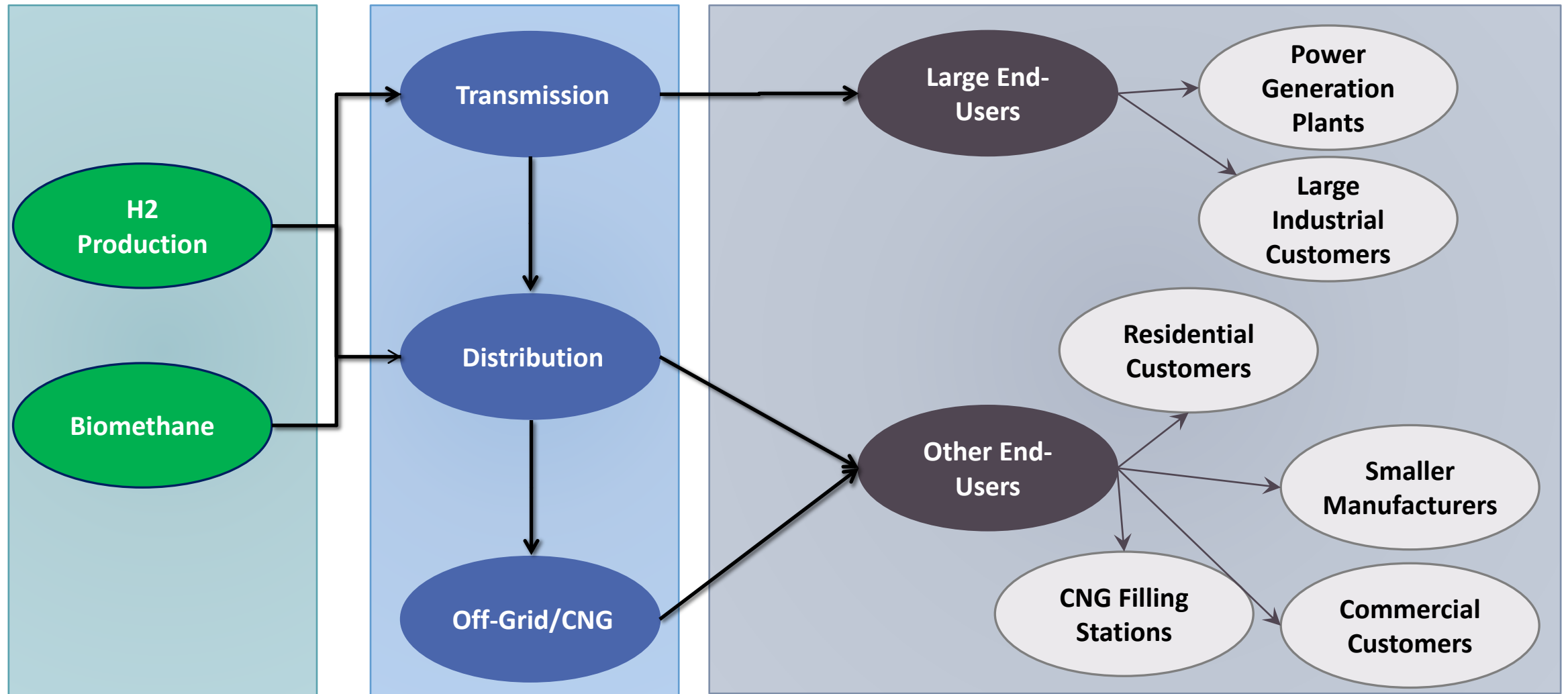


# Presentation of EU experience: support schemes and regulation

KATERINA SARDI AND PANTELIS CAPROS



# New-gas supply/demand chain



# National biomethane (and hydrogen) support schemes implemented in the EU

Production	Transportation	Consumption
<ul style="list-style-type: none"> <li>• Direct financial support</li> <li>• Earmarked amounts for capex support to projects allocated through a competitive process</li> <li>• Grants</li> <li>• Reduced lending rates</li> <li>• Reduced income tax</li> <li>• FiT for a certain period (e.g. 12-15 years)</li> <li>• FiP (constant base and a variable part linked to the local gas hub price.</li> <li>• Guarantees of Origin/Certificates</li> </ul>	<ul style="list-style-type: none"> <li>• Zero or reduced costs of network connection</li> <li>• Priority of network access</li> <li>• Priority in operation (network injection)</li> <li>• Favourable balancing rules</li> <li>• Transparency in connection procedures</li> </ul>	<ul style="list-style-type: none"> <li>• Financial support for: <ul style="list-style-type: none"> <li>○ Buses and heavy-duty vehicles</li> <li>○ Fuel stations</li> <li>○ Faster depreciation support for heavy duty vehicles</li> </ul> </li> <li>• Tax exemptions or additional taxes for non-green fuels <ul style="list-style-type: none"> <li>○ Fuel tax, vehicle tax, CO2 tax</li> <li>○ Income tax</li> </ul> </li> <li>• Carbon Contracts for Difference (CCfDs) in the industrial sector</li> </ul>



Cost of FiT, FiP schemes borne by state taxes, sale of guarantees of origin

# Drivers for new-gas penetration

- Specific national targets for a certain percentage of gas demand to be met by new gases in the short/midterm (5-10 years). Mandatory quotas on consumption:
  - Renewable fuel
  - Renewable heat
  - Renewable electricity
  - Specific goals for public transport
- National hydrogen targets directed to different sectors of the economy providing for a combination of tools and benefits
- Earmarked projects and commitments for penetration e.g. a certain number of H2 powered vehicles by 2030
- Mandatory new gas % in the mix of gas supplied
- Gas disclosure obligations upon suppliers
- Sectoral commitments for CO2 reductions.

# Examples of FiT & FiP for electricity and biomethane production in EU

Country	"Green" tariff for electricity	Tariff for biomethane
<b>Austria</b>	<ul style="list-style-type: none"> <li>Basic biogas tariff <b>0.156 – 0.186 €/kWh</b> + bonus for biogas enrichment <b>0.02 €/kWh</b></li> </ul>	-
<b>Denmark</b>	-	<ul style="list-style-type: none"> <li>Premium up to natural gas price, biomethane end tariff up to <b>0.0780 €/kWh</b></li> </ul>
<b>France</b>	<ul style="list-style-type: none"> <li>Only "green" tariff for biogas for electricity <b>0.150 – 0.175 €/kWh</b></li> </ul>	Premiums depending on type of gas <ul style="list-style-type: none"> <li>Biomethane from landfill: <b>0.045 – 0.095 €/kWh</b></li> <li>Agricultural biomethane: <b>0.085 – 0.125 €/kWh</b></li> <li>Sewage: <b>0.065 – 0.135 €/kW/year</b></li> <li>Calls to tender with price trajectory, of <b>€ 67/MWh HHV</b> for the injected bio methane projects in 2023 and <b>€ 60/MWh HHV</b> in 2028 (cap of a maximum purchase price trajectory of <b>87 €/MWh</b>)</li> </ul>
<b>Germany (until 2014)</b>	<ul style="list-style-type: none"> <li>Basic tariff for biogas plus bonuses for biogas enrichment:               <ul style="list-style-type: none"> <li>Biogas: <b>0.134 – 0.237 €/kWh</b> + bonus for biomethane: <b>0.03 €/kWh</b></li> </ul> </li> </ul>	-
<b>Italy</b>	-	<ul style="list-style-type: none"> <li>Premium up to natural gas price, biomethane end tariff: <b>0.044 – 0.087 €/kWh</b></li> </ul>
<b>Netherlands</b>	-	<ul style="list-style-type: none"> <li>SDE++ scheme: division into 5 categories:               <ul style="list-style-type: none"> <li>Tariff from <b>70 – 300 €/ton CO<sub>2</sub> reduced</b></li> </ul> </li> </ul>
<b>United Kingdom</b>	<ul style="list-style-type: none"> <li>Green tariff for biogas/biomethane over market price for electricity: <b>0.100 – 0.116 €/kWh</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Premium up to natural gas price</b>, biomethane tariff by groups:               <ul style="list-style-type: none"> <li>T1: <b>0.055 €/kWh</b> (for the first 40,000 MWh)</li> <li>T2: <b>0.032 €/kWh</b> (for the following 40,000 MWh)</li> <li>T3: <b>0.025 €/kWh</b> (for the remaining biomethane)</li> </ul> </li> </ul>

# Case Study 1: Denmark (1/2)

Support Scheme Category	Description
Current Feed-in-Premium Scheme for biomethane injected into the natural gas grid	<ul style="list-style-type: none"> <li>• <b>Three Feed-in-Premiums:</b> <ol style="list-style-type: none"> <li>a) <u>Base subsidy</u> serving as a base which the biomethane plant's owner is certain to receive in the future It was set at 0.038 €/kWh in 2013, while the price is regulated annually with 60% of the change of the consumer price index. The tariff for 2018 was estimated at 0.039 €/kWh</li> <li>b) <u>Temporary subsidy</u> for the rapid initiation of biogas projects The subsidy was set at 0.005 €/kWh in the beginning of 2016 with an annual reduction of 0.001 €/kWh until the end of 2019 when it was phased out (0 €/kWh)</li> <li>c) <u>Gas price adjusted subsidy:</u> It is comprised of a base subsidy of 0.013 €/kWh plus the difference among 0.026 €/kWh and the average natural gas price of the previous year on Gaspoint Nordic</li> </ol> </li> <li>• The current subsidies for biogas production from existing plants are guaranteed until 2032, or at least 20 years after their commissioning</li> </ul>
Earmarked amounts for capex support to projects allocated through a competitive process	<ul style="list-style-type: none"> <li>• Promotion of the use of biogas and other green gases for upgrading (biomethane), transport and industrial processes through the adoption of the new Energy Agreement on 29<sup>th</sup> June 2018</li> <li>• New biogas plants will be allocated subsidies <u>on a tender based principle</u> with price ceilings since 2021, a <u>pool € 32 million/year</u> is set aside for 20 years from 2021, the tenders for the pool will be put forward in 2021-2023, a part of the pool will be reserved for ecological biogas</li> </ul>

# Case Study 1: Denmark (2/2)

Support Scheme Category	Description
<b>Tax exemptions</b>	<ul style="list-style-type: none"> <li>• Biogas in Denmark is exempted from CO2-taxes</li> <li>• Biomethane injected into the grid is tax wise regarded as natural gas and taxed with CO2 and energy taxes</li> </ul>
<b>Biomethane certificates</b>	<ul style="list-style-type: none"> <li>• Issuance of certificates to the Danish biogas producers injecting biomethane into the gas distribution or transmission system</li> <li>• Sale of the certificates to the gas suppliers allowing them to document to the gas consumers that renewable gas has been injected into the gas grid</li> <li>• Voluntary agreement since 2011 to include all the RES-gasses, but the process is currently running only for biomethane</li> <li>• Energinet (national TSO for electricity and gas) is responsible for the registration and the issuance of the certifications and each certificate represents (according to article 19 of RED II)</li> </ul>
<b>Biofuels use</b>	<ul style="list-style-type: none"> <li>• <b><u>Minimum requirement of 5.75% of biofuels</u></b> share in the fuels sold for transportation on land</li> <li>• Biomethane mixed in natural gas is included in these biofuels</li> <li>• Utilization of the biomethane certificates for the documentation of the share of biofuels</li> <li>• Most Danish biomethane plants are certified to produce RED II compliant sustainable biomethane for use in transport under biofuel quotas</li> </ul>

# Case Study 2: France (1/3)

- The French “Energy Transition for Green Growth Act (LTECV)” effective from August of 2015 **includes the target of 10% biomethane in the grid by 2030**. Medium-term targets for the production of injected biomethane is estimated at 8 TWh for 2023 and 14-22 for 2028.
- To promote penetration the plan foresees **two calls to tender**, for an annual production objective of 350 GWh HHV/year each, to be launched each year.
- The Clean Mobility Development Strategy (SDMP) defines a further number of drivers :
  - Low-emission vehicles for upgrading public and private fleets,
  - Alternative fuel distribution infrastructures including gas and hydrogen stations,
  - Investment support in clean heavy-goods vehicles through a strengthened additional depreciation scheme for natural gas heavy-goods vehicles until 2021,
  - **Increases in the diesel tax rate for the transport of goods by road**,
  - Continuous development of hydrogen recharging stations and regional hydrogen mobility ecosystems, in particular through fleets of commercial vehicles:
    - 5,000 light commercial vehicles and 200 heavy vehicles (buses, lorries, regional trains, boats), as well as the construction of 100 stations supplied with locally produced hydrogen by 2023,
    - 20,000–50,000 light commercial vehicles, 800–2,000 heavy vehicles and 400–1,000 stations by 2028



## Case Study 2: France (2/3)

Support Scheme Category	Description
<b>Current Feed-in-Tariff Scheme for biomethane injected into the natural gas grid</b>	<ul style="list-style-type: none"> <li>The level of support consists of 2 administrative incentives depending on the capacity of the installations and the type of the feedstock: <ul style="list-style-type: none"> <li><b>a) a basic reference tariff:</b> <ul style="list-style-type: none"> <li>non-hazardous waste storage facilities: 0.045 – 0.095 €/kWh</li> <li>other types of installations: 0.064 – 0.095 €/kWh</li> </ul> </li> <li><b>b) a feedstock premium:</b> <ul style="list-style-type: none"> <li>municipal waste and household waste: 0.005 €/kWh</li> <li>intermediate crop products and waste or residues from agriculture, forestry, agribusiness or other agro-industries: 0.02 €/kWh – 0.03 €/kWh</li> <li>wastewater treatment: 0.001 €/kWh - 0.039 €/kWh</li> </ul> </li> </ul> </li> <li>Support period: 15 years</li> </ul>
<b>Guarantees of Origin (GOs)</b>	<ul style="list-style-type: none"> <li>Designed to work alongside the biomethane FiT</li> <li>Certification that the gas has been produced from RES</li> <li>One GO is equivalent to a biomethane producer injecting 1 MWh of biomethane into the grid</li> <li>Traceability of biomethane and guarantee that transactions between suppliers and users is ensured through national GO register</li> </ul>

## Case Study 2: France (3/3)

Support Scheme Category	Description
<b>Investment Aid</b>	<ul style="list-style-type: none"> <li>• Biogas producers can receive subsidies from: <ul style="list-style-type: none"> <li>○ the French Environment &amp; Energy Management Agency (ADEME), and</li> <li>○ the local authorities</li> </ul> </li> <li>• Investment aids are between 20% - 30% of capital costs</li> <li>• Subsidies represent more or less 10% of the investment, bank loans (and sometimes crowdfunding) being heavily used at 70%, and the rest made up by own financing from the plant owner(s)</li> <li>• The grid connection investment costs were borne by the first producer to ask for the new connection to be made by November 2019. A new scheme is enforced under which other ongoing projects are considered to share the cost between them, while the grid operator takes 40% of the cost since 2018</li> <li>• Incentives for the purchase of clean vehicles</li> </ul>
<b>Tax exemption</b>	<ul style="list-style-type: none"> <li>• Biogas projects are exempted from local taxes</li> </ul>

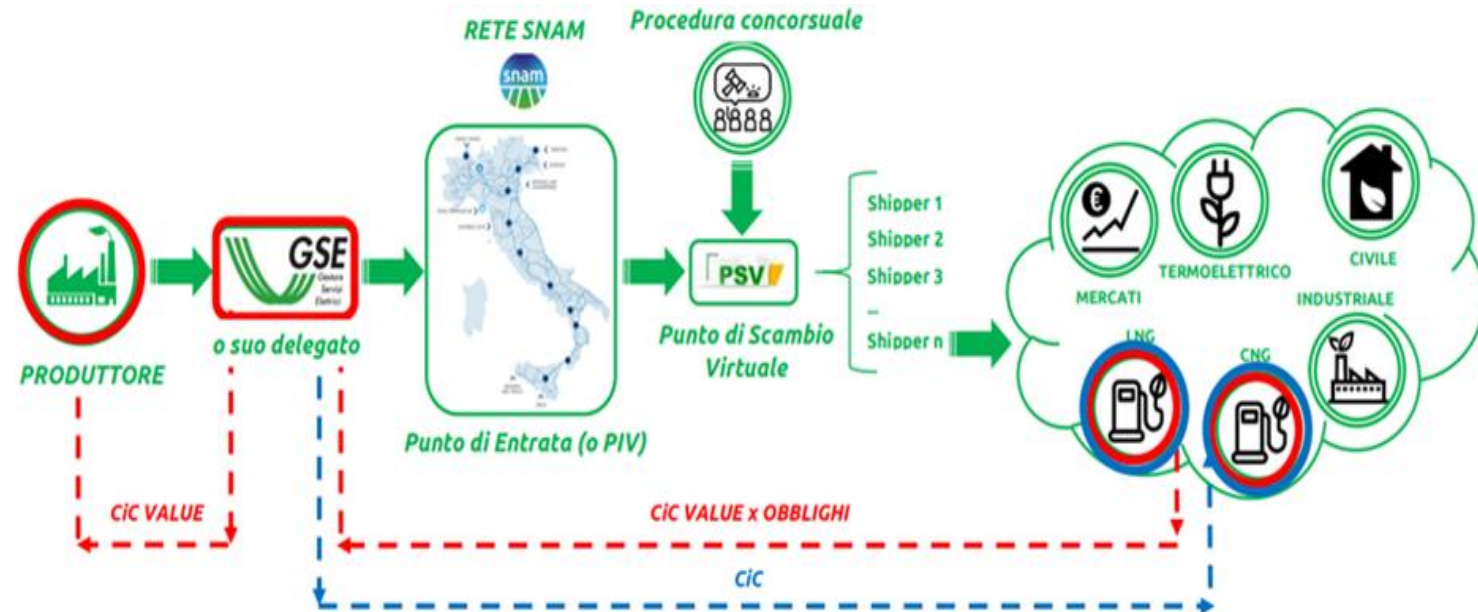
## Case Study 3: Italy (1/3)

- A Decree for the promotion of the use of biomethane and other “advanced” biofuels in the transport sector was signed in 2018 (“Biomethane” Decree)
- With the “Biomethane” Decree, Italy set the objective for a 10% share of consumption in the transport sector to be derived from renewable energy by 2020 and a sub-target for 0.9% and 1.85% for “advanced” biomethane and other “advanced” biofuels by 2020 and 2022 respectively
- The Decree allocates funds of €4.7 billion to installations, new and existing ones undergoing upgrades to biomethane and becoming operational by 2022 at the latest:
  - A maximum annual production of 1.1 bcma is covered (for comparison current Italian indigenous production of conventional gas is around 4.5 bcma, while the annual national gas consumption exceeds 70 bcma)
  - Gas retailers are obliged to include biofuels in their offer and show a preference to biofuels produced in the national territory

## Case Study 3: Italy (2/3)

**The current biomethane promotion scheme in the transport sector is well established and clear depending on the allocation of the “CIC” Certificates (Certificati di Immissione in Consumo di biocarburanti)**

- “CICs” are issued by GSE to biomethane producers and bought by suppliers of transport fuels subjected to a mandatory blending quota for biomethane determined annually
- For the first 10 years of operation, a biomethane producer can decide to sell the amount of CICs produced to GSE obtaining the DA gas market price as traded in the Italian energy exchange GME minus 5%
- CICs: An additional premium of 44 €/MWh for biomethane or 87 €/MWh for “advanced” (as provided in RED II) biomethane is obtained by producers
- The producers can alternatively decide to trade directly their biomethane obtaining only the premium
- Following the 10-year period, producers have access to the ordinary method of valuing CICs through the private sale to parties

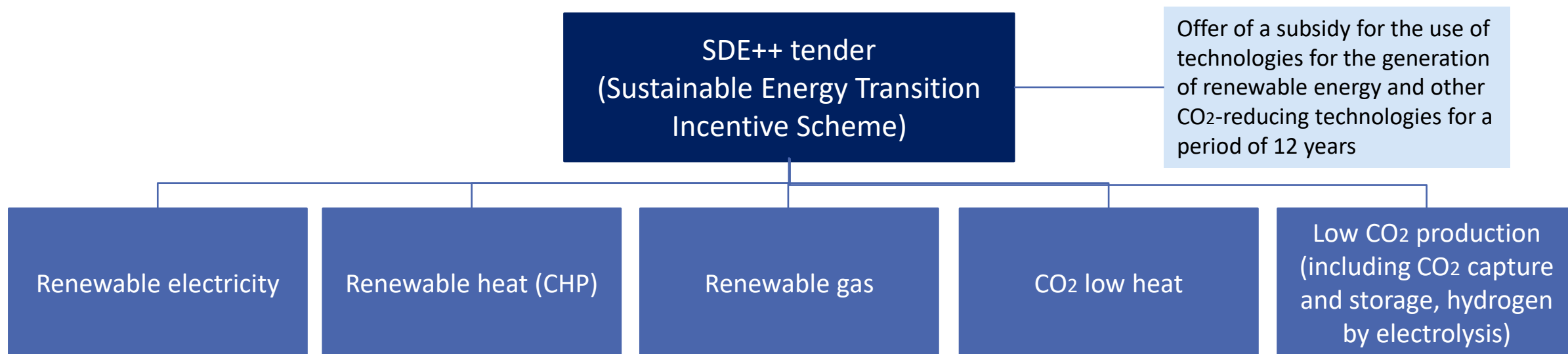


- The current framework also stipulates for biomethane to be ultimately sold in a virtual point: This can be the case for the plants connected to the distribution network where biomethane, for commercial purposes, may be considered as delivered at a virtual entry point (PIV) of the gas pipeline network operated by the TSO Snam Rete Gas and subsequently sold to downstream suppliers at the virtual trading point of Snam Rete Gas (PSV) either by a bilateral transaction or through the organized gas market of GME

## Case Study 3: Italy (3/3)

Additional Support Schemes	Description
<b>Infrastructural Development Support</b>	<ul style="list-style-type: none"> <li>• Support of the development of the biomethane system through the introduction of an increased number of CICs for the construction of new filling station for bio-CNG or bio-LNG forms</li> <li>• If the biomethane producers sustain a certain share of the infrastructural cost of a new filling station (at least 51 % individually or together with other producers), this will result in an increase in the allocated CICs by a factor of 20% to 70% of the cost of the entire construction with a maximum value of € 600,000 per CNG filling station or € 1,200,000 per LNG filling station</li> </ul>
<b>Guarantees of Origin (GOs)</b>	<ul style="list-style-type: none"> <li>• GOs for biomethane injected into the natural gas grid are issued for biomethane not meant to be used in the transport sector and not receiving the support through CICs certificates</li> <li>• GOs concerning a limited portion of the biomethane's production (produced from certain animal, food, agro, and industrial by-products)</li> <li>• GOs may be also used by participants in the EU ETS towards reducing their obligations to counterbalance their emissions through EU Emission Allowances (EUAs) as provided by Regulation (EU) 601/2012 concerning monitoring and reporting of GHG emissions</li> </ul>

## Case Study 4: The Netherlands – SDE++



- The scheme compensates the “unprofitable top” of the technology’s categories, i.e. the difference between the cost price of the technology that reduces the CO<sub>2</sub> (the “base amount”) and the market value of the product that the technology produces (the “correction amount”)
- The “base amount” is determined for the entire duration of the grant, while the “correction amount” is determined annually and it is adjusted if the market value raises leading in such way to a lower received subsidy
- **A budget of € 5 billion for the SDE++ tender will be opened from 24.11.2020 to 17.12.2020 through 4 phases:**
  - The projects are ranked based on the tender amount submitted in €/ton CO<sub>2</sub> whereas the tender amount is divided by a CO<sub>2</sub> emission factor when ranking,
  - Fixed maximum tender amount during the four phases: Phase 1 - 70 €/ton CO<sub>2</sub>, Phase 2 – 85 €/ton CO<sub>2</sub>, Phase 3 – 180 €/ton CO<sub>2</sub>, Phase 4 – 300 €/ton CO<sub>2</sub>

# Case Study 4: The Netherlands – Support Schemes for Hydrogen (Hydrogen Strategy)

## Applied research and innovative pilot projects

- The Energy Innovation Demonstration Scheme “DEI+” is supporting innovative pilot projects (research & development) in the field of hydrogen
- A subsidy of 25%-45% of the eligible costs and a ceiling of € 15 million per project depending on the company’s size is provided
- Utilization of the Mission-oriented Research, Development and Innovation Scheme “MOOI” for the promotion applied research and development of hydrogen’s production through tenders

## Scaling up through new, temporary operating cost support

- Facilitation of the transitional period among the demo and the roll-out phase by making use of the existing Climate Budget funds available for temporary operating cost support as of 2021
- Rearrangement of a part of the existing funds for hydrogen pilot projects : € 35 million per year are expected to be allocated for investments for the scaling-up process of hydrogen’s projects.
- This new allocation of existing funds is complementary to the DEI+, HER (renewable energy subsidy module) and the SDE++
- Potential state aid framework (e.g. the possible extension of the state aid for projects of European common interest - IPCEI) is under examination

## Roll-out

- Support of the hydrogen production by electrolysis for the first time from November 2020
- Electrolysis production, as well as CO2 capture and storage for the production of blue hydrogen can compete in the CCS category of the scheme



# Case Study 5: Germany (1/4)

**The incentive scheme for the biomethane's utilization is different depending on the specific sectors**

## Electricity production

- “Renewable Energy Law (EEG)”:
  - Biomass projects bid in separate per technology public auctions organised and monitored by the Federal Network Agency where the bids must be specified in €/ct/kWh:
    - capacity thresholds for technology deployment are stipulated for the control of the capacity volumes commissioned each year (150 MW for 2017-2019, 200 MW for 2020-2022), whereas the capacity of the new biomass installations must be at least 150 kW,
    - the proportion of cereal grain kernels and/or maize used to produce biogas must be at most 50% in 2017-2018, 47% in 2019-2020 and 44% in 2021-2022
  - The Federal Network Agency sorts the bids in ascending order and awards the market premium to the lowest bidders. The premium is only paid for 50% of the bid quantity and the maximum bid decreases yearly by a rate of 1%. The cost of the market premium is borne by the final consumers
- “Combined Heat and Power Act (KWKG)”:
  - Increase of the electricity generation from CHP plants, supporting the launch of the fuel cells’ technology and funding for the construction and expansion of the heating and cooling systems
  - Eligibility period for CHP plants larger than 50 kW with 30,000 full load hours and 60,000 full load hours for a size of up to 50 kW



# Case Study 5: Germany (2/4)

**The incentive scheme for the biomethane's utilization is different depending on the specific sectors**

## Heat generation sector

- **“Renewable Energy Heat Act (EEWärmeG)”**:
  - Definition of the target of meeting 14% of the heat market demand with RES by 2020,
  - The usage of biomethane for the heat supply of buildings will be recognized as a way of increasing the renewable energy's share only in case its application is in CHP units

## Transport

- **“Biomass Sustainability Ordinance”**:
  - Definition of the requirements regarding the sustainable generation of biomass to be applied as biofuel,
- **“Biofuel Quota Act”**:
  - Introduction of a GHG biofuel quota of 6% of GHG reductions from 2020 onwards,
  - Biofuels that are counted within the quota are fully taxed

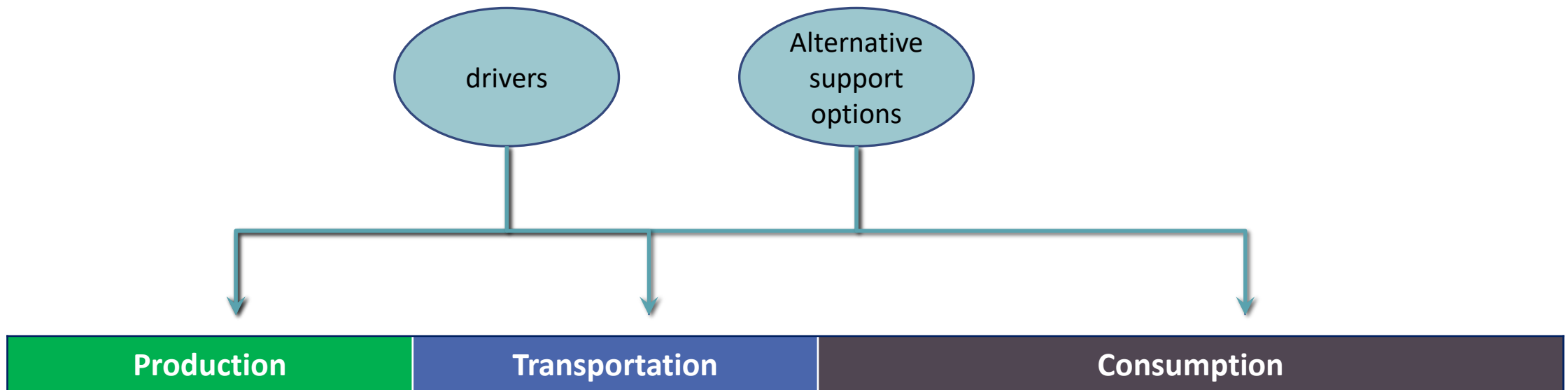
# Case Study 5: Germany (3/4)

- Additional Support Schemes:
  - **Investment support:** The Federal Government has launched a wide range of funding - Financial subsidy through the Market Incentive Program (Marktanreizprogramm – MAP) and further support programs of the public bank KfW and the “Energy Saving Ordinance”
  - **Grid connection investment costs:** The costs for the biomethane injection into the gas grid will be shared between the plant operator and the gas grid operator in the proportion 25%/75% respectively
  - **Tax reduction for biomethane:**
    - 5.50 €/MWh for power generation (i.e. CHP units) and heat production (i.e. boilers),
    - 13.90 €/MWh for the usage of biomethane as a transportation fuel until 31.12.2023. increasing to 31.80 €/MWh onwards,
    - in case of biomethane being used for the heat supply of the production industry and of the forestry and agricultural sector, stakeholders can apply for energy tax reduction.

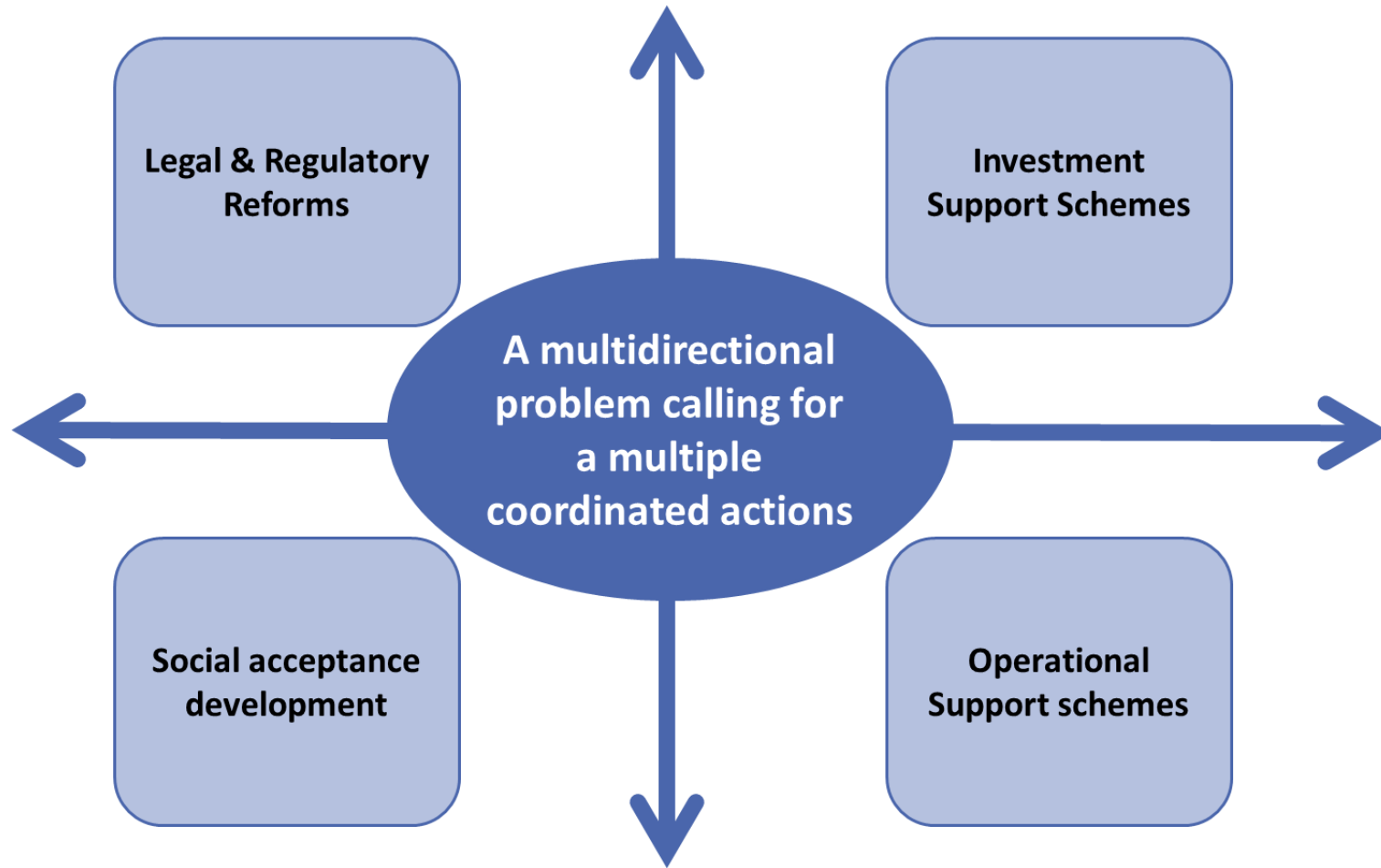
## Case Study 5: Germany (4/4)

- The German government aims at the green production of steel through the use of hydrogen and issued an action plan for a strong steel industry in Germany in July 2020. The action plan was developed with the cooperation of industry stakeholders and the Federal Ministry of the Economy and Energy
- In order to accelerate and facilitate the climate friendly development of industrial processes in steel and chemical industries, among other measures, a pilot process for **Carbon Contracts for Difference (CCfDs)** has been initiated
- Through the CCfDs, an agreement is concluded between the state and the company. The state guarantees a defined CO<sub>2</sub> price, whereas the company commits to reduce its emissions based on the agreed amount in the contract, via investments in innovative technologies.

EU experience shows that new-gas penetration shall be the result of a combination of drivers and support schemes across the value chain.



# Recommendations for Greece



# Driver 1 : Specific national targets for a certain percentage of gas demand to be met by new gases in the short/midterm (5-10 years)

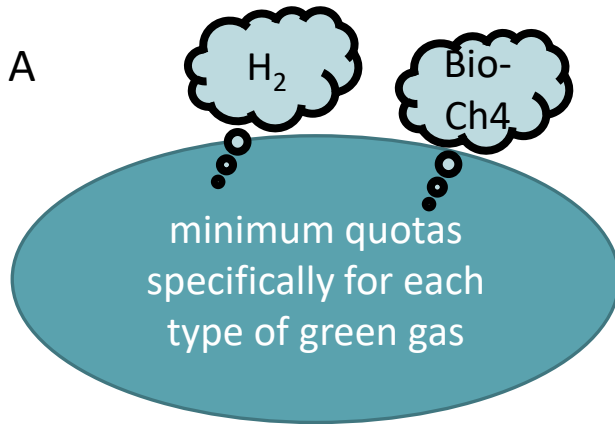
- The National Energy and Climate Plan of Greece and the Long-Term strategy set out targets for biomethane

Projected consumption of natural gas and new-gases in the demand sector							
Demand [ktoe]	2030	2050					
	NECP-2030	NECP-2030	NECP-2050	EE2	NC2	EE1.5	NC1.5
Natural gas	1,668	1,723	1,851	1,192	648	351	42
Synthetic Methane	0	0.16	0	0	913	0	1,143
Hydrogen	0	2	120	103	542	116	916
Biogas	14	28	326	408	452	238	463

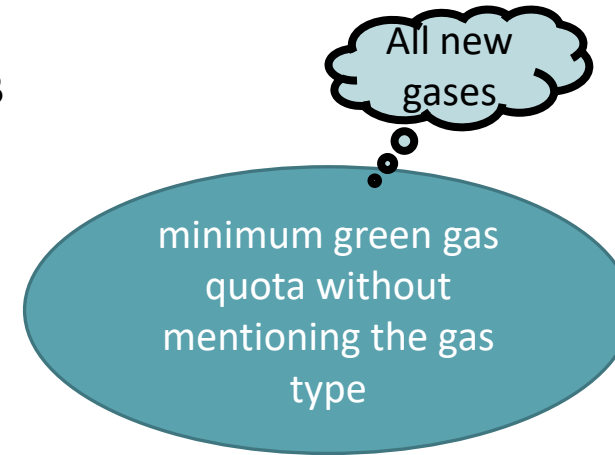
- A new-gas penetration target specifically for biomethane seems relevant particularly in the context of other actions for regional development in the areas affected by lignite decommissioning.
- It may be too early in time to consider a more ambitious target for hydrogen. It is recommended that Greece follows developments at European level in the context of the EU Hydrogen strategy and re-evaluates the scope of a specific hydrogen target in 2021-2022 following the review of the European legal framework.
- A national target is not enough to initiate a new market. Further detailed design is necessary**

## Driver 2a : Blending mandates (“quotas”) – Types

Case A



Case B



Incentivises efficient upstream investments as quotas for each gas are clear.  
Biomethane technologies are reasonably mature and a biomethane quota can be defined

Technology neutral

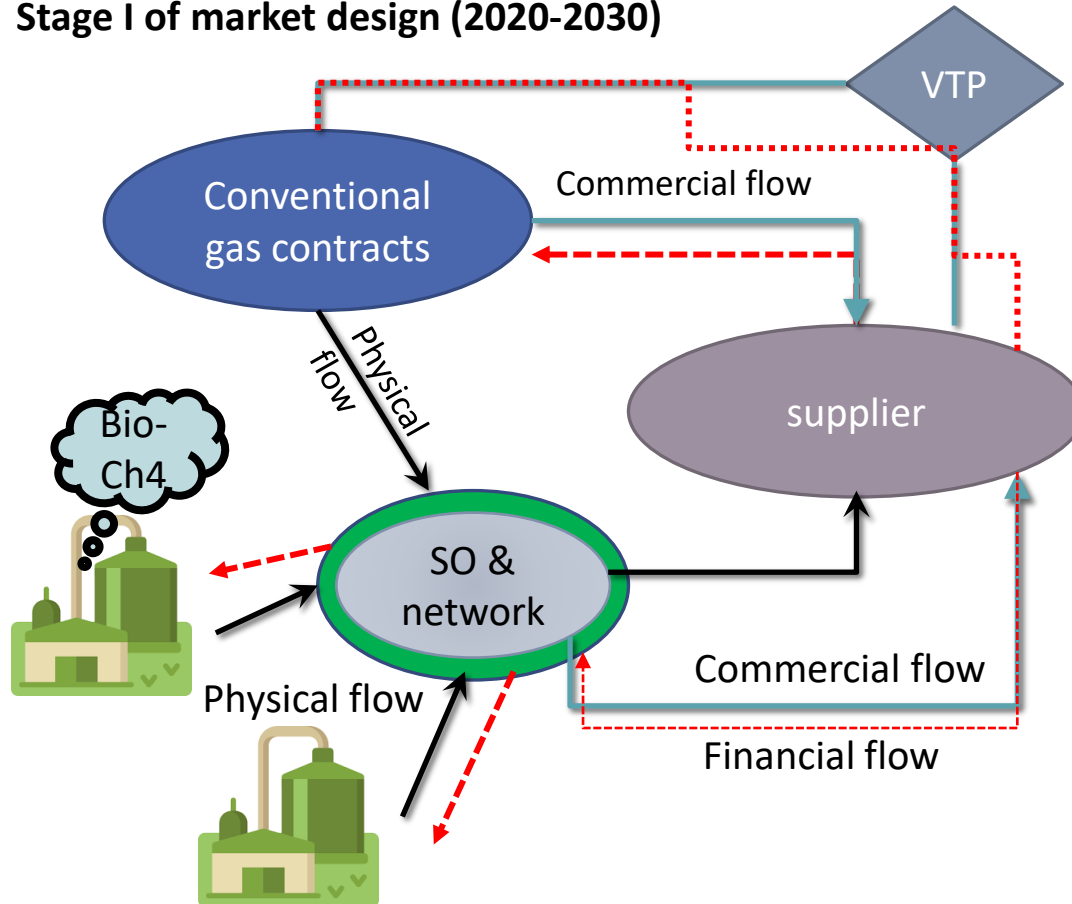


Non technology neutral

Detailed tracking is required  
May create uncertainties on potential producers as the amount of certain gas of a certain type to be accepted is uncertain

## Driver 2b : Blending obligations at early stage

### Stage I of market design (2020-2030)



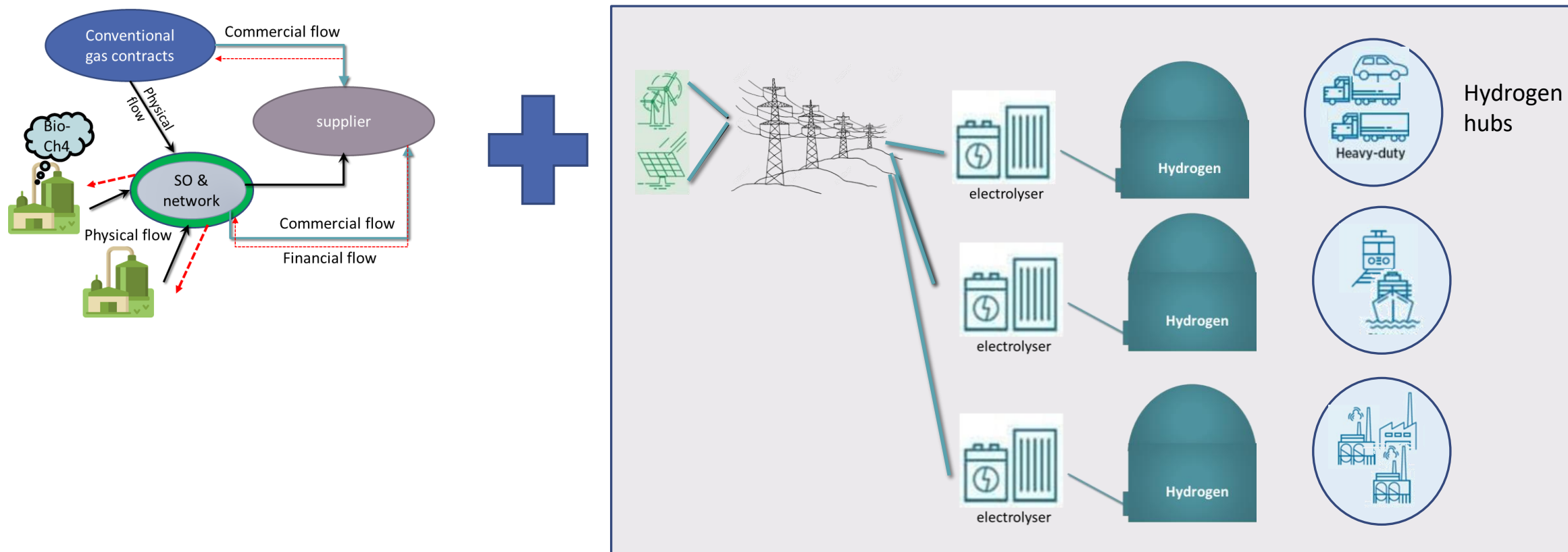
- The DSO acts as a facilitator to the actual new-gas transaction (if not under unbundling obligations, the DSO would act as an equivalent of a single buyer).
- Gas sourcing under a negotiation process may have drawbacks (monopsony power, bargaining power)
- National-wide auctions for biomethane feed in premium tariffs may be better (e.g. auctions by RAE)



On-grid  
demand

## Driver 2c : Regular adjustments in obligations and gases

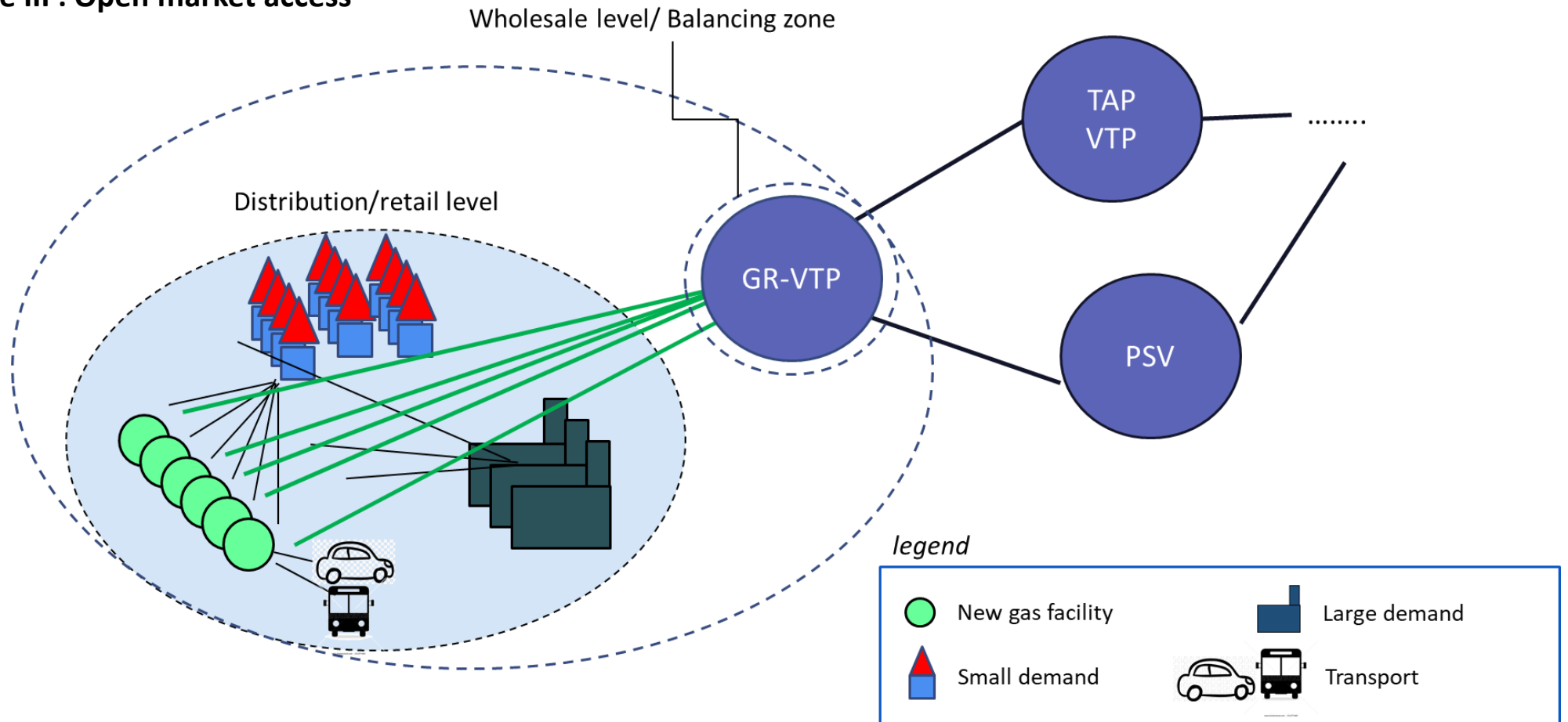
Stage II of market design 2030 -> Stage I + hydrogen hubs to supply to concentrated markets in transport refueling, industry



On-grid  
demand

# Driver 2d : Regulation is gradually adjusted to represent a full functional market with new gases

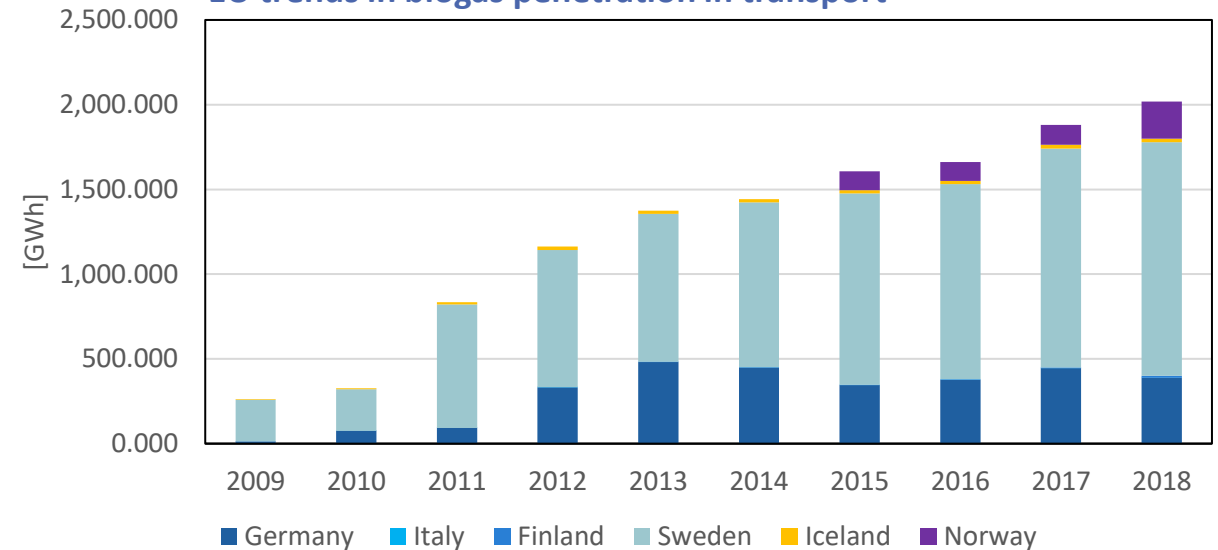
## Stage III : Open market access



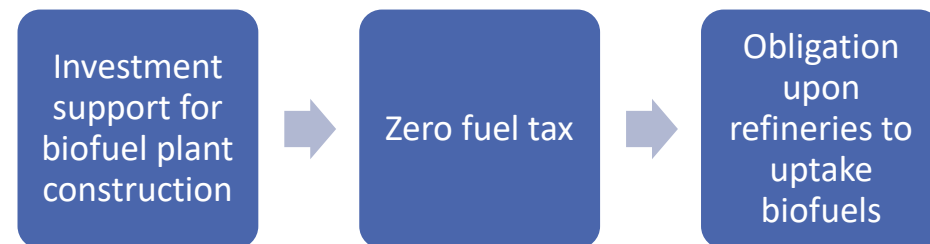
## Driver 3 : Mandatory new-gas percentages in the mix of gas for transport and mandatory commitments for uptake

- Experience from the introduction of biofuels and mandatory mixing obligations with conventional gasoline and diesel for transport may be considered.
- The use of biomethane for transport as well as hydrogen in refineries as foreseen under RED II for the fulfilment of the RES quota obligation on transport fuel suppliers should be considered.

EU trends in biogas penetration in transport



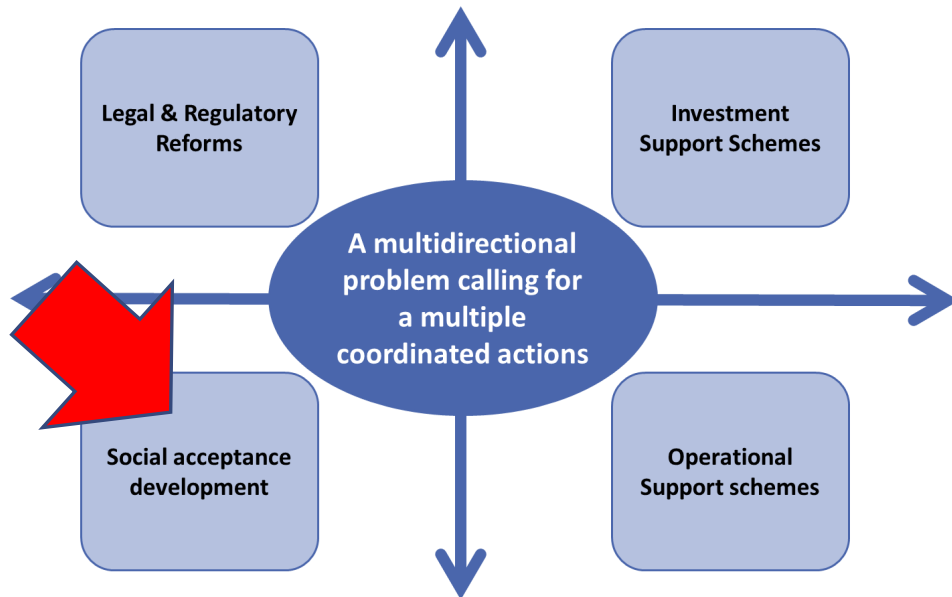
(2018 data, Eurostat)



- With the exception of Sweden and Norway current penetration of biogas in most MS is negligible until now. About 20% of all biogas in transport is due to Germany but no increasing trends are observed.
- It is expected that penetration shall increase in the coming years due to the implementation of the 'captive fleet' method (H2 recharging stations and vehicles) -

## Driver 4 : Gas disclosure obligations

- New-gas injection in transmission/distribution shall require a fuel disclosure obligation upon suppliers and a guarantees of origin mechanism in place.
- A fuel disclosure obligation shall also build an environmental conscience upon consumers



### Gas Infrastructure Group

Lowering our customers' carbon footprint



#### Renewable Natural Gas (RNG)

##### What is RNG?

Waste methane from hog and dairy farms, food waste, landfills and wastewater treatment

##### Around-the-Clock Renewable Energy

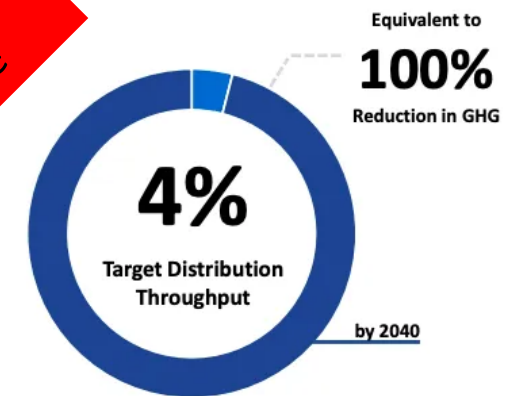
RNG generates 24/7 on-demand energy to reliably serve customers

#### Incentivizing RNG use

- Established Tariff to allow RNG at CNG fueling stations
- Prepared "GreenTherm" Tariff to allow customers to choose RNG
- Assigned key account reps to attract RNG developers and educate customers



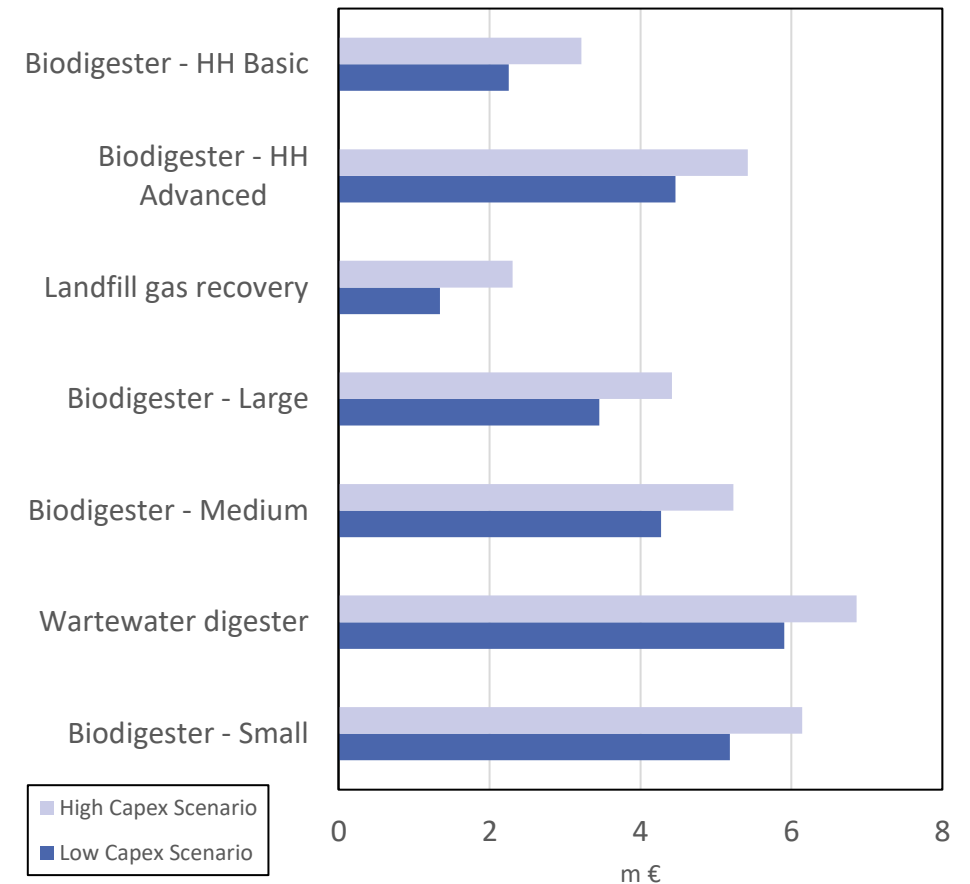
#### Attracting RNG onto Our System



*Every 1% will lower our customers' carbon footprint by 25%*

# Support Option 1a : Investment aid for new gas projects including projects selected through a competitive process – Biomethane

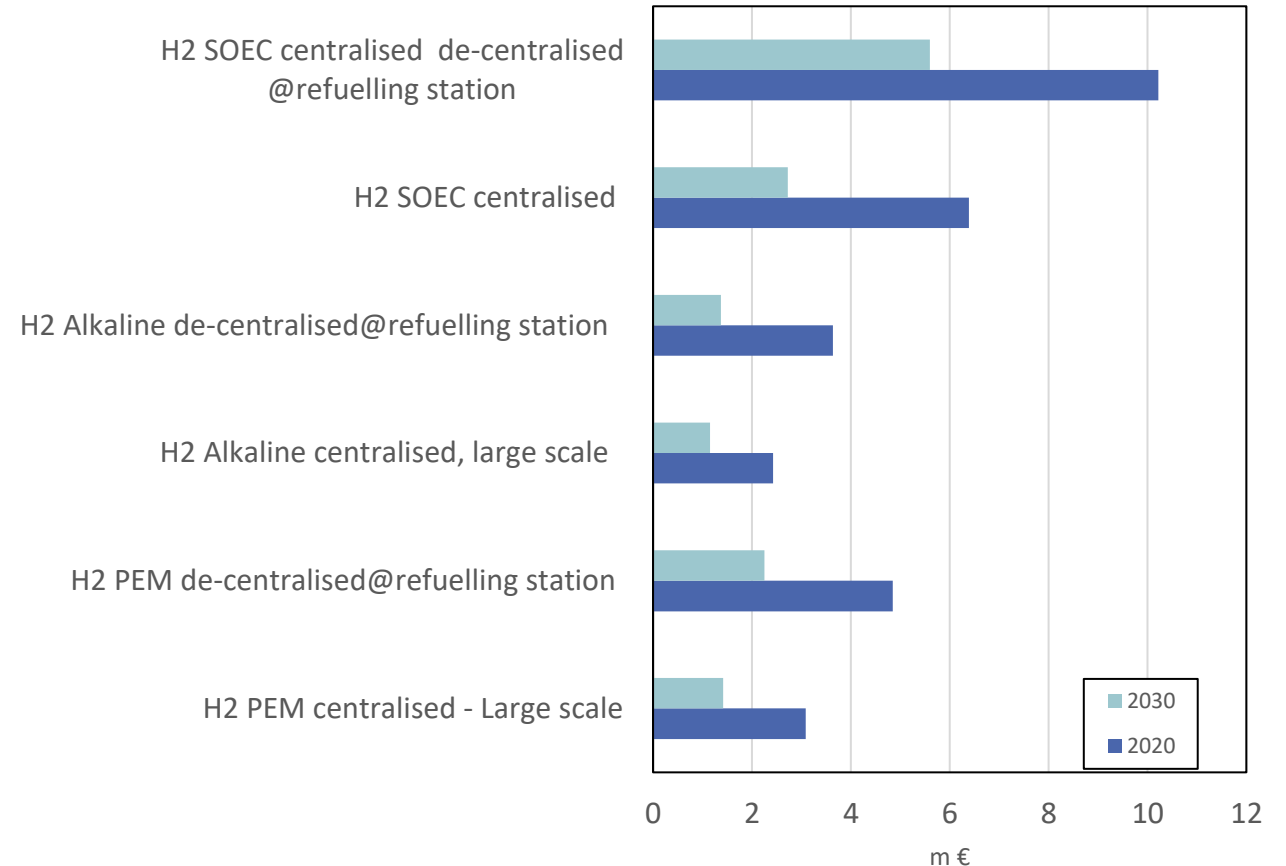
- A plan for the promotion of new gases should foresee the development of pilot/demonstration projects. Given the lignite decommissioning such a plan is timely.
- To achieve the biogas/biomethane consumption projected in the NECP and the Long-Term Strategy to 2050 (~14 ktoe), an amount of the order of 4-7 mil € may need to be earmarked to meet initial projected demand.
  - Estimates provided considering capital costs in the range of 20 to 80 €/MWh including a 2-4 €/MWh cost for the upgrade of biogas to biomethane.



Unit costs sourced from IEA

# Support Option 1b : Investment aid for new gas projects including projects selected through a competitive process – H2

- For hydrogen, initial earmarked amount is calculated in the range of 3-10 mil € for a hydrogen production of 0.16 ktoe.
  - Estimates are considering capital costs in the range of 1,600 to 5,300 €/MWh.
  - Learning by doing is expected to play a significant role so that capital costs will be substantially within the decade.



Unit costs sourced from PRIMES

## Option 2 : Operational Aid (1/3)

- Feed-in tariffs for projects over 0.5MWh (3 MW for wind) are being phased out throughout Europe for new RES electricity projects as they are not compatible with State Aid guidelines.
- Although it remains to be specified how the new State Aid Regulation from 2021 will address new-gases, there is a general trend of operational support mechanisms towards feed-in premiums.
- Premiums are established with a base (constant) component and a market part linked to the revenues from the market sale of gas (day ahead) in TTF as has been the case in other Member States.

Feed-in tariffs

Auctions for sitting

Favourable taxation  
regime (income tax)

Feed-in premiums

Favourable  
balancing rules



## Option 2 : Operational Aid (2/3)

	Pros	Cons
<b>Feed-in tariffs</b>	<ul style="list-style-type: none"> <li>+ shields new market entrants from price risk lowering the capital cost and enabling private investment.</li> <li>+ production uptake is guaranteed (e.g. in the context of a mandatory premium)</li> </ul>	<ul style="list-style-type: none"> <li>– experience has shown that high tariffs to support immature technologies may lead to less efficient investments to the detriment of consumers</li> </ul>
<b>Feed-in premiums</b>	<ul style="list-style-type: none"> <li>+ production is traded at market conditions with additional payment received on top of market price.</li> </ul>	<ul style="list-style-type: none"> <li>– There is no organised gas market in Greece yet and no experience in market dynamics</li> <li>– The operation of TAP and IGB may contribute to further changes in the market that cannot be foreseen</li> <li>– Adoption of a floating premium may cause further uncertainty and limit investment appetite.</li> </ul>



## Option 2 : Operational Aid (3/3)

	Pros	Cons
<b>auctions</b>	<ul style="list-style-type: none"><li>+ As siting locations may be limited particularly for biomethane, and for the sake of economic efficiency it is best if licenses for new plants are auctioned and premiums are a result of a competitive bidding process.</li><li>+ Criteria for project selection in addition to price may be efficiency targets in production, anticipated CO2 reductions after a certain period in time, a viable investment (without FiT) after a 10-year period according to EU practice</li><li>+ Based on EU experience (and state aid guidelines) the duration of the premium should be of the order of 10 years.</li></ul>	

# Option 3 : Other support mechanisms related to the investment and its operation

- Zero or reduced costs of network connection
- Priority of network access
- Priority in operation (network injection)

Connection cost reduction has been traditionally used in distribution networks as an incentive to increase penetration and can be considered in the context of new gases. The economic efficiency criterion in the respective Tariff Regulations protects against tariff increases

# Option 4 : Investment support on the demand side

- Financial support for:
  - Buses and heavy-duty vehicles - public transport
  - Fuel stations
  - Faster depreciation support for heavy duty vehicles firing diesel oil (to consider carefully depending on biofuel percentage)

Production

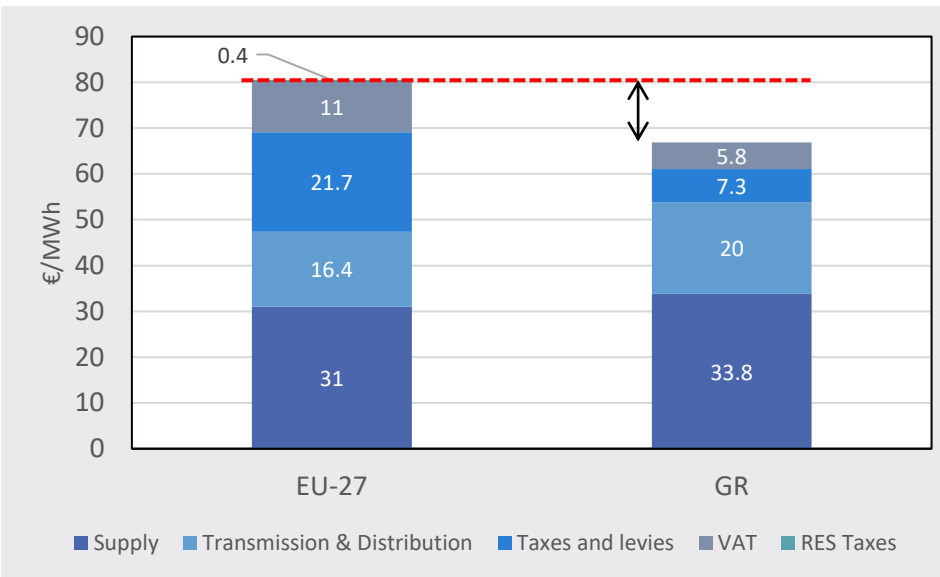
Demand

# Option 5 : Taxation mechanisms

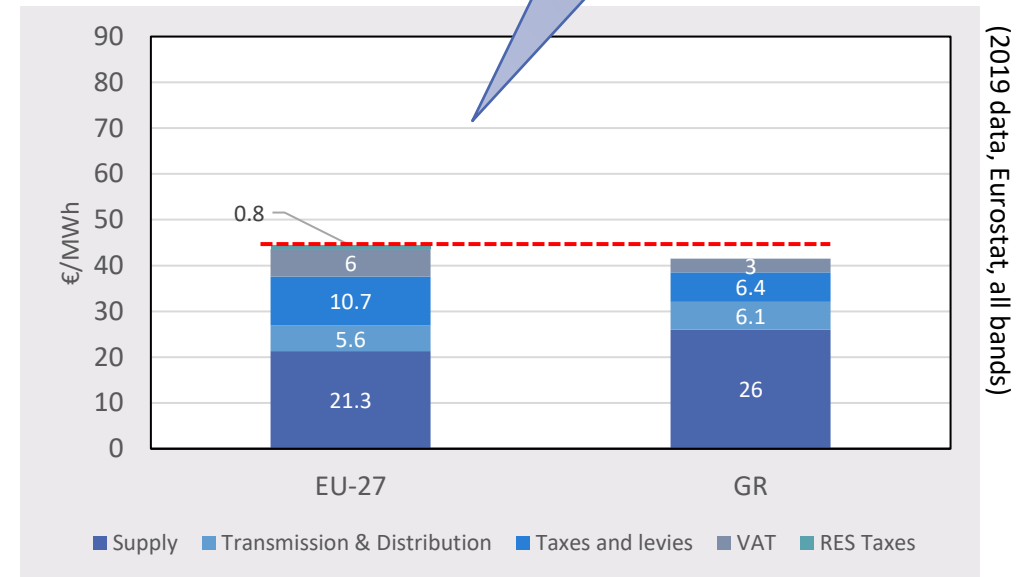
- Reduction of income tax
- Reduction of VAT, taxes and levies for RES gases.

Reduced taxation has been traditionally used as a method to promote the use of gas in Greece

Household



Non-household



## Option 6 : Introduction of the measure of the project-based Carbon Contracts for Differences (CCfDs) especially for the industrial sector

- CCfDs are based on the difference between the yearly average auction price of emissions allowances (EUAs) and the contract price, thus ensure guaranteed carbon price for the project.
- An agreement is concluded between the state and the company. The state guarantees a defined CO<sub>2</sub> price, whereas the company commits to reduce its emissions based on the agreed amount in the contract, via investments in innovative technologies.

	Pros	Cons
CCfDs	<ul style="list-style-type: none"><li>+ Stabilises revenue streams otherwise affected by volatile CO<sub>2</sub> prices thus reducing the cost of financing (reduction of risk)</li><li>+ Fully compatible with EU ETS and compatible with current state aid guidelines</li></ul>	<ul style="list-style-type: none"><li>– Early stages of implementation</li></ul>

# Cost recovery of support schemes

- **Guarantees of origin** for new-gases produced under a support scheme may be auctioned by DAPEEP (or another relevant authority if defined) by analogy to the procedure adopted in Italy (and also France for electricity).
- Proceedings from the auctions may be used to fund the support schemes. Recent auctions in GME (IT, secondary market) report prices of around 60 €/MWh (680 €/CIC, 1 CIC=10 Gcal).
- Renewable levies to be borne by gas consumers
- CO2 taxes, part of the EU ETS proceedings as with ELAPE
- For investment expenditures, structural and other funds.

# EU Funds and other mechanisms (1/2)

EU Funds & Mechanisms	Description
European Clean Hydrogen Alliance	<ul style="list-style-type: none"> <li>Facilitation of the implementation of the actions of the EC's Hydrogen Strategy and support of the investments for the scale up of the production and demand for renewable and low-carbon hydrogen</li> <li>Identification and building up of a clear pipeline of viable investment projects</li> </ul>
Strategic European Investment Window of the InvestEU programme	<ul style="list-style-type: none"> <li>Promotion of the penetration of hydrogen's technologies by incentivising private investment with a strong leverage effect</li> </ul>
ETS Innovation Fund	<ul style="list-style-type: none"> <li>An amount of € 10 billion will be allocated for the facilitation of first-of-kind demonstration of innovative hydrogen-based technologies during the period 2020-2030</li> </ul>
LIFE Programme	<ul style="list-style-type: none"> <li>The main objective of the EU's program is the co-financing of projects contributing to the implementation, updating and development of EU environmental and climate policy and legislation</li> <li>A total budget of € 5.45 billion is estimated for 2021-2027 assisting the efforts made for the transition to a cyclical economy, clean energy and the climate change mitigation</li> </ul>
European Regional Development Fund and the Cohesion Fund	<ul style="list-style-type: none"> <li>Support for green transition during the period 2021-2027</li> </ul>

# EU Funds and other mechanisms (2/2)

EU Funds & Mechanisms	Description
REACT-EU	<ul style="list-style-type: none"> <li>Enhancement of the EC's efforts made in the field of RES and low-carbon hydrogen in cooperation with EU MS, regional and local authorities, the industry and other stakeholders</li> </ul>
Just Transition Mechanism (JTM)	<ul style="list-style-type: none"> <li>Mitigation of the negative effects of the climate change and the transition,</li> <li>Financing of the diversification and the modernization of the local economy</li> </ul>
Connecting Europe Facility Energy and Connecting Europe Facility Transport	<ul style="list-style-type: none"> <li>Funding of dedicated infrastructure for hydrogen, repurposing of gas networks and carbon capture projects and hydrogen refuelling stations</li> </ul>
Research and Innovation framework Programme Horizon Europe (Horizon 2020 Fuel Cells and Hydrogen Joint Undertaking (FCH-JU))	<ul style="list-style-type: none"> <li>Creation of an institutionalized Clean Hydrogen Partnership with main focus on renewable hydrogen production, transmission, distribution and storage, alongside selected fuel cell end-use technologies notably on transport and on industry and bringing them to market readiness</li> <li>A total budget of € 94.1 billion is estimated for the period 2021-2027</li> </ul>
EIB financing	<ul style="list-style-type: none"> <li>Facilitation of the implementation of the investment agenda through synergies with EIB financing (e.g. InnovFin)</li> </ul>



# Conclusions

- EU commitments towards the promotion of new gases and hydrogen in particular create favourable conditions for their penetration.
- A complex, carefully designed support scheme, combined with the establishment of a robust regulatory framework shall be necessary.