Future Role of Gas from a Regulatory Perspective

Outlook and Initial Conclusions

Workshop with Steering Group and Advisory Panel

21 September 2017

Agenda

- Introduction (objectives, approach and scope of work)
- Demand scenarios (recap)
- New technologies (overview, criteria for assessment and value chain options)
- Commodity markets perspective
  - Electricity generation
  - Heating
  - Transportation
- Infrastructure perspective
  - Conventional natural gas infrastructure
  - Natural gas infrastructure in the transportation business
  - Infrastructure for new gases and district heating
- Discussion / Feedback / Next Steps

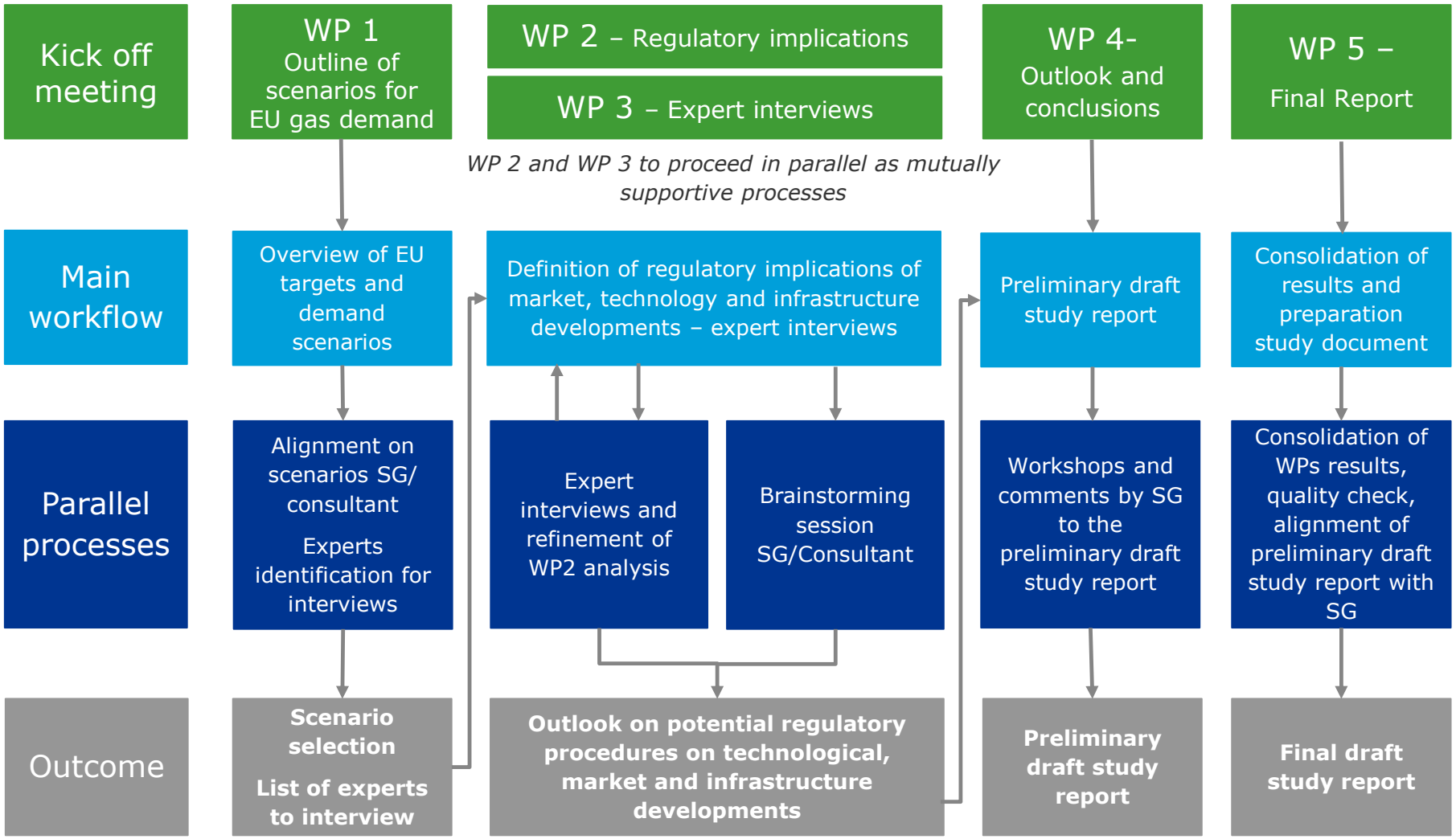
Introduction (Objectives, Scope of Work and Approach)

Introduction

Project Objectives

- Advisory support to the CEER Gas Working Group to prepare report on the future role of gas
- Overview of EU policy targets and actions relevant for the recent and foreseeable development of gas – the study shall outline the various regulatory implications resulting from the changing role of gas
- The study split into 5 work packages:
  - WP 1:Outline of scenarios for future gas demand in EU-28
  - WP 2:Regulatory implications (technologies, commodity and infrastructure)
  - WP 3:Expert interviews
  - WP 4:Outlook and conclusions
  - WP 5:Consolidation of results and study document

Overview of Scope of Work and Work Packages



Approach

Commodity and infrastructure perspective

- The results of the analysis and the recommendations are presented under two perspectives: commodity markets and infrastructure
- Commodity markets
  - Assessment of the use and of the competitiveness of natural gas across electricity, heat and transportation sectors
  - Identification of regulatory measures
- Infrastructure
  - Assessment of infrastructure for natural gas, transportation as well for new gasses (hydrogen and biomethane) and non-gasses (district heating)
  - Identification of regulatory measures

Demand Scenarios (Recap)

Demand Scenarios

Selection of the scenarios

- Three sets of scenarios are considered for our analysis:
  - ENTSOG (TYNDP) 2017
  - World Energy Outlook 2016
  - EU Reference Scenario

- Assumptions underpinning the scenarios are assessed
- Focus on natural gas demand on a 2040 perspective
- Three scenarios are constructed for the study
  - low, average and high gas demand
- The scenarios also consider the emission and environmental targets

Demand Scenarios

Major characteristics of the demand scenarios (high, average and low), selected market segments

Sector	High	Average	Low
Power Generation	Gas-fired plants as main source of back-up for RES	Overall decrease of conventional generation (gas and coal)	Most of generation from RES; gas plants are too carbon-intense
Road-Transport	Increasing use of gas as a fuel	Increasing use in heavy-duty vehicles but a large development of EV overall	A slight increase in demand
Maritime-Transport	LNG becoming a primary fuel	LNG becoming a primary fuel	A slight increase in demand
Heating	Stable demand due to a lack of significant improvements in energy efficiency	Reduction of demand due to new technologies (e.g. heat pumps, biomass) better access to DH and increase in energy efficiency	Significant demand falls due to maximum efficiency improvements

New Technologies for Use of Gas

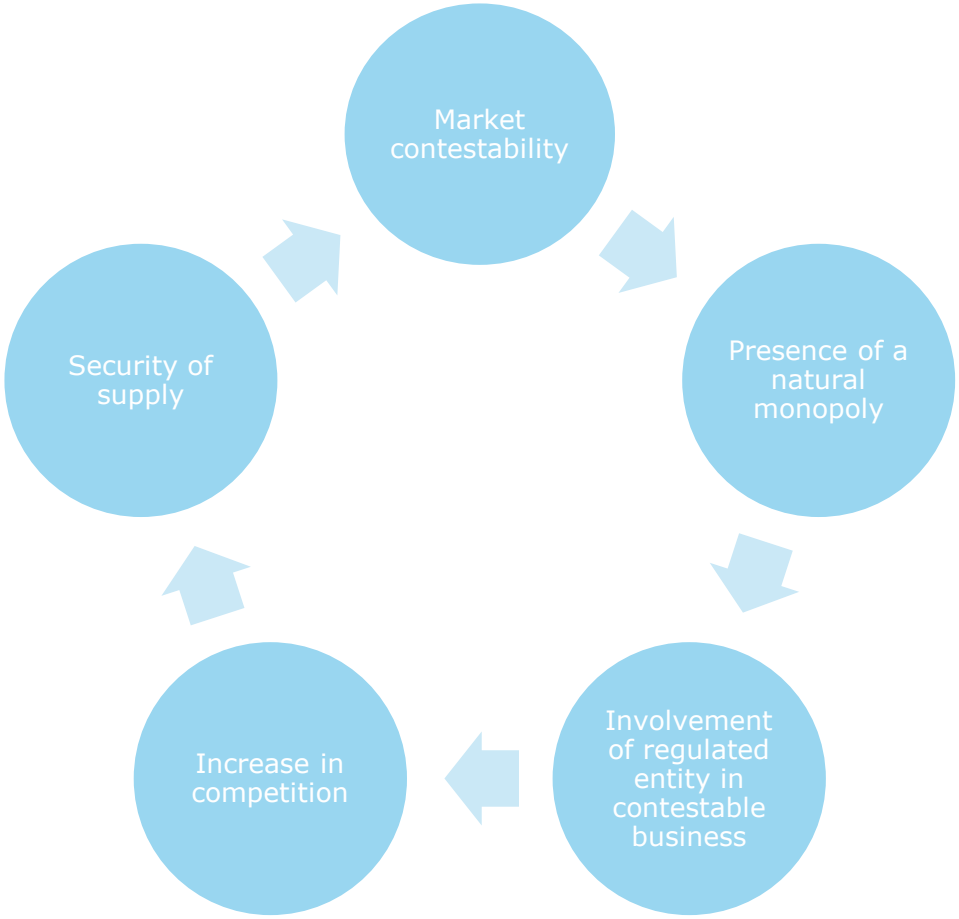
New Technologies

Approach

- The aim of the analysis on new technologies is to identify the impact that these have on natural gas as a commodity and the infrastructure areas
- Technologies assessed include: CNG, LNG, biogas, power-to-gas and hydrogen, carbon capture and storage
- Multiple value chain options are identified for each of these technologies
- A set of criteria to identify the need of regulation defined and consequently applied to the different value chain options
- The conceptual work supported by relevant case studies and examples from the regulatory practices in different countries

New Technologies

Criteria to assess the need for regulatory intervention



Market contestability: contestable activities are not subject to regulation

Natural monopoly: activities that constitute a natural monopoly should be regulated

Involvement of regulated entities in contestable businesses / unbundling: involvement not excluded but subject to regulatory requirements

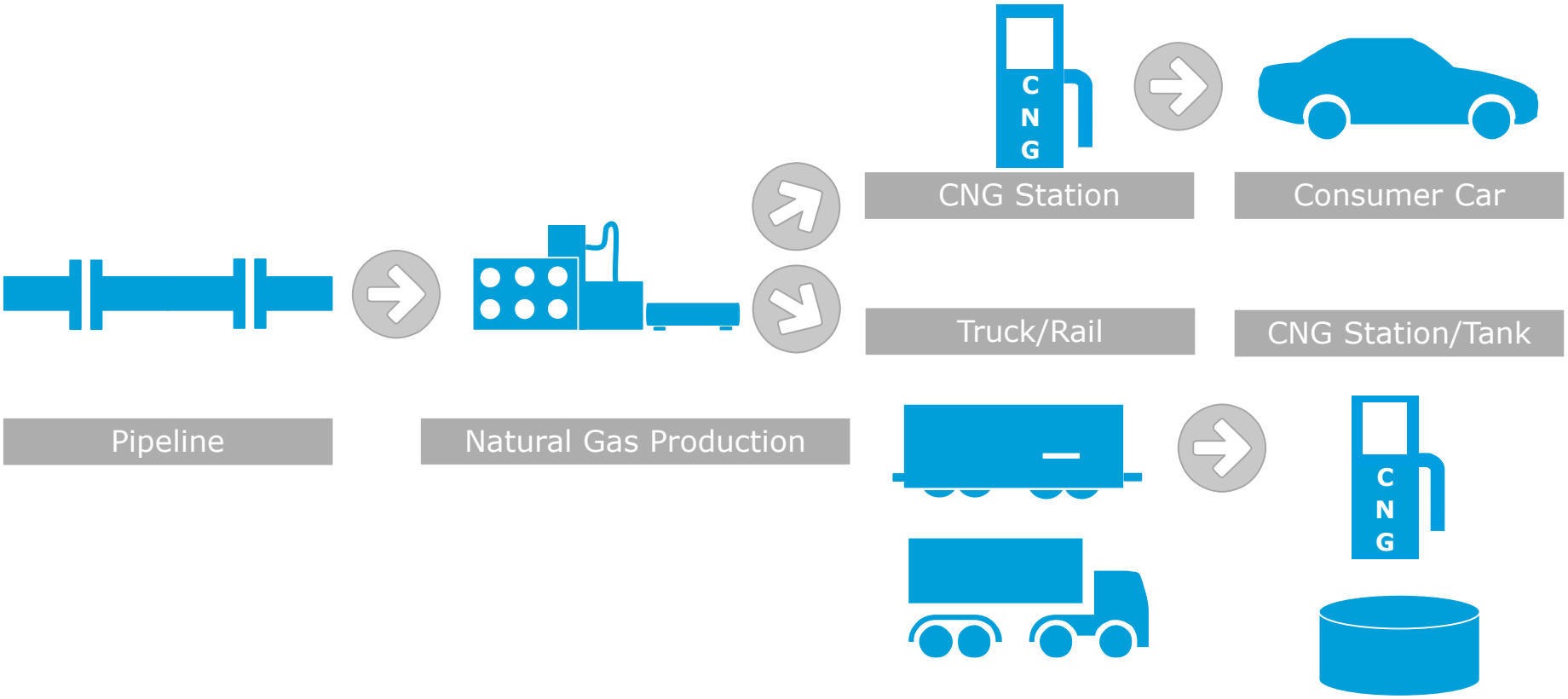
Increase in competition: the ability of certain business activities or involvement of regulated entities in them to enhance competition

Security of supply: the involvement of regulated entities in contestable businesses to support security of supply of natural gas

Others: innovation, positive externalities, acceleration of infrastructure development

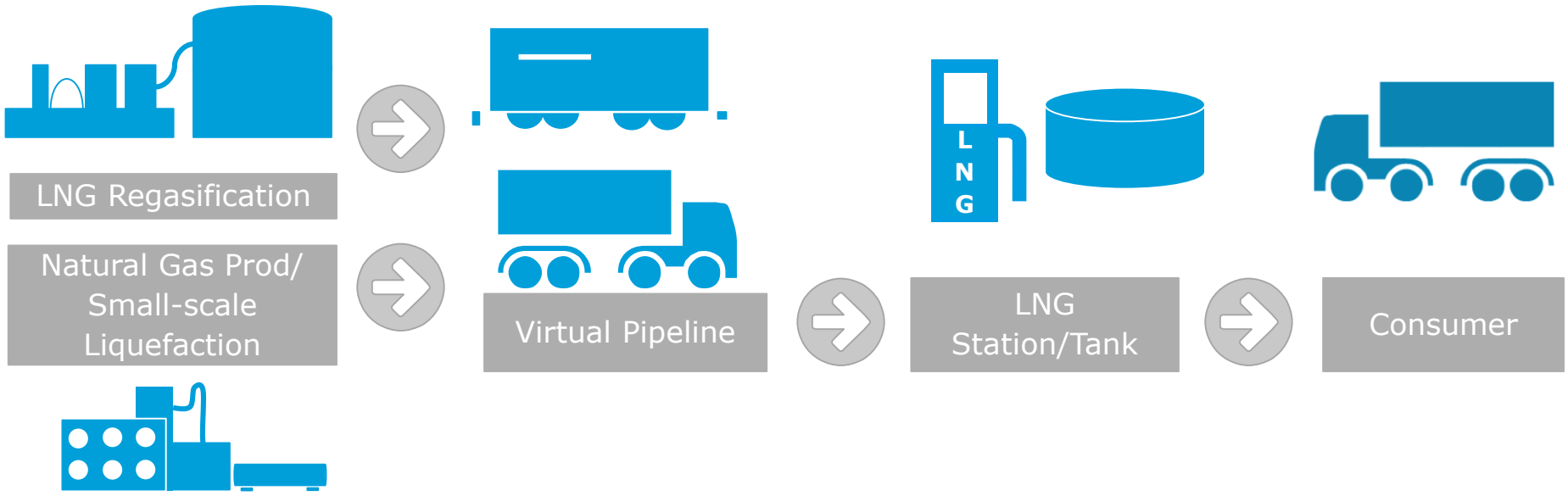
New Technologies

CNG - Overview of the value chain



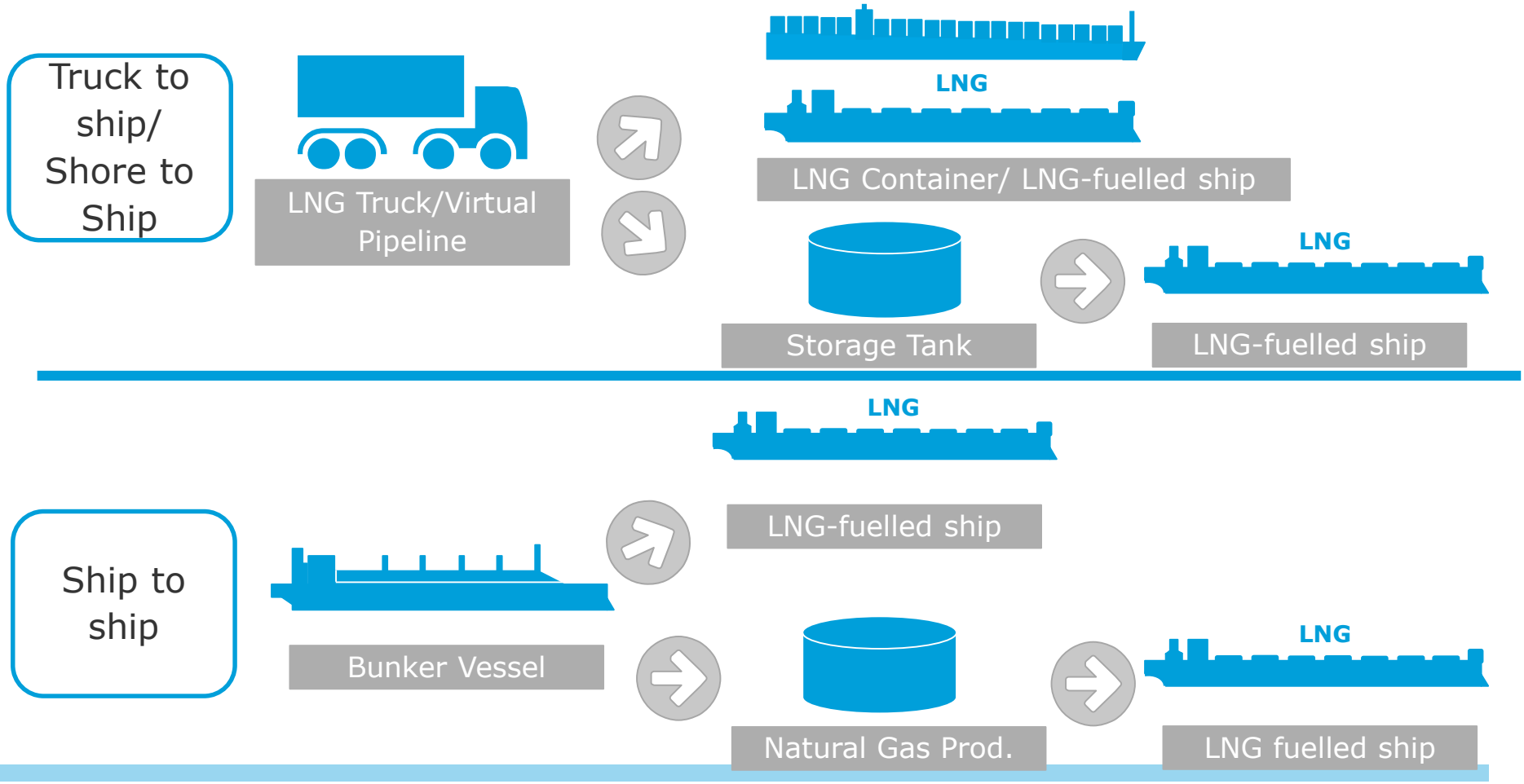
New Technologies

LNG - Overview of the value chain



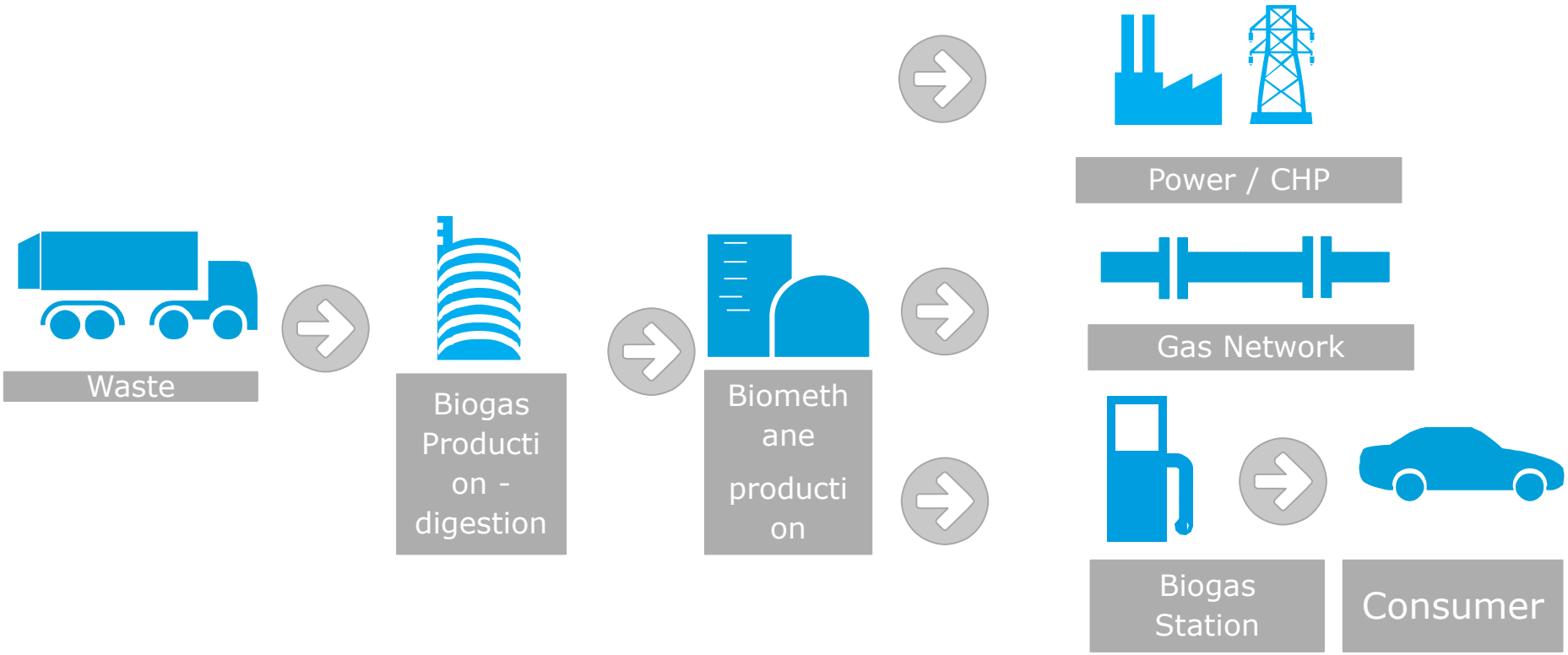
New Technologies

LNG maritime – Overview of the value chain



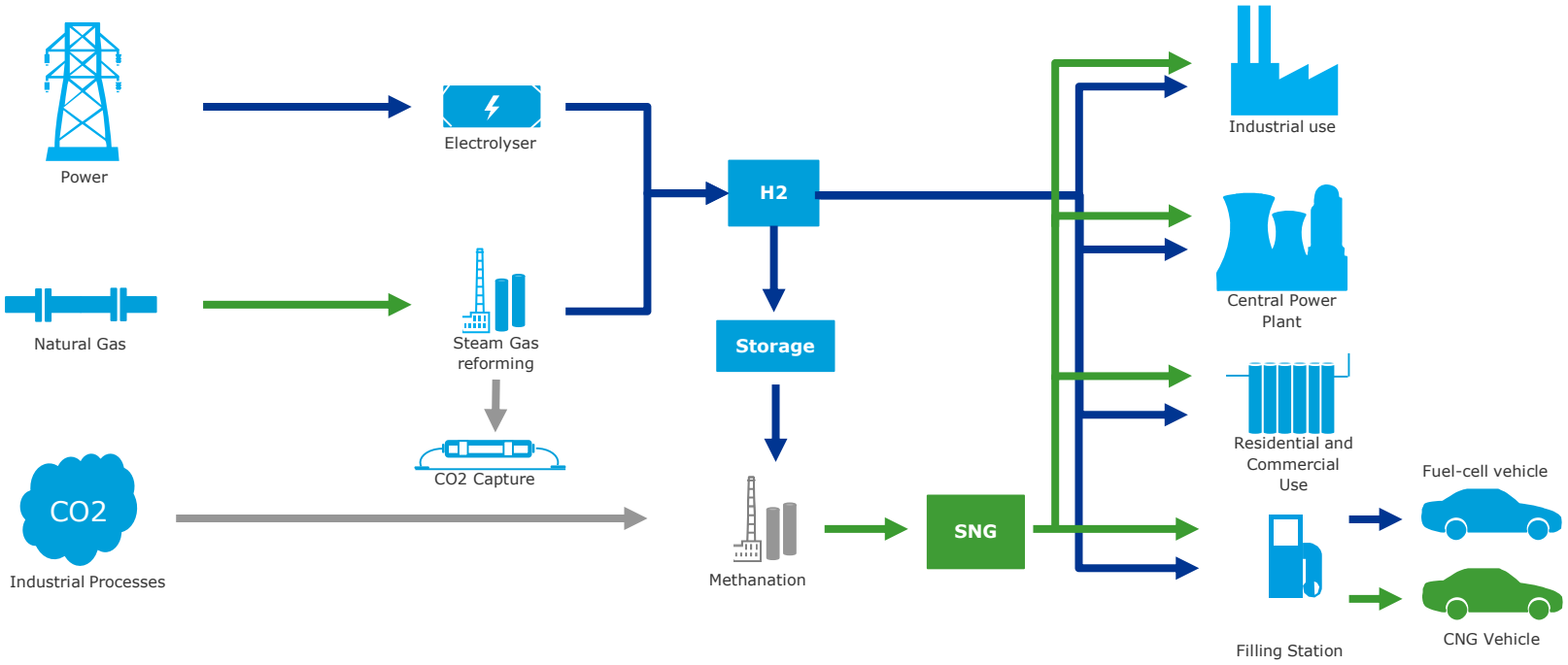
New Technologies

Biogas



New Technologies

Hydrogen/P2G



New Technologies

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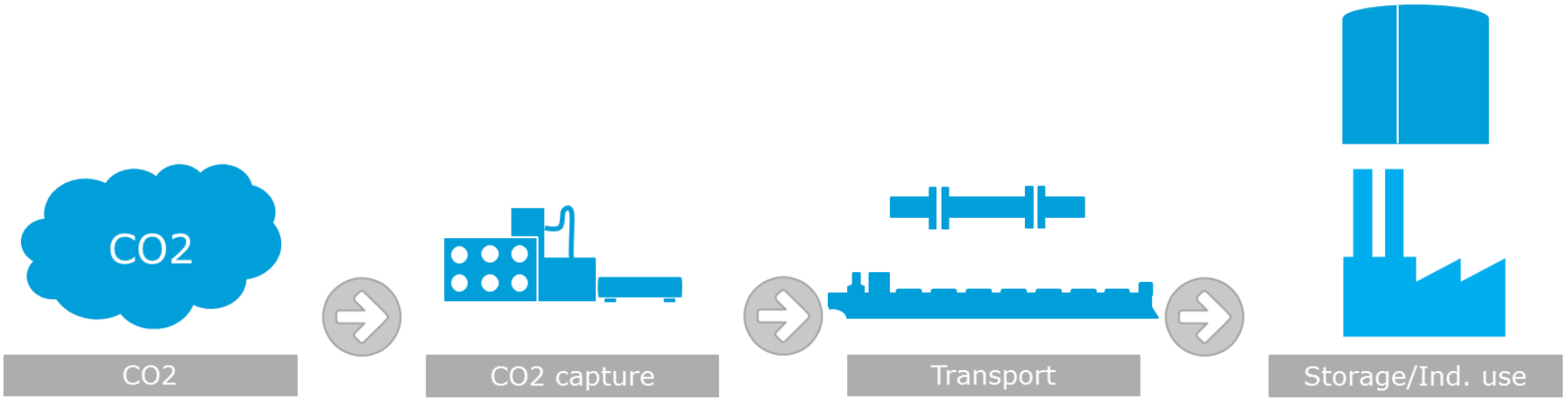


Commodity Markets Perspective

Commodity Markets Perspective

Approach

- The analysis looks at the competitiveness of natural gas as a fuel. The competitiveness is assessed by comparing the advantages of gas with other energy sources in three relevant markets:

1. **Power generation sector**
2. **Heating sector**
3. **Transportation sector**

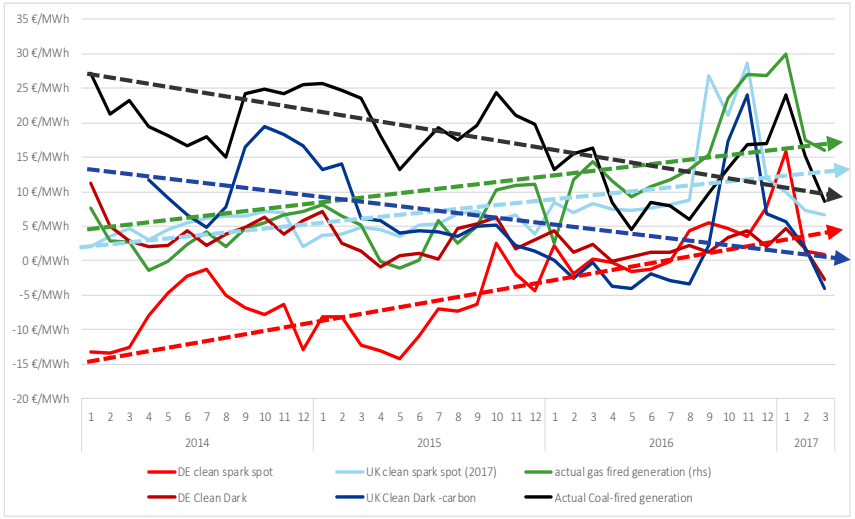
Building on the outcome we address the need to amend or further develop the existing regulation. This might, for example, be in terms of removing market distortions, improving market design, enhancing competition or providing explicit incentives for new technologies.

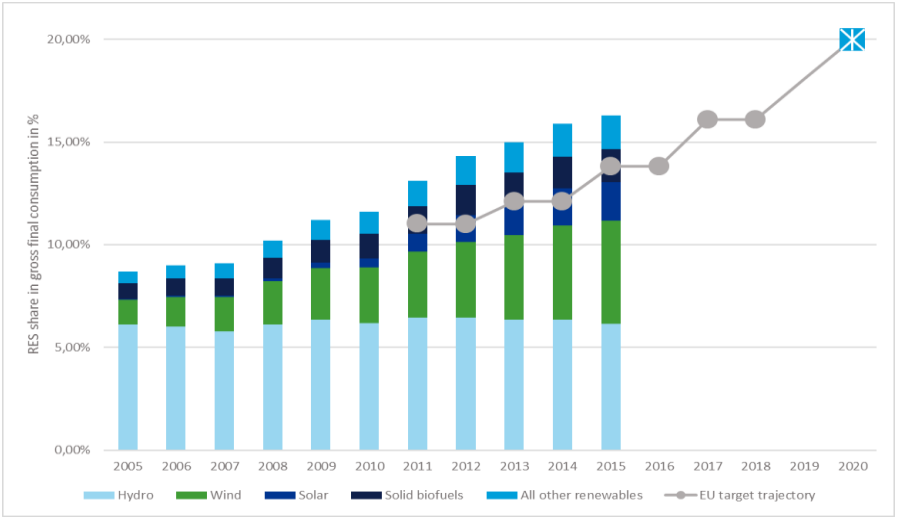
Commodity Markets Perspective

Power Generation Sector

Natural gas is used to generate electricity, mainly in open and combined cycle turbines. In the electricity market, natural gas competes with other generation technologies. Gas-fired plants exhibit high flexibility and are considered to be well complemented to intermittent RES generation. In respect to coal, gas is a cleaner source of energy.

- In the last years, natural gas has under-performed when compared to RES and coal. These developments were mainly caused by the large penetration of RES/policy support, competitive coal supply, low carbon prices/ unfunctional emission trading scheme.
- Recently the performance of gas power plants has started to improve what may indicate possible change leading to gas overtaking coal as the primary fuel for power generation.





Commodity Markets Perspective

Power Generation Sector — Regulatory Implications

With respect to gas commodity market, regulation should aim to enhance competition in this market. Direct interventions such as subsidies for gas generation, do not appear adequate and will cause distortive effects. Regulatory measures appear necessary in the areas described below.

1. **Continue improving functionality of gas markets**
   - A new mechanism should be defined to support efficient mergers of trading hubs or markets currently managed by different TSOs. This could even take the form of a new network code defining the procedures for achieving this goal. Options including re-examination of the governance of decisions on zonal mergers, and potentially forms of common funding arrangements to address wealth transfers may also be considered.
   - Quo Vadis study launched by EC aims to assess the current market design in terms of maximising social welfare and to suggest changes to improve it.
   - Regularly reviews of the gas target model

Power Generation Sector - Regulatory Implications

2. Gas transportation tariffs

Transport tariffs may become a significant part of the cost of operating a gas-fired plant. Tariff design must ensure that power plants do not close prematurely triggered by the network tariff itself.

- Confronted with a lower utilisation, plants will need to use network capacity for short periods of time. Regulators should consider using short-term multiplier that will not excessively increase the short-term capacity charges and will not discourage users to book this capacity.
- Consider developing specific short-term capacity products for the gas-fired power plants.
- In a broader context, the declining demand and excess transportation capacity may necessitate a basic rethinking of the network tariff design. The role of auctions for capacity allocation may diminish. The role of reserve prices will increase but their structure and level will need to be revisited. Depending on the tariff design and cost recovery schemes (e.g. Ramsey pricing) higher mark-ups on (within-country) domestic entry points than on entry points into the EU system or exit points to neighbouring systems may occur. There may be a need to consider harmonizing the reservation prices within wider regions in Europe to avoid potential distortions.

3. Improve coordination of power and gas sectors

- An improvement of the coordination of gas and power network operators is required in terms of operational decisions, time alignment but also a coordinated approach to plan new infrastructure -> e.g. P2G hydrogen.

Commodity Markets Perspective

Heat Sector

Natural gas is used for heating by converting into heat via boilers at customer sites. Gas competes with other sources such district heating and electricity in the heat market.

- The competitive position of both heating concepts depends on:
  - The configuration of the networks and the specific local consumption conditions, i.e. consumption density. Short distribution networks with high consumption densities, typically urban areas with high population density, would reduce distribution costs.
  - The cost of heat generation which is characterised by generation technology and fuel procurement cost. For example:
    - For district heating, generation based on waste heat from local industry or CHP technology may improve its competitiveness due to efficiency advantages of the joint production process
    - For natural gas, the competitiveness depends on the cost and efficiency of the gas boiler and the gas prices for residential consumers.

Commodity Markets Perspective

Heat Sector - Regulatory Implications

An illustrative analysis of the full cost of supply of residential heat indicates that under the current market conditions both heating concepts are comparably competitive. The competitiveness in the future will depend to a significant extent on the underlying policy framework, development of technologies and fuel prices.

In the average and low scenarios natural gas demand in the heat sector declines (due to energy efficiency improvements in building sector), market share of heat supply from heat pumps and district heating increases. In the high scenario, gas demand remains stable (slow progress of energy efficiency improvement).

Effective competition between available heat solutions

The principal regulatory objective should be to ensure effective competition between the available heating solutions, however in the light of the specific environmental targets and the underlying policy framework. Multiple policy tools exist (fuel taxes, co-generation support schemes, subsidies and funding facilities or energy efficiency promotion tools).

In respect to the gas market, gas wholesale and retail supply are competitive areas, there is no scope for a direct price regulation of gas supply to consumers except for the targeted protection of vulnerable consumers. In practice markets in several countries remain concentrated, with low switching activity from consumers and price regulation of end-user prices.

National regulators should continue to focus on the further enhancement of the effectiveness of retail competition: facilitating market entry, improving switching procedures and gradual abolishment of price regulation except vulnerable customers.

Use of CNG and LNG in Transportation

The analysis comprises three major steps.

Step 1	Review of the current market situation and role of natural gas across three sub-sectors (light-duty vehicles (LDV), heavy-duty vehicles (HDV) and maritime transportation)
Step 2	Application of selected criteria for assessment of competitiveness to sub-sectors (cost of purchasing vehicles and operating cost, fuel availability, emission reduction potential)
Step 3	Regulatory implications for natural gas in the transportation sector

Use of CNG and LNG in Transportation

Natural gas represents a competitive fuel for transportation.

Cost-competitiveness	Natural gas fuelled vehicles exhibit higher purchase costs compared to regular gasoline and diesel vehicles but lower operating costs. EVs exhibit the lowest operating costs of all vehicles in the LDV sub-sector but the highest purchase costs.
Fuel availability	The availability of infrastructure for fuelling purposes (CNG and LNG stations and bunkering facilities) still fragmented / limited. Additional investments required to increase the use of natural gas in transportation.
Emission reduction potential	Natural gas contributes to the reduction of CO2 emissions in the LDV sub-sector. Its emission reduction potential in the HDV sub-sector is limited by the efficiency of truck engines. In the maritime sub-sector, LNG represents the main fuel option to meet sulphur emission standards.

Use of CNG and LNG in Transportation

Regulatory implications

- Fuelling infrastructure still fragmented, and can impede the growth in use of natural gas in transportation across
- Major reason is the "chicken and egg" problem:
  - Users of CNG and LNG expect to have the fuel infrastructure available before committing to purchase vehicles running on such fuels
  - On the other hand, infrastructure developers expect to have sufficient commodity demand in place to secure the utilisation and cost recovery of the infrastructure
- Several parties including regulated entities have expressed their interest in investing in CNG or LNG fuelling infrastructure
- The involvement of regulated entities in the contestable business of natural gas fuelling infrastructure should comply with the unbundling requirements (see the section on infrastructure)

Use of CNG and LNG in Transportation

Policy support measures

- Examples for incentives on policy level may include:
  - Tax breaks for the purchasing of vehicles
  - Incentives (direct subsidies or indirect ones) for the purchase of vehicles
  - Subsidies for the development of fuelling infrastructure (CNG and LNG)
- Licensing requirements for the supply of natural gas (and in broader context also LNG and CNG) differ across member states
- A harmonization of licensing requirements across Europe for natural gas supply may be beneficial
- Coherent and unambiguous approach to licensing requirements across Europe would help to:
  - Remove uncertainties
  - Establish a level playing field for competing fuels
  - Facilitate cross-border activities

New Gases

Biogas and hydrogen

- Biogas / biomethane and hydrogen (from P2G) can be used to substitute natural gas in a number of applications (e.g. electricity and heat production, transportation) and to reduce overall emissions of such applications
- Biogas can be used to produce electricity and heat, as a fuel in transportation sector or upgraded as biomethane and injected in natural gas grids
  - Production increase in several European countries driven by the availability of multiple types waste that can be used as feedstock for its production
  - Production is still dependent on subsidies due to its high costs compared to natural gas
- Hydrogen production via P2G / electrolysis, steam gas reforming, synthetic natural gas. Transport via networks as hydrogen blend or pure hydrogen.
  - Production still at early stages of development with relatively high production costs, however the production scale expected to increase
  - Currently blending of small hydrogen proportions exists, blending of larger quantities still under development
  - Similar to biogas, hydrogen development depends on policy and regulatory support

New Gases

Regulatory implications and policy support measures

- Production and supply of hydrogen are contestable activities, no need of regulation
- Regulation required on the infrastructure used to transport biomethane or hydrogen (either in existing pipelines or new dedicated pipelines)
  - Similar to the existing regulation on natural gas networks (including provisions on access to capacity, congestion management, balancing, etc)
- Additional policy measures can be used to support the production and supply of biomethane and hydrogen.
  - These include tax incentives, investment grants for pilot projects, CO2 certificate schemes

Infrastructure Perspective

Infrastructure Perspective

Approach

- Assessment of regulatory implications for natural gas infrastructure
  - Regulatory treatment of stranded assets
  - Coordinated cross-border decommissioning of stranded assets
- Assessment of regulatory implications for CNG/LNG infrastructure in the transportation sector
  - Contestable and non-contestable businesses
  - Involvement of network operators
  - Coordinated national/regional CNG/LNG infrastructure plans
  - Regulatory schemes for infrastructure promotion
- Assessment of regulatory implications for infrastructure for new gases and district heating
  - Infrastructure for new gases
  - District heating
  - Incentives for innovation and decarbonization investments

Natural Gas Infrastructure

Definition and criteria of stranded assets

- *"Stranded asset as those which do not recover "all or part of their investment during the time that they are operational."* (Divestment and Stranded Assets in the low carbon transition, OECD. 2015)
- *"Those investments which have already been made but which, at some time prior to the end of their economic life (as assumed at the investment decision point), are no longer able to earn an economic return"* (Redrawing The Energy Climate Map." World Energy Outlook Special Report, IEA. 2013)
- *Stranded assets arise when the sunk costs from prior investments will not be recovered because future revenues (via prices, volumes or both) are expected to be significantly lower than assumed when the commitment was made due to material changed circumstances. (*Joskow, P)

- ***Proposed definition:*** *Stranded assets in gas infrastructure represent investments undertaken which cannot be fully recovered under the regulatory framework in which they operate, prior to the end of their lifetime.*

Natural Gas Infrastructure

Options of regulatory treatment for stranded assets

- Adjusting the depreciation policy
- Asset valuation to establish RAB
- Adjustment of cost of capital
- Explicit compensation

Natural Gas Infrastructure

Stranded assets / Adapting the depreciation policy

- Adapting the depreciation policy (accelerated depreciation) either:
  - By reducing the asset life meaning that the asset is depreciated quicker and asset values being depreciated to zero earlier than their standard life or
  - Adopting front-loaded depreciation profile meaning that the asset is depreciated more in the beginning and a smaller amount in the later years
- Changes to depreciation allowances change the time when the revenue is earned
- Accelerated depreciation used when in the long-term future there is a risk of demand decline or technical obsolescence
  - Assumes that customers in the short to medium term use the network more intensively and pay more than customers in the long-term future
  - Assumes that the tariff increase resulting from accelerated depreciation will not discourage the network users to further use the network (elastic reaction)

Natural Gas Infrastructure

Stranded assets / Asset valuation to establish RAB

- Asset valuation methods
  - Historic cost (original purchase price), indexation (adjust the historic cost to account for inflation), replacement value and deprival value
- Replacement value method
  - Calculates the cost of replacing an asset with another asset (not necessarily the same) that will provide the same services and capacity as the existing asset
  - From the perspective of the stranded asset this may be somewhat difficult as the cost of replacing an asset depends on how that asset is defined
    - Is it the physical item in question (e.g. a pipeline) or its future 'service potential' i.e. the asset may still be used but not to its full capacity (due to under-utilisation and limited demand for capacity)

Natural Gas Infrastructure

Stranded assets / Asset valuation to establish RAB

- Deprival value method
  - Deprival value defined as the minimum loss the business would suffer if it were deprived of the asset. Were the asset to be replaced, its value would equal the replacement cost. If the asset would not be replaced, then the deprival value would be the greater of the net present value of expected cash flows from the continued use of the asset or the net realisable value of disposing of the asset (exit value)
  - Difficulties in their practical application due to the circularity problems (i.e. to set the asset value the regulator needs to know the future cash flows, which at the same time are based on future prices and capacity demand, however prices depend on the allowed revenue and the allowed revenue depends on the initial asset value)
  - Furthermore, the use of forward looking approaches and potential reduction of RAB to account for stranded assets is a legal question and would also have legal implications

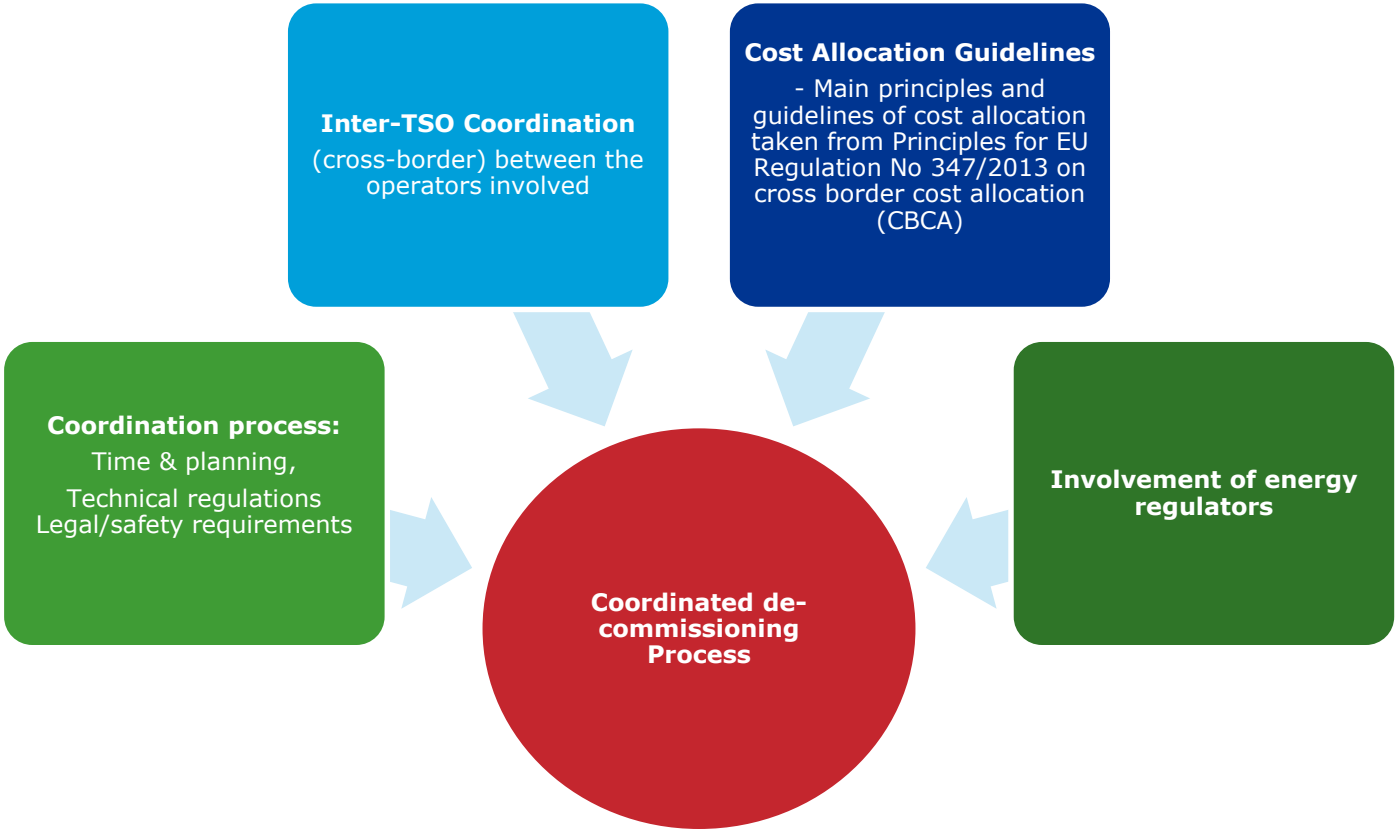
Natural Gas Infrastructure

Stranded cost / Adjusting the regulated rate of return

- Premium return in tariffs against future volume risk
  - The premium essentially accounts for the risk that the TSO has for not being able to market capacity after expiry of the long-term contracts
  - The premium also helps to avoid sharp increase in tariffs in long term in case that lower quantities will be contracted in future.
- Discounted return in the tariffs mitigating stranded cost
  - Aims at preventing a sharp increase in network tariffs that may discourage capacity bookings in the short to medium term
  - It could be implemented as an one-off adjustment

Natural Gas Infrastructure

Coordinated decommissioning is required if the asset stretches over more than one country



Natural Gas Infrastructure

Coordinated decommissioning

- Identification of assets to be decommissioned
  - Role of the TSO as part of the asset management function to identify which assets should be decommissioned
  - Requirement to inform and submit plans on investment and decommissioning to the national energy regulators which also feeds into the ENTSOG TYNDP
- Process and procedures of coordinated decommissioning
  - European level, Council Regulation (EU, Euratom) No 617/2010 concerning the notification to the Commission of investment projects in energy infrastructure
  - Framework for the exchange of data and information on future production, transmission and storage capacities for energy
  - Includes information on planned and under-construction projects, transformation of existing infrastructure and decommissioning projects of a certain size, on a five-year horizon

Natural Gas Infrastructure

Coordinated decommissioning

- Inter TSO-Coordination
  - Information providing detailed technical information on the asset, and rationale behind the decommissioning should also be provided.
  - Documented as part of a market analysis assessment justifying the lack of current and future need of asset resulting in decommissioning of the asset
  - This assessment could be a joint effort between the relevant TSOs if the assets stretch over more than one country.
- Roles and involvement of national energy regulators
  - For cross-border decommissioning it is advisable to nominate a single point of contact that serves to coordinate the decommissioning project.
  - Central contact point would ensure clear communication channels. Similar to ACER recommendations for PCI project, the national energy regulator in which the longest part of the infrastructure is located could be the best choice for the role of the central point of contact for the TSOs and other national energy regulators.

Principles of cross border cost allocation

Two options explored:

Option 1 - Payment for the cost of the assets based on their location / country territory

- Implies that the cost allocation is purely based on the where the asset is located and each TSO would be responsible for the decommissioning of the asset in its home country
- Coordination between the TSOs and energy regulators in the respective countries required

Option 2 - Cross-border cost allocation agreements (CBCA) under PCI

- Steers towards adopting agreements between the parties involved
- Investment costs of PCI should be borne by the relevant TSO or project promoters to which the project provides a net positive impact / use of CBA to evaluate investment proposals to ensure society benefits from them
- CBCA deals with distribution of costs among all the countries which are affected positively and/or negatively by a gas infrastructure project having cross-border impact

Natural Gas Infrastructure

Selected principles/criteria for cost allocation for cross-border coordination of decommissioning

Principles: Cost Causality / Reflectivity, Practicability, Low Administrative Burden, Transparency

- Option 1
  - More suited for cross-border decommissioning based on the principles of predictability, transparency and practicability
  - Not entirely compliant with the cost causality principle, where cost allocation shall reflect the costs caused by the national TSO
- Option 2
  - Typically applied for cross-border investments but may also be applied for decommissioning projects
  - Costs allocated among the affected countries, allocation follows the results of a cost and benefit analysis
  - Relatively high administrative burden, transparency dependent on the clarity of the specific rules

CNG/LNG Infrastructure in Transportation

Role of CNG and LNG Infrastructure

- CNG and LNG infrastructure makes CNG and LNG available for use as a fuel in transportation
- Infrastructure comprises:
  - Physical pipeline and non-pipeline transport (virtual pipelines) / connection to the gas networks
  - CNG and LNG refuelling stations including compression equipment to convert natural gas in CNG or LNG
- Contestability
  - Specific parts of the value chain like physical networks to transport gas to the CNG refuelling stations constitute a natural monopoly and should be regulated.
  - Other activities like gas storage, which may not be natural monopolies, can become de-facto monopolies due to physical or operational limitations
  - Transportation via virtual pipelines (LNG/CNG) or provision of refuelling station services are contestable activities and can be provided in a competitive environment
  - Monitoring specific segments to prevent from distortion of competition /abusive use of market power (for example LNG and CNG refuelling stations)

CNG/LNG Infrastructure in Transportation

Regulatory implications – Network operators in a contestable business

- Diversification towards contestable activities (P2G, CNG/LNG)
  - Complementary to the traditional transmission / distribution (diversification and scope effects)
  - Contribute to the commodity demand which in turn may encourage network demand (scale effects)
- Such involvements can provide various benefits in terms of infrastructure development, network security and increase competition
- Role of regulators
  - Should not create a barrier and should ensure that customers and market participants benefit to the largest extent possible from the range of services
  - Should recognise the existing advantages of network operators due to the experience and knowledge in development and management of gas infrastructure
  - Should prevent (unintended) interactions between the regulated and contestable sectors
  - May consider adapting the existing unbundling rules, by recognising explicitly the specific circumstances and the motivation for such involvements

CNG/LNG Infrastructure in Transportation

Regulatory implications – National/regional plans and other schemes

- National and regional plans related to urban planning can affect the implementation of infrastructure for new technologies (e.g. CNG and LNG stations)
- The coordination of the urban planning and the plans for the establishment of CNG/LNG refuelling stations can support the coherent infrastructure growth
- National/regional infrastructure planning is not a task of energy regulators. However, they can provide relevant information and support the activities of regional governments or municipalities as well as other institutions mandated to develop these plans
- Additional instruments such as concessions can also support the implementation of infrastructure for new technologies

District Heating

Need of regulation

Regulation in district heating

- There is not a strict need to regulate the district heating when competition exists from other fuels such as gas, electricity, oil
- Authorities (energy regulators or competition authorities) focus often on monitoring competition and preventing market abuse
- In some cases, ex-ante regulation applied when the potential competition for district heating from other fuels is limited

Regulatory procedures and arrangements

- In terms of coordinating and planning of district heating, strong role of national or regional/ local authorities
- Positive experiences with the involvements of municipalities and local governments

Policy support

- Multiple governments have implemented incentive schemes targeting the environmental benefits of district systems
- Various methods applied such as CHP support schemes, concessions, grants, subsidies, favourable loan terms for district heating investments

Hydrogen

Need of regulation

- Transportation of hydrogen via existing natural gas or dedicated pipelines is a regulated activity
- Hydrogen transportation will happen via natural gas pipelines. Dedicated pipelines may be constructed at a later stage.
- Possible tasks of regulators include:
  - Adjustment of norms on blending of hydrogen in gas pipelines
  - Steer technology roll-out (time and targeted penetration)
  - Design of fully fledged access arrangements and network codes (later stage)
  - Involvement of network operators in contestable businesses
    - There might be individual cases where regulators will need to look at the potential benefits from integration of P2G installations in the regulated network assets, particularly when the installations and their direct control have an essential role for the secure network operation.

Biomethane

Need of regulation

- Network integration of biomethane important
- Regulators should set clear connection rules including connection charges and technical connection requirements
- Responsibility for setting standards for product quality norms and metering requirements
- May consider setting additional commercial quality standards to network operators, for example maximal time to connect biogas plants after connection application
- May consider specific incentives for parties injecting biomethane into the gas grid in the form of reduced entry tariffs and connection charges

Regulatory Incentives for Innovation and Decarbonisation

Investment in innovation and decarbonisation is happening in Europe

Explicit investment incentives

- Key objective is to encourage investment in innovative projects

Examples

- Examples from regulatory jurisdictions in Europe
- Schemes used by regulators

Specific schemes

- Explicit allowances
- Depreciation policy
- Cost of capital (WACC)

Regulatory Incentives for Innovation and Decarbonisation

Innovation / Definition

- Innovation can be defined simply as a "new idea, method or product”
- Typically the criteria applied in practice:
  - Focus on either new technology or the application of technologies that have not yet a long use record
  - Relate to products/ technology which are not widely used commercially or are in initial stages of demonstration

Regulatory Incentives for Innovation and Decarbonisation

Funding for innovation as part of the regulatory framework (UK)

- In recent years, energy regulators have recognised the need for promoting innovation and incorporated specific innovation mechanisms
- Great Britain: Innovation as part of an "innovation stimulus":
  - Network Innovation Allowance (NIA) and the Network Innovation Competition (NIC)
  - The Network Innovation Allowance (NIA) is a set annual allowance that allows the regulated network operators a funding opportunity of 0.5-1% of revenue to be spent on innovation projects
  - The NIA funds smaller scale research, development and demonstration projects and can cover different types of innovation, including commercial, technological and operational
  - The NIC is based on annual competition to fund innovative projects which could deliver carbon or environmental benefits for gas customers, and that would not be implemented without this additional funding

Regulatory Incentives for Innovation and Decarbonisation

Funding for innovation as part of the regulatory framework (UK)

- The regulated network company must apply to regulator (Ofgem)
- The application must demonstrate that the proposed innovation project meets eligibility criteria. Projects must have a direct impact on the gas network and include one of the following:
  - A specific new (unproven) piece of equipment (including control and/or communications systems and/or software)
  - A specific novel arrangement or application of existing equipment including control and/or communications systems and/or software)
  - A specific novel operational practice directly related to the operation of the gas transportation system
  - A specific novel commercial arrangement
- The projects must also ensure that they offer
  - Potential to develop new learning
  - Potential to deliver net financial benefits to the customer
  - Without leading to unnecessary duplication

Regulatory Incentives for Innovation and Decarbonisation

Examples for areas of innovation

- Examples
  - Possibility to supplying bio-methane through existing gas networks
  - Supplying low carbon hydrogen through the existing gas distribution network and conversion of the low-pressure gas networks to supply hydrogen to homes, buildings and industry instead of natural gas
  - Using P2G technology to turn renewable electricity to gas for use in the existing gas networks
- Illustrative qualification criteria
  - A new or unproven technology or operational practice directly related to the gas network
  - Should relate to the research and development of technologies and practices (biogas, CNG/LNG or hydrogen) that could help to achieve decarbonisation targets

Regulatory Incentives for Innovation and Decarbonisation

Funding schemes (Examples)

- **Ireland**
  - The current price control from 2013-2017 an allowance of €8m was allowed for innovation opex funding, of which €7.2m was allocated to gas transmission and €0.8m to distribution
  - Innovation funding has focused on the roll out of CNG for use in the transport sector, bio gas and research grants
  - In its most recent decision for the upcoming price control (Oct 2017-2023), an innovation allowance of up to €20.0 m approximately 1% of allowed revenue has been allocated
  - Five principle areas of innovation funding was allocated to CNG, biogas, research, business/ technical and programme management services
  - This innovation funding is treated as a pass-through cost item and is not part of the efficiency requirement
- **France**
  - The French Energy Regulatory Commission (Commission de régulation de l'énergie - CRE) introduced in its current gas transmission price control (started 2017) an incentive regulation mechanism for research and development (R&D) expenditure

Regulatory Incentives for Innovation and Decarbonisation

Funding schemes (Examples)

- **WACC Premium**
  - The Italian regulator (AEEG) allows an additional return over its 'base' return (WACC premium) for certain types of investments in the gas transportation network
  - This additional return is limited to a certain number of years
  - The objective is to encourage development and expansion of the network, and import capacities
  - Similarly in France, in its previous price control (2009-2013), CRE allowed an additional 3% investment premium for a period of ten years for projects investments that serve to create new shipping capacity on the main network or to reduce the number of balancing zones

➢ These examples of the WACC premium are not directly linked to investments for innovation and or decarbonisation type projects

Regulatory Incentives for Innovation and Decarbonisation

Suggestions

- Innovation and decarbonisation incentives can be incorporated into the regulatory framework by using special allowance
- The allowance would be based on a proportion of the allowed revenues. This could be applied for smaller scale research and development projects that qualify for the allowance
- The regulated companies would need to apply to use the allowance and present their projects and the potential benefits
- Regulators may also consider to use depreciation rates (shorter asset life) and cost of capital (WACC premium) to support specific investments

Thank you!

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