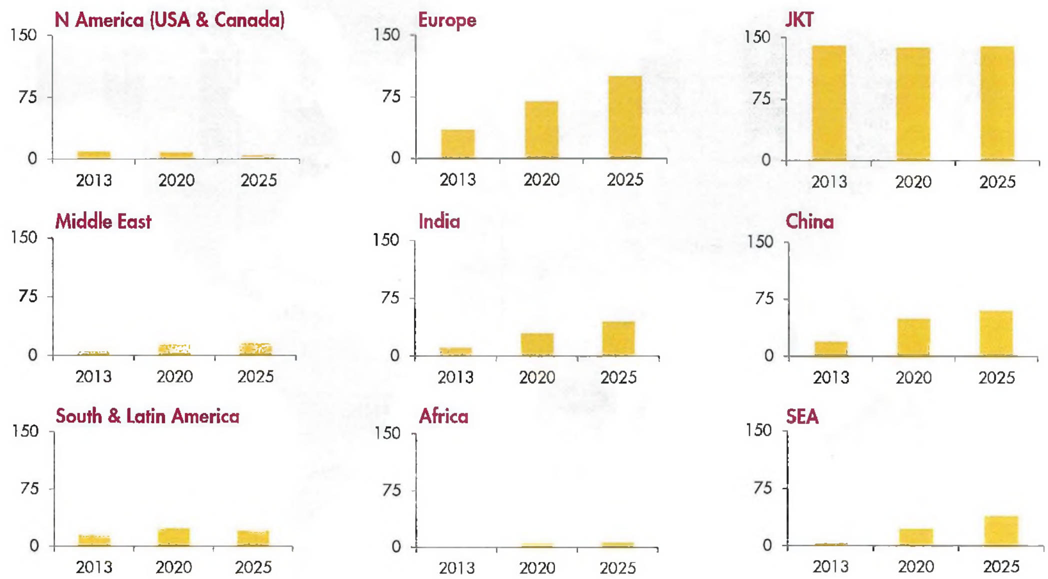


* Risked view of all LNG supply projects

LNG DEMAND GROWTH DRIVEN BY EMERGING ASIA AND EUROPE

Regional Δ = 2013 to 2025 growth

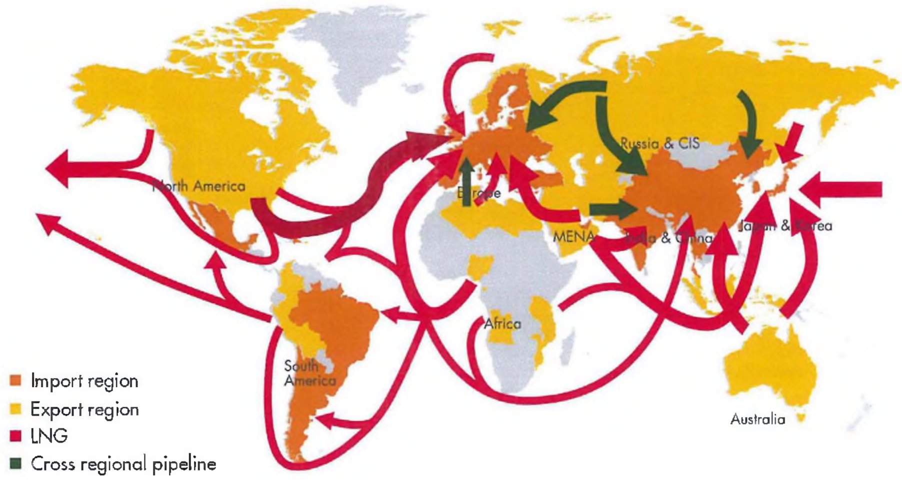
**Demand growth excludes LNG into transport*



Source: Shell Analysis

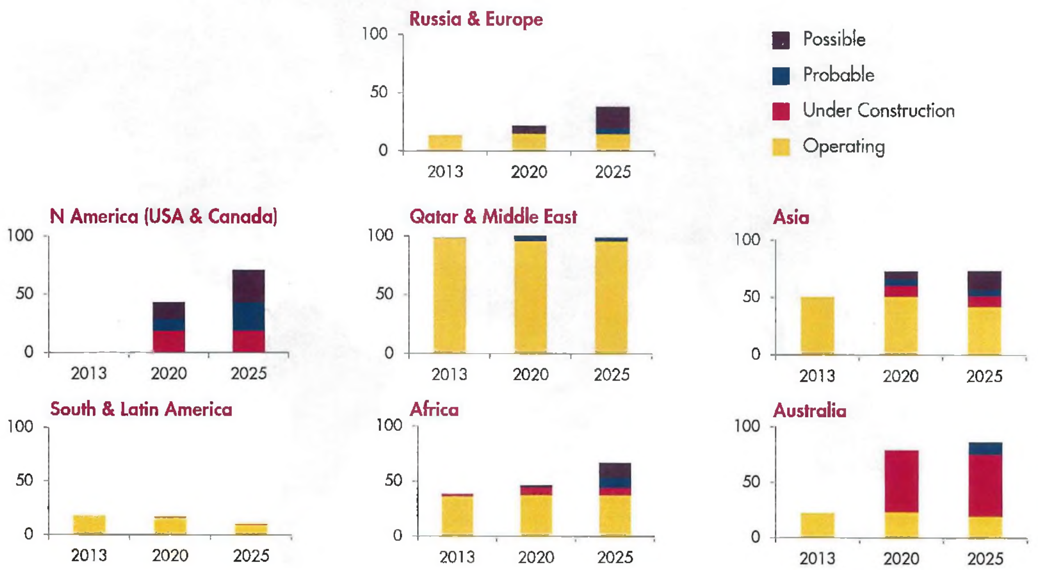
MAIN CROSS-REGIONAL TRADE FLOWS BY 2025

Global Trade Flows



LNG SUPPLY GROWTH DRIVEN BY NORTH AMERICA AND AUSTRALIA

Regional Δ = 2013 to 2025 base case growth

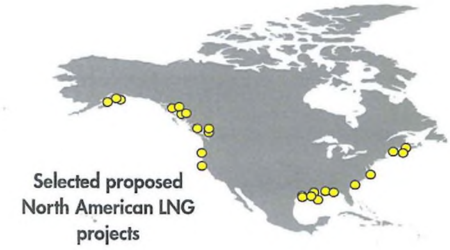


Source: Shell Analysis

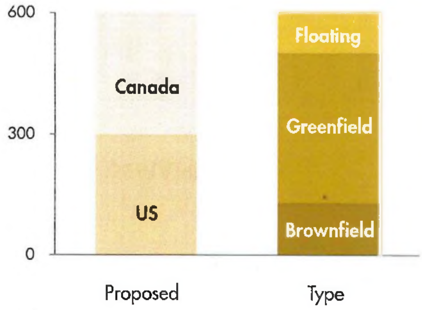
NORTH AMERICA GAS EXPORT

Progress:

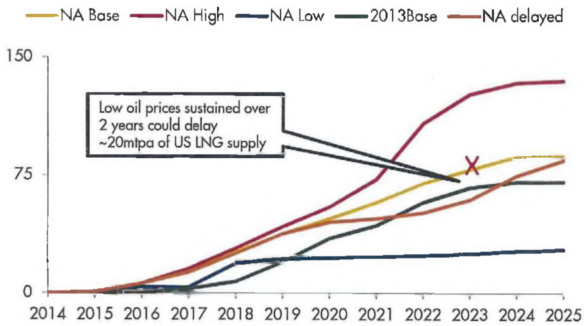
- Customer commitments, supportive regulatory framework, financing and credible contractors enabling first supply wave
- Growth restrained by ability to secure permits, industrial capacity & costs and customer portfolios
- Current low oil prices could constrain demand early 2020's



Proposed North American projects (mtpa)

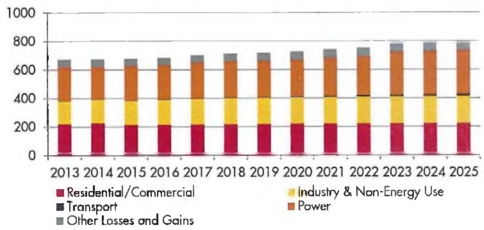


Outlook for North America (mtpa)



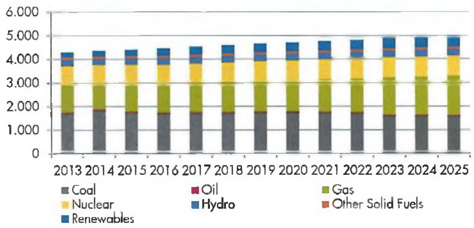
NORTH AMERICA: DOMESTIC GAS DEMAND

US GAS DEMAND (BCM)

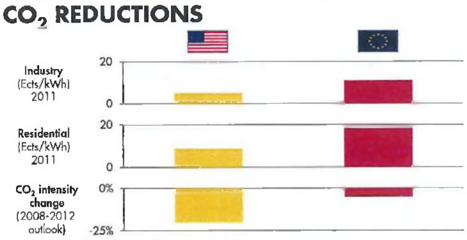


Source: Woodmac

US ELECTRICITY GENERATION (TWH)

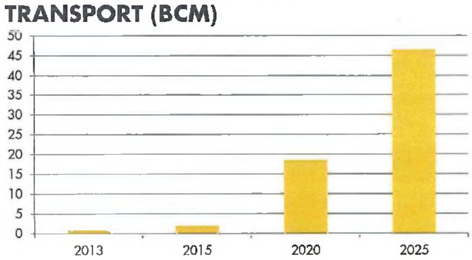


ELECTRICITY COST NOT REFLECTING CO_2 REDUCTIONS



Source: Gas Naturally

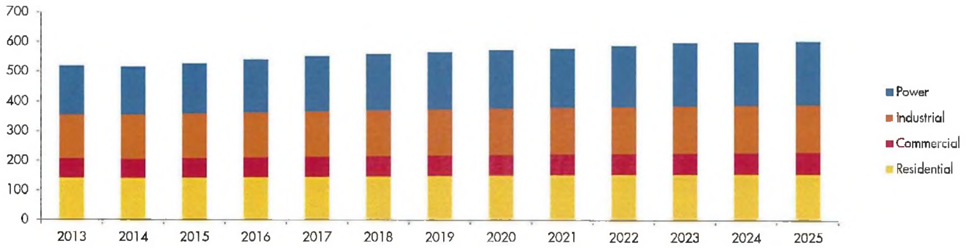
CITIBANK US GAS DEMAND IN TRANSPORT (BCM)



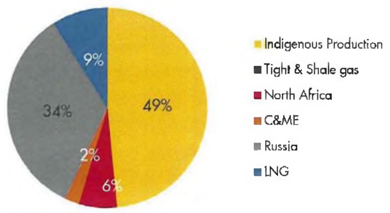
1.2 EUROPEAN OUTLOOK

EUROPEAN GAS SUPPLY AND DEMAND OUTLOOK

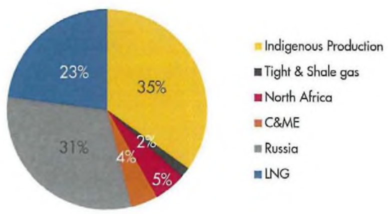
EUROPE GAS DEMAND BY SECTOR (BCM)



EUROPEAN SUPPLY MIX IN 2014
10 bcm/y = 1 bcf/d

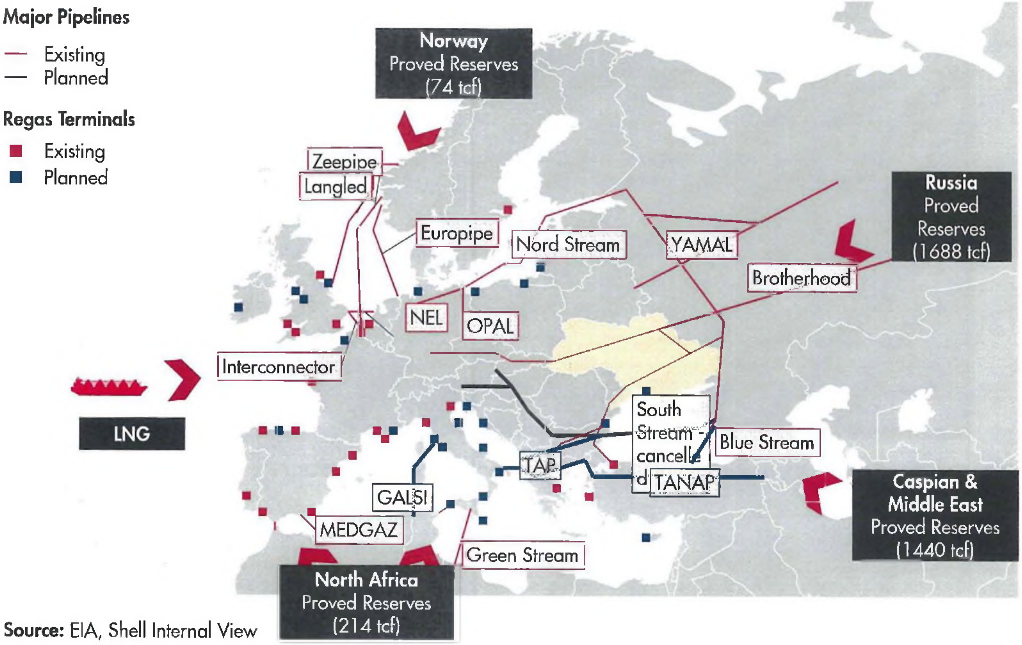


EUROPEAN SUPPLY MIX IN 2024
10 bcm/y = 1 bcf/d



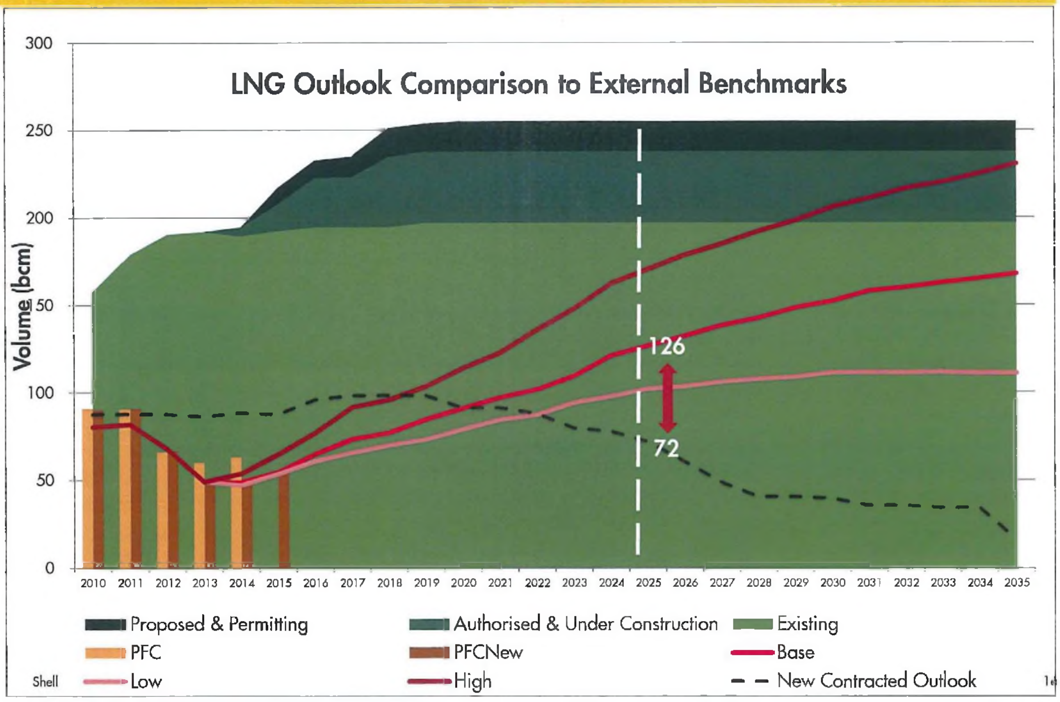
Source: Shell Internal View

EU GAS INFRASTRUCTURE AND SUPPLY ROUTES



Source: EIA, Shell Internal View

BY 2025 EUROPE NEEDS ~ 126 BCMPA [OR ~100 MTPA] TO BALANCE S&D; SUFFICIENT REGAS CAPACITY AVAILABLE



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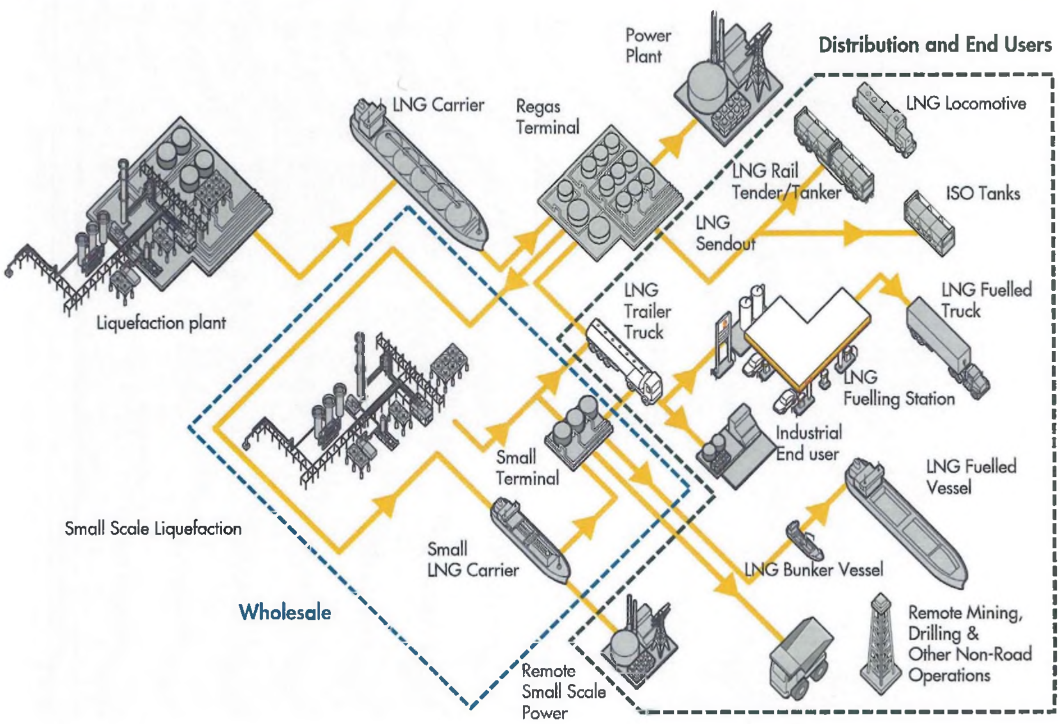
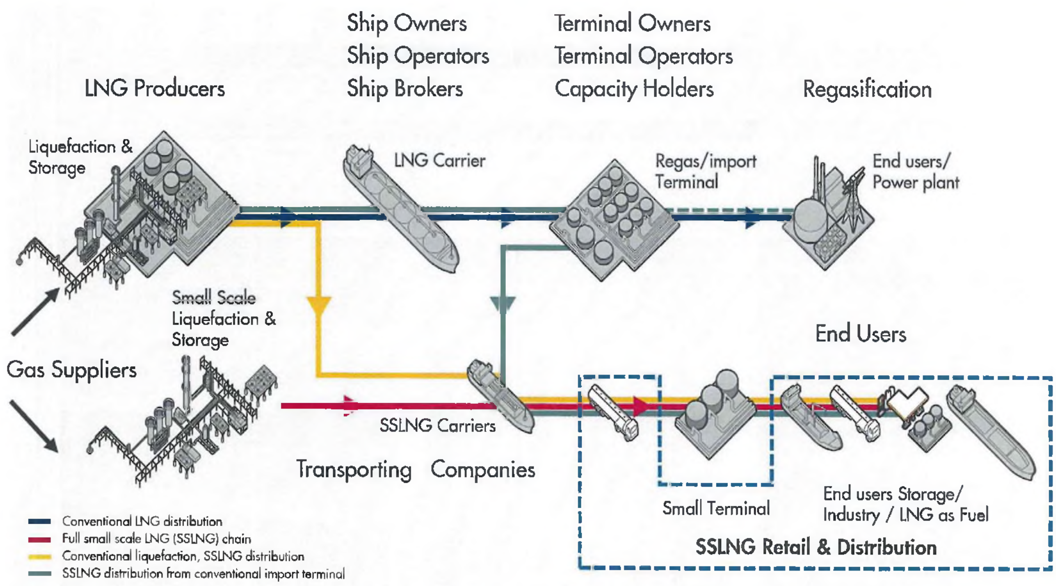
2. LNG TECHNOLOGY DEVELOPMENT

THE EMERGING SMALL-SCALE LNG VALUE CHAIN

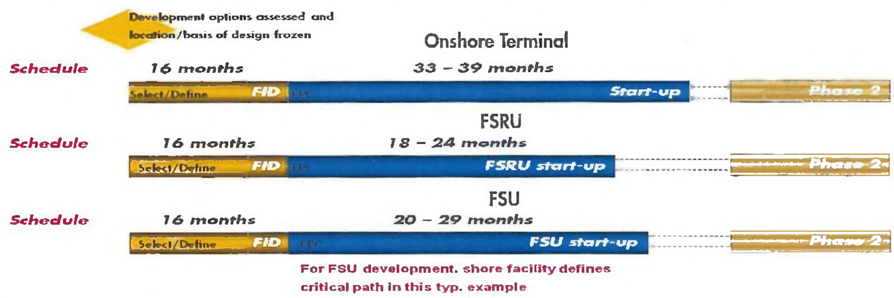


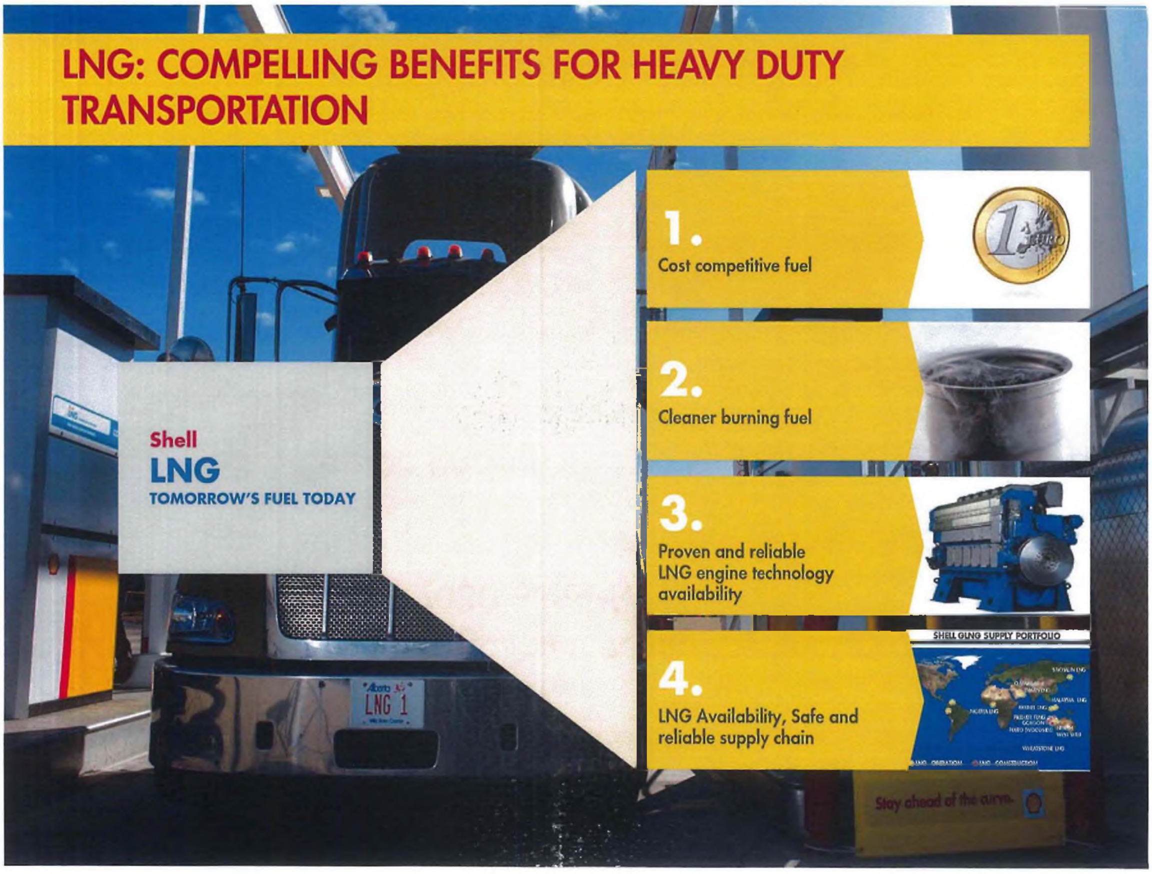
TYPES OF SMALL-SCALE LNG SUPPLY NETWORKS



Integrated Players, Structuring Companies, Traders (no assets)
Governments, Regulatory Bodies

PROVEN CONCEPTS: LNG REGASIFICATION TERMINALS



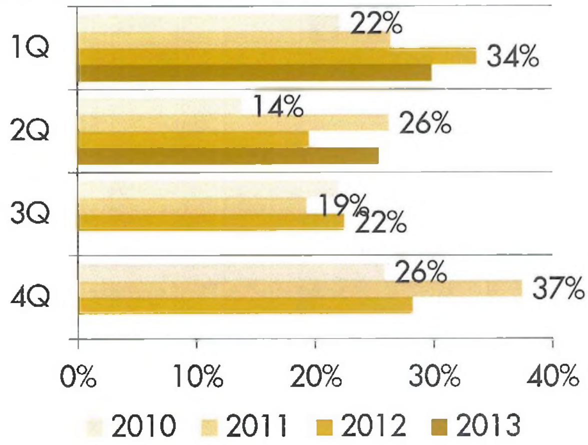


3. The role of gas in meeting the Energy Union and 2030 objectives

3.1 Carbon Pricing

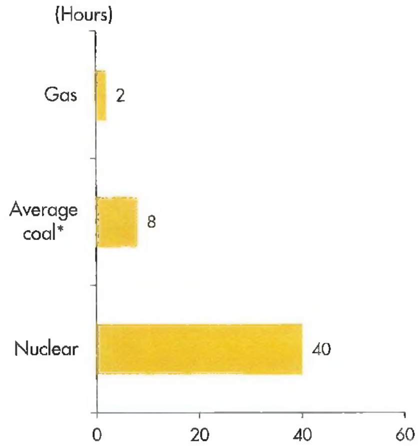
GAS SUPPORTS RENEWABLES DEVELOPMENT

Intermittent nature of renewables makes meeting demand challenging
(Load factor-%)



Variability of load factor of onshore wind power generation in the UK for the same periods of each year

Gas is the most responsive fossil fuel



Time required for the different fossil fuels to come online in cold conditions

Source
- DECC (UK) "Energy trends section 6: renewables (Oct 2013)"
- Eurelectic: "Flexible generation: backing up renewables (2011)"
- *Average of hard coal and Lignite fired coal power plants

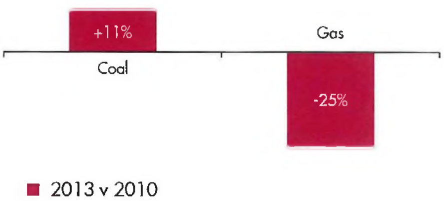
FPL 29

EUROPEAN ENERGY POLICY PARADOX

LOW CO_2 PRICE	CHEAP COAL	DECLINING POWER DEMAND	GROWTH IN RENEWABLES	OVERCAPACITY IN POWER GENERATION

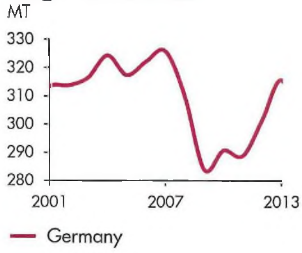
DETERIORATED POSITION OF GAS IN EU POWER

COAL DISPLACES GAS IN POWER MIX



Which increases CO_2 emissions in some countries

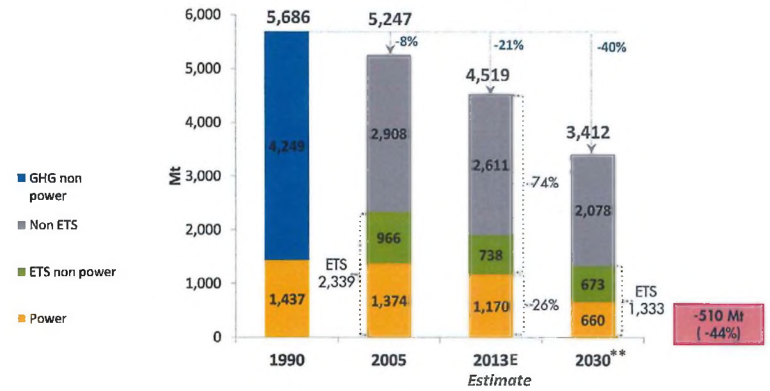
CO_2 EMMISIONS



Source: WoodMackenzie

KEY ROLE FOR POWER IN ACHIEVING GHG TARGETS

Historical GHG emissions EU28+3 ($MtCO_2$) and targets 2030

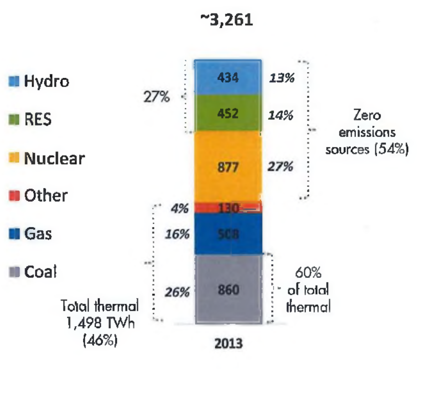


- The power sector accounts for 26% of the total 2013 emissions, but will need to achieve significant further reductions reductions to 2030
- A 500 Mt CO2 reduction out of 1100 Mt CO2 in the power sector equates to a 44% reduction vs. 2013.

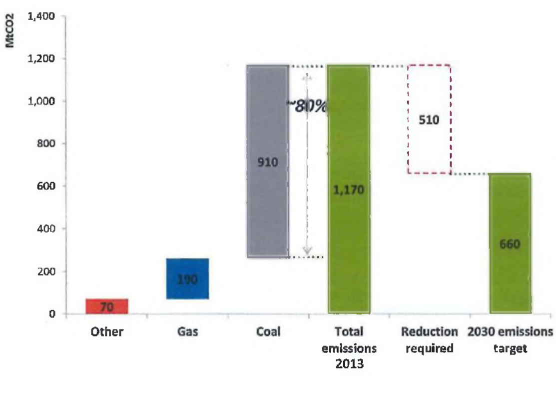
Source: Database EEA (European Environment Agency); EC 2050 Roadmap
*** ETS non power is calculated by difference: ETS emissions – ETS power emissions. While emissions non ETS are calculated by difference: Total GHG emissions – ETS emissions*

EMISSIONS FROM THE POWER SECTOR IN PERSPECTIVE

Power generation mix at 2013 (TWh)*



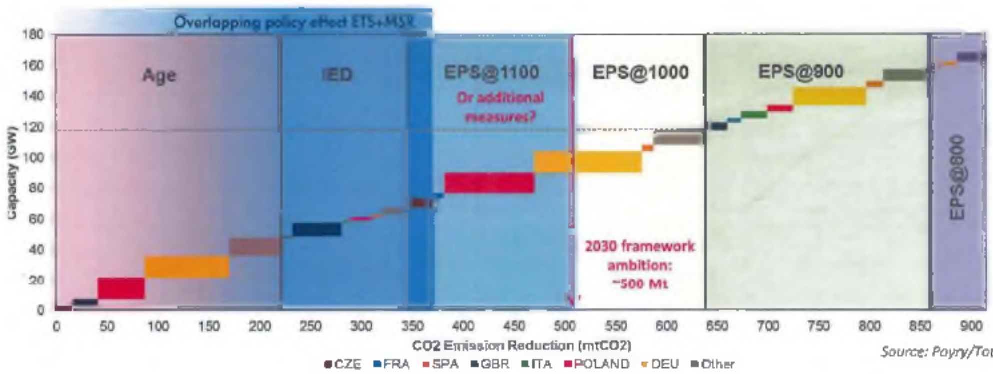
2013 Emissions power sector EU**



- Coal accounts for 80% of total power sector emissions while producing 26% of the total power.
- Achieving the targets will require a strong fuel switch away from coal to a strong growth of renewables and moderate growth of gas generation.

**Source*: EUROSTAT
** Estimation on the base of Eurostat and IEA data
IEA 2014 WEO projection assumes 40% GHG and 27% RES target acehived, partial fulfillment of 20% EE target.

ADDITIONAL MEASURES?



Source: Poyry/Total model

- Age retirement and the IED are expected to lead to a GHG reduction of 340-350 Mt between 2015 and 2030 through closure of 60-70 GW of coal capacity (~260TWh generation vs 2013).
- The ETS could deliver an additional 10 Mt reduction* (-10 GW) through coal to gas fuel switching if the price reaches 40EURO/t

Source: Total/Poyry model.
**Assumptions: coal price 80 \$/t. gas price 32 €/MWh, CO2 price 40 €/t. (A CO2 price higher than 40 €/t might not be economically sustainable for the industry). Coal plants affected with emission factor above 1300 kgCO2/MWh.*

3.2 Internal Energy Market

COMPLETING THE INTERNAL ENERGY MARKET – FOCUS AREAS

1	**Removal of barriers to entry** – focus on enforcement of basic Third Package requirements and remove unnecessary bureaucracy	•Examples: failure to transpose the EU Gas Directive requirements in local legislation (requirement for regulatory approval of prices in PL); language restrictions to wholesale market participation PL); licensing restrictions in Romania
2	**Develop markets to deliver security of supply** – any intervention should be temporary and should not lead to market distortions	•Examples: booking behaviours which restrict certain types of access or usage of storage should not be allowed as these tend to reduce the value of storage and distort market behaviour to the detriment of supply security and market efficiency (for example the storage obligation in PL acts as a barrier to import, restrictions in CZ and Spain reduce availability of commercial storage).
3	**Effective third party access to network** – focus on CAM and CMP implementation	•Examples: EU rules still do not apply to transit pipelines dedicated to long term agreements (UKr-RO-BL-GR); not clear plan and partial implementation of CAM at some interconnection points (for example only monthly products on the RO-HU; unclear plans for BL borders); lack of effective UIOLI provisions (PL, RO, BL).
4	**Improving connectivity across the region** – focus on infrastructure	•Examples: speeding up the commissioning and implementation of key Projects of Common Interests which receive EU funding (for example the RO-BL interconnector, GR-BL interconnector); increasing the reverse flows capability of some major gas pipelines running today only from East to West (Obergailbach, Waidhaus); AU-HU interconnector

NETWORK CODES

1. Tariffs:
   - Scope of the code
   - EU transmission charging
2. Capacity Allocation Mechanisms
3. Congestion Management Procedures
4. Balancing

3.3 Potential Barriers

BARRIERS: FINANCIAL REGULATION

- Financial market regulation (MiFID II) proposals risk undermining development of the internal energy market and could reduce energy market liquidity.
- Stringent regulations exist under REMIT and the 3rd Package.
- A "REMIT carve-out" was agreed in the MIFID2 Level 1 agreement. It is important that the delegated acts protect the REMIT carve out.
- Failure to do so could result in increased barriers to entry, reduced liquidity and undermining efforts to create a competitive Internal Energy Market.

Q&A's

Shell