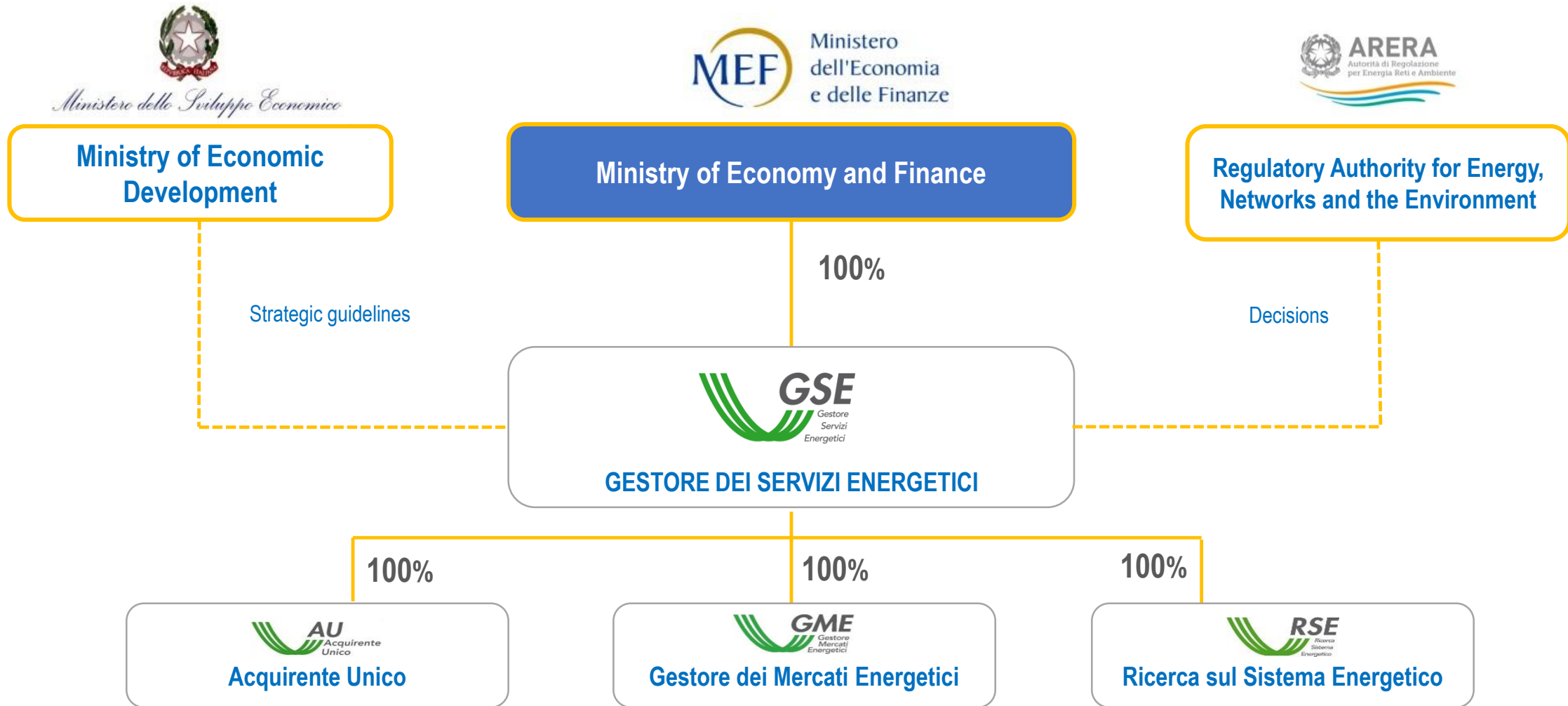
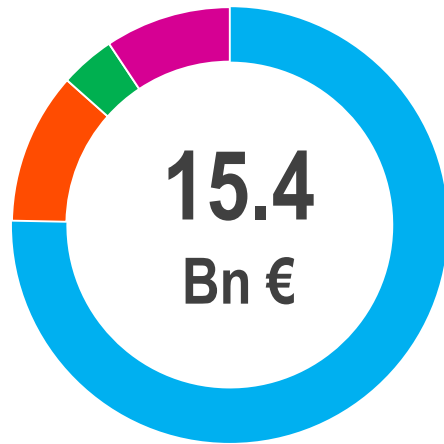


THE GOVERNANCE OF ENERGY TRANSITION: THE EUROPEAN AND THE ITALIAN PERSPECTIVES

—
Alberto Biancardi



GSE'S MISSION AND ACTIVITIES

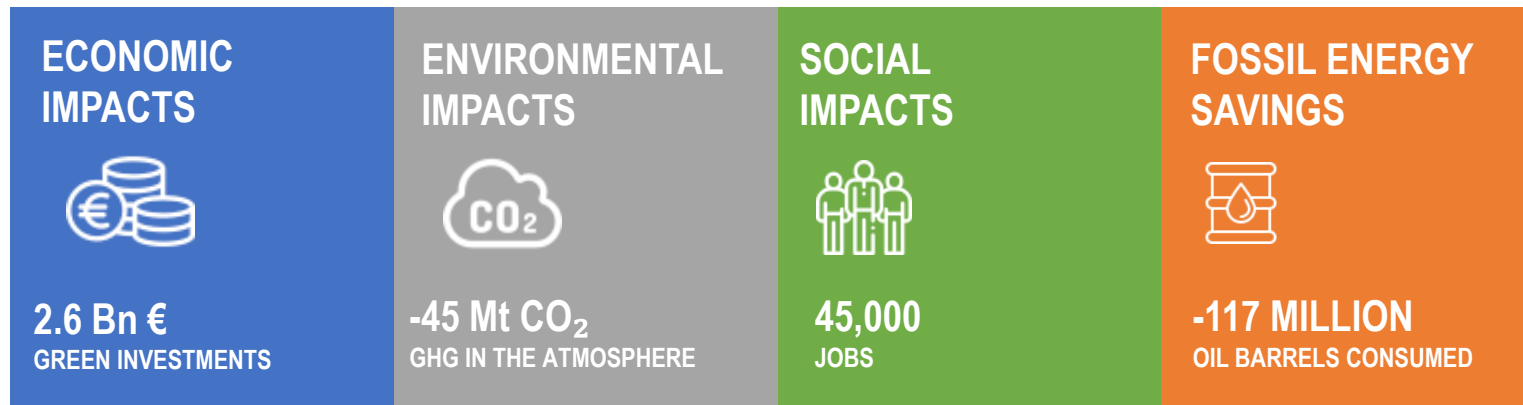


GSE FOR THE SUSTAINABILITY PROMOTION

In 2018 GSE activities allowed the allocation of **15.4 Bn €** - corresponding to **about 1%** of the national **Gross Domestic Product** - for the sustainability promotion

11.6 Bn €	Financial support for RES electricity
1.7 Bn €	Energy efficiency and RES H&C
0.6 Bn €	RES in the transport sector
1.4 Bn €	EU-ETS

VALUE GENERATED FOR ITALY



1

NATURAL GAS SECTOR: GLOBAL DEVELOPMENT

THE NATURAL GAS SECTOR – GLOBAL DEMAND

In 2018 the **global demand** for gas **increased by 4.6%** (vs. 2017), recording the **highest increase since 2010** due to increased demand and the switch from coal to gas; the United States led the increase of gas consumption, followed by China

2000-2018:

▬ Europe from 606 to 607 bcm

↑ Brazil from 10 to 36 bcm

↑ USA from 669 to 860 bcm

↑ Middle East from 186 to 535 bcm



Gas demand by region and scenario (bcm)

	Stated Policies						Sustainable Development	
	2000	2018	2025	2030	2035	2040	2030	2040
North America	800	1 067	1 163	1 183	1 195	1 221	1 052	791
United States	669	860	936	947	949	957	870	646
Central and South America	97	172	178	198	224	257	168	169
Brazil	10	36	34	37	46	57	30	40
Europe	606	607	621	593	578	557	519	380
European Union	487	480	477	442	416	386	387	266
Africa	58	158	185	221	265	317	176	200
South Africa	2	5	5	7	8	9	6	8
Middle East	186	535	559	646	739	807	550	507
Eurasia	471	598	628	639	652	674	551	471
Russia	388	485	505	506	506	514	438	363
Asia Pacific	313	815	1 071	1 218	1 374	1 522	1 234	1 322
China	28	282	454	533	598	655	508	497
India	28	62	103	131	166	196	199	303
Japan	81	120	102	90	90	89	92	62
Southeast Asia	89	163	203	231	264	295	212	240
International bunkers	-	0	11	21	34	50	14	15
World natural gas	2 530	3 952	4 415	4 720	5 060	5 404	4 264	3 854
World low-carbon gases	-	4	27	53	72	90	138	269
World total gases	2 530	3 956	4 442	4 773	5 132	5 494	4 402	4 123

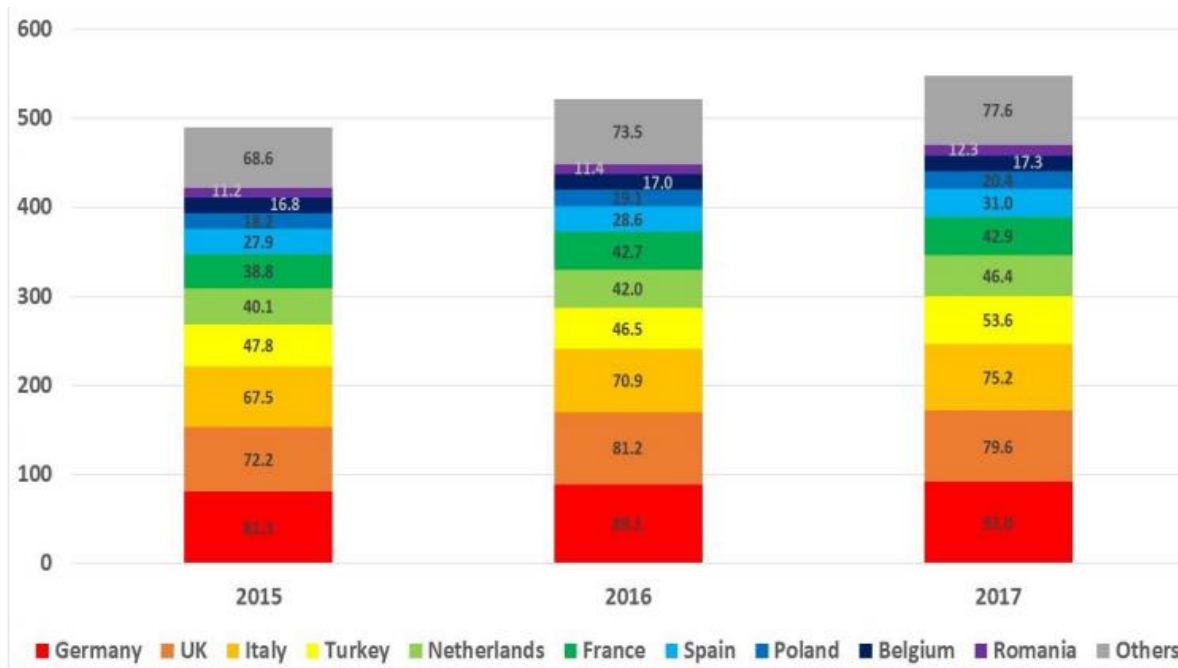
Source: IEA-WEO 2019

➔ *Natural gas is expected to be a key building block to a sustainable energy future at global level*

THE NATURAL GAS SECTOR – EUROPE

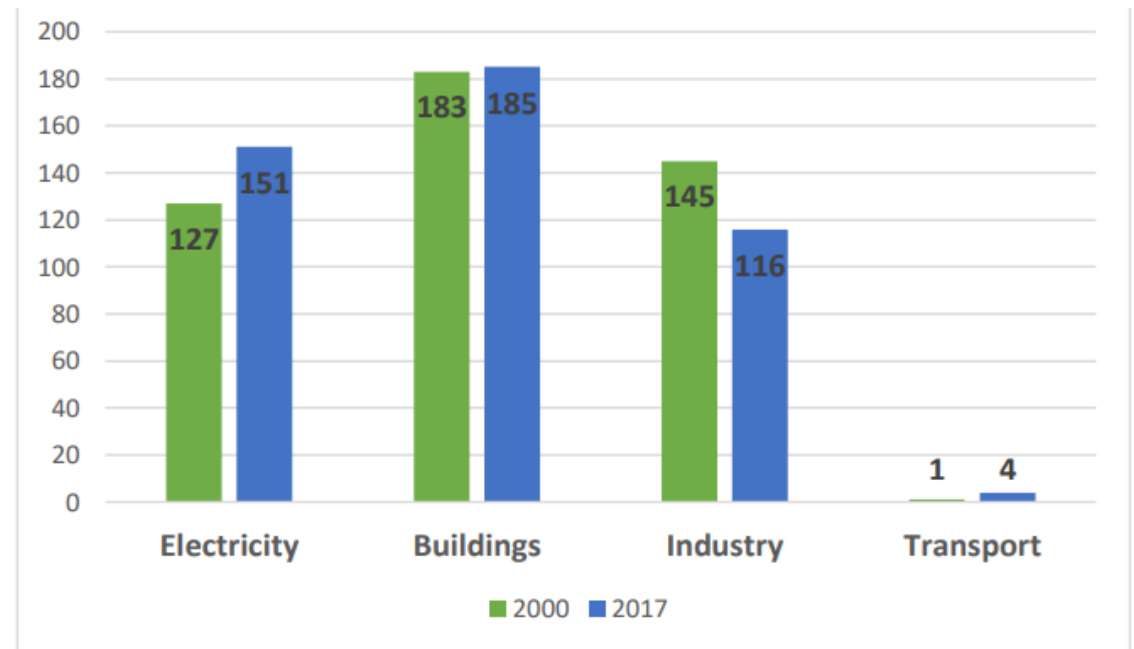
- After a decline between 2010 and 2014, natural gas demand in Europe **rose again starting from 2015**
- The trend continued in 2016 and 2017 to reach **548 billion cubic meters (bcm)**. The growth has been concentrated in **Germany, Italy, UK, Netherlands** and **France**
- Natural gas has been estimated to account for **23% of total EU primary energy consumption**
- The **demand for natural gas in Europe is likely to be stable** (or slightly decrease) **until 2030**

Natural gas demand in Europe in 2015, 2016 and 2017 (bcm)



Source: calculation from IEA monthly data for OECD countries

Natural gas consumption in the EU by sector (bcm)

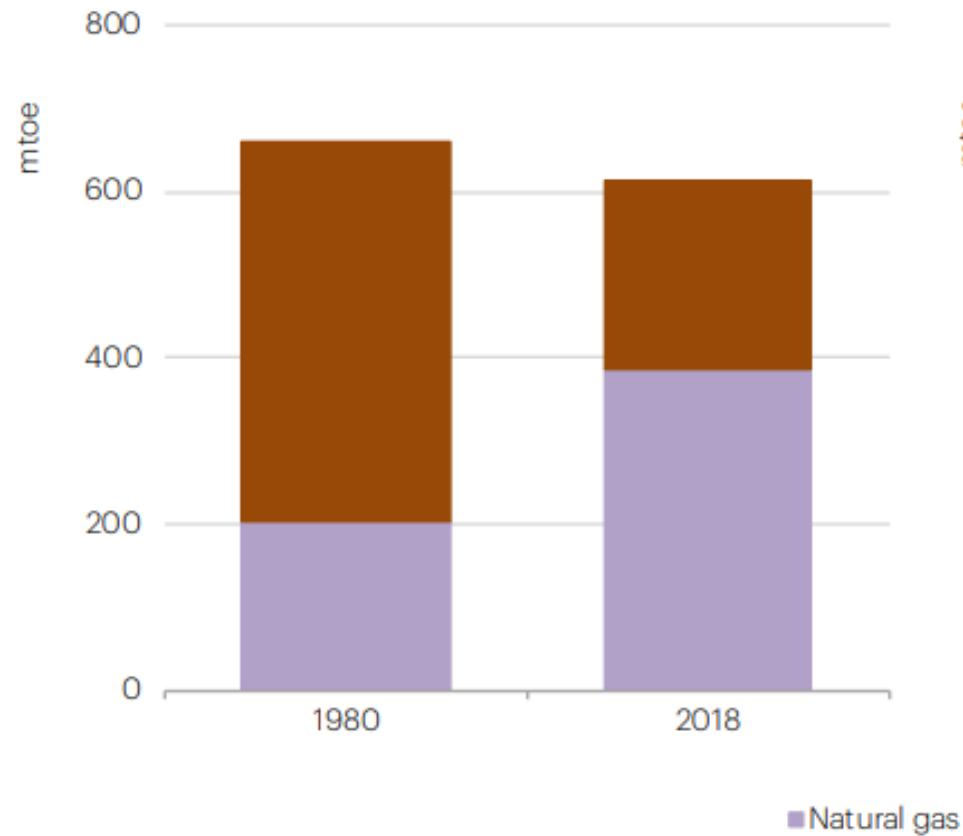


Source: IEA- 2018

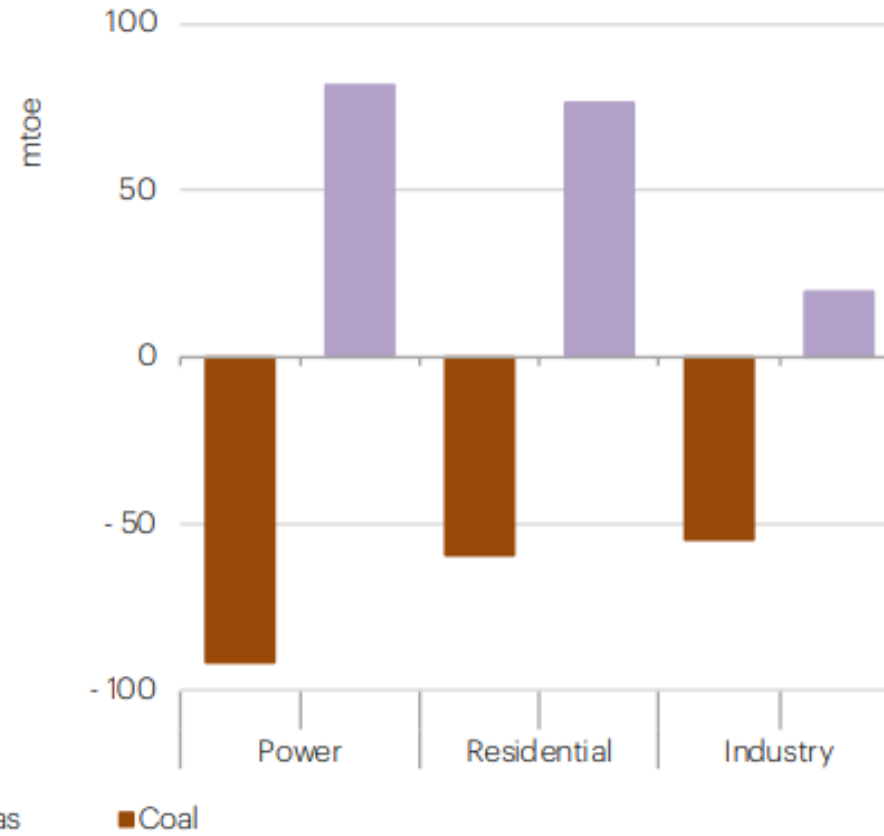
THE NATURAL GAS SECTOR – EUROPE

The **growth** of **gas consumption** is accompanied by a **decrease** in **coal consumption**

Total gas and coal consumption in the European Union (Mtoe)



Changes in sectorial consumption, 2018 compared to 1980



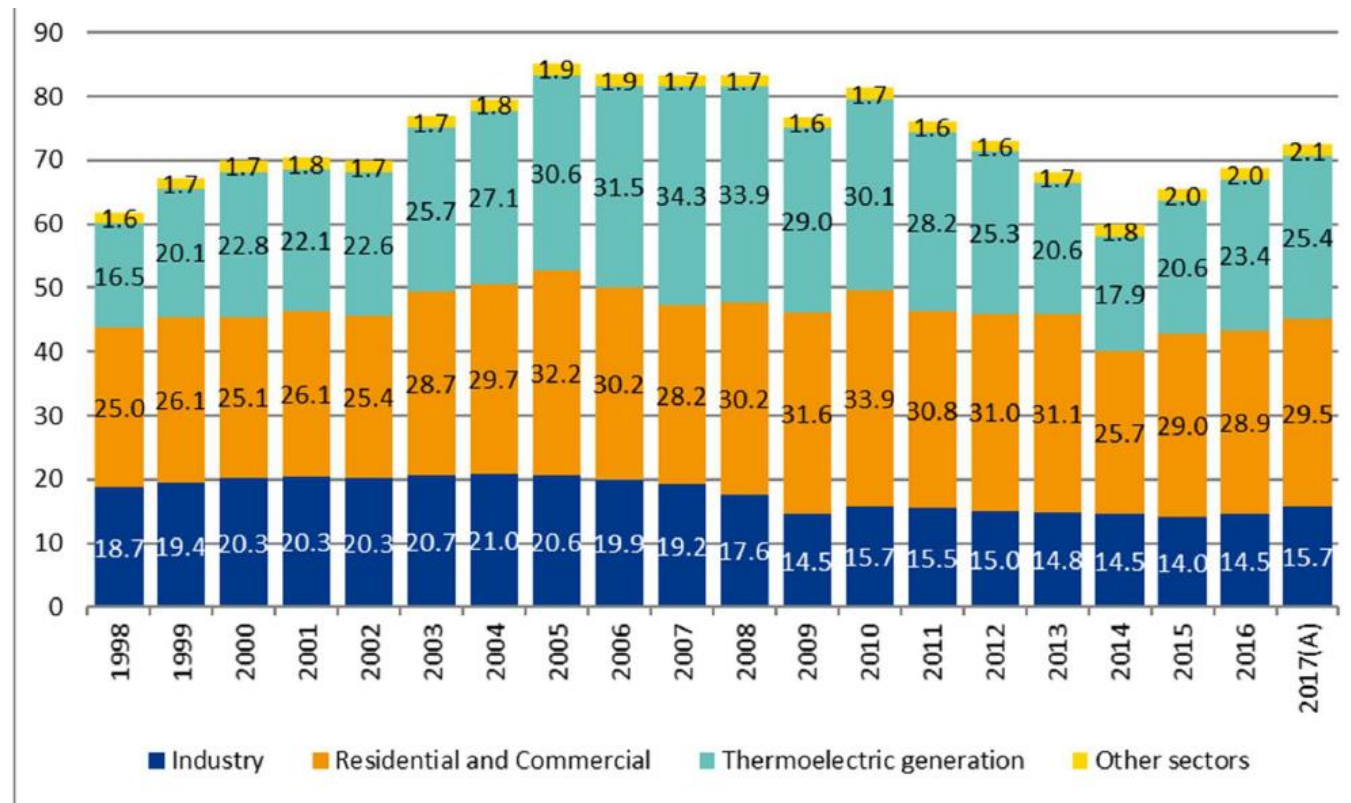
Note: European Union grouping consists of all 28 member states in 1980.

Source: IEA, Role of Gas in energy transition

THE NATURAL GAS SECTOR - ITALY

Natural gas consumption is basically stable, thanks to environmental policies. **Gas is replacing coal.**

Natural gas net consumption by sector, (Gm³)



(A) Temporary data.

Gm³: values net of consumption and system losses

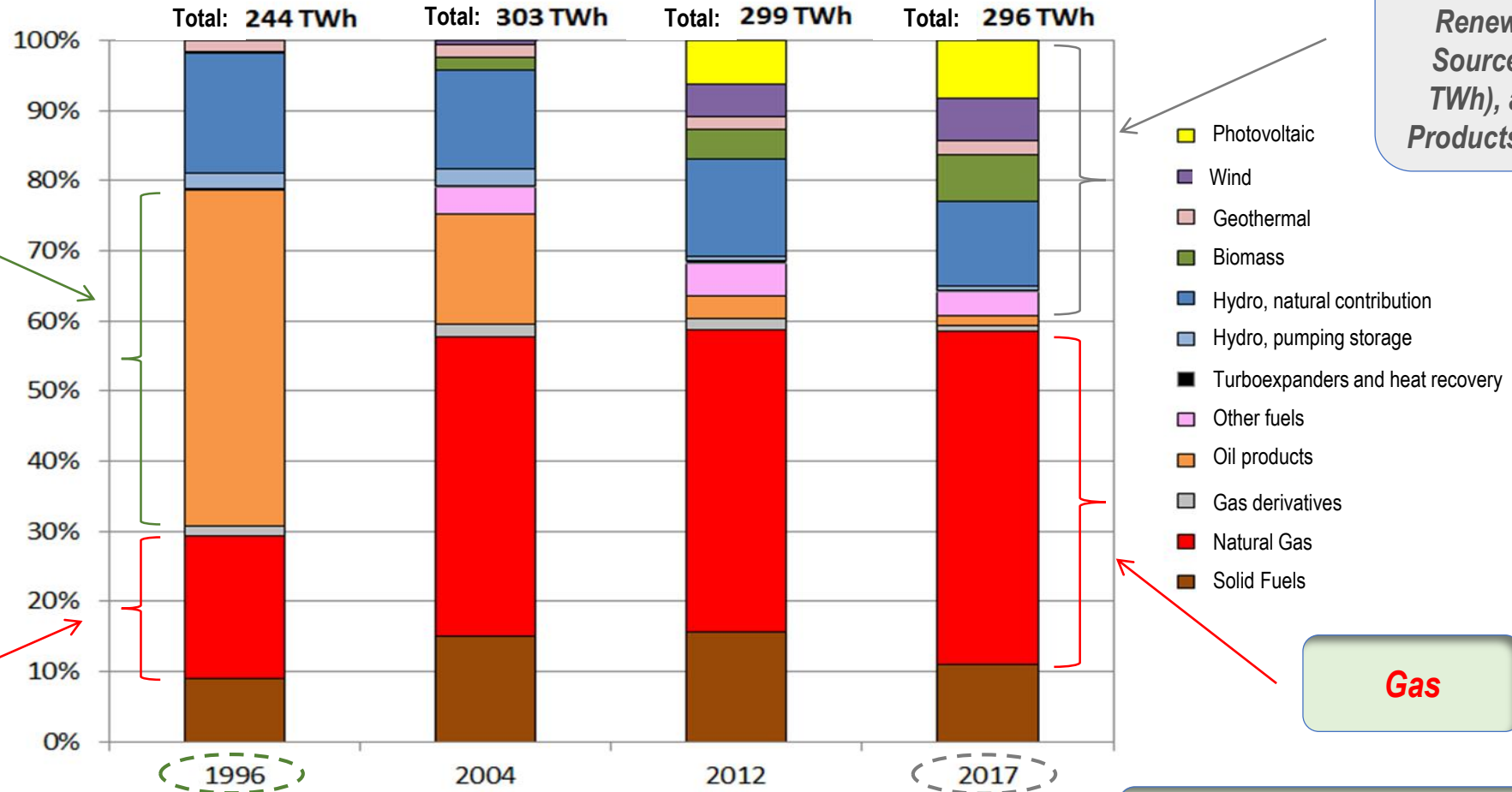
Source: Ministry for Economic Development, national energy balance, several years.

2

NATURAL GAS FOR ELECTRICITY PRODUCTION IN ITALY: PAST AND PRESENT

THE ITALIAN EXPERIENCE IN RENEWABLE ENERGY DEVELOPMENT

EVOLUTION OF THE ELECTRICITY GENERATION MIX



Source: ARERA

NO NUCLEAR POWER GENERATION

GAS IS INCREASINGLY RELEVANT FOR ELECTRICITY GENERATION

Major presence of Oil Products for power generation: about 110 TWh

Relevant presence Renewable Energy Sources (about 115 TWh), almost no Oil Products (about 3TWh)

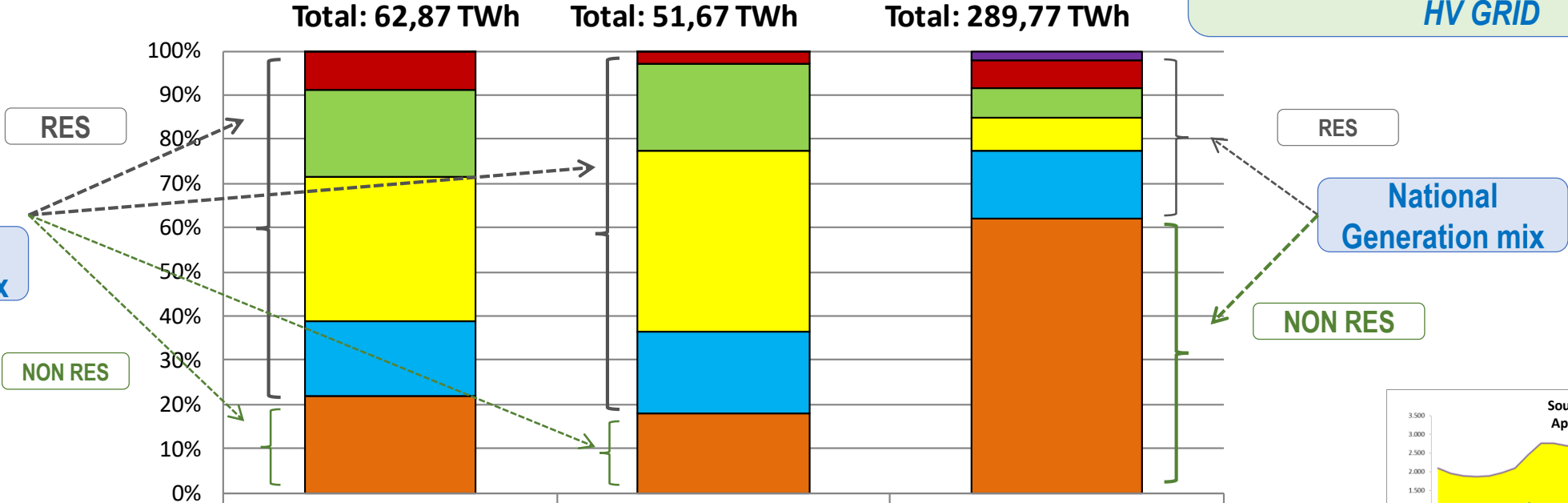
Gas

Gas

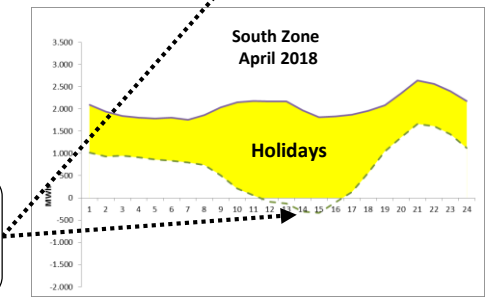
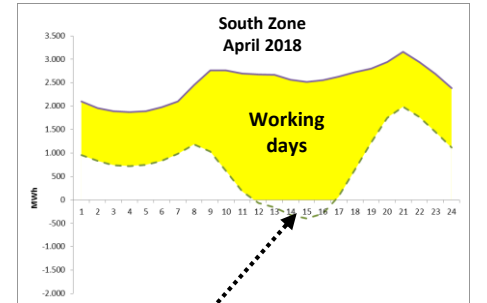
THE ITALIAN EXPERIENCE IN RENEWABLE ENERGY DEVELOPMENT

Strong differences between:

GAS IS VERY RELEVANT FOR BIG-SIZE POWER PLANTS CONNECTED TO THE HV GRID



	GD	GD-10 MVA	ITALY
Geothermal	0.3%	0.0%	2.2%
Wind	8.6%	2.8%	6.1%
Biomass, Biogas and Bioliquids	19.8%	20.0%	6.7%
Solar	32.6%	40.6%	7.6%
Hydro	16.9%	18.6%	15.3%
Non RES	21.8%	18.0%	62.1%



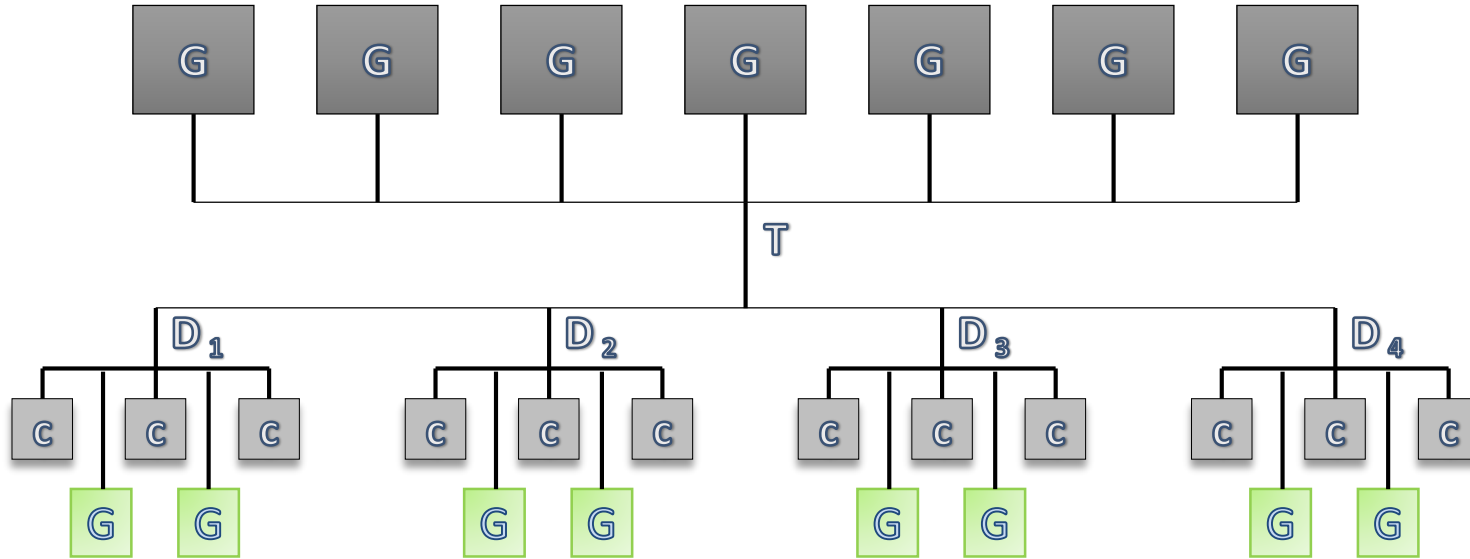
Energy produced but wasted!

Source: ARERA

DISTRIBUTED GENERATION MIX - YEAR 2016

PARADIGM SHIFT OF THE ELECTRICAL SYSTEM

...TO DISTRIBUTED GENERATION APPROACH...



➤ **Energy flows**

➤ **Generators and consumption completely separated**

Main consequences on governance and tools:

- **Building bridges between essential facilities and the other activities (as grids) the other sectors)**
- **Central dispatching and energy exchange (possibility, information) discussion (availability of information)**
- **State possibility to define tariffs, contracts etc.**
- **Investment in new transport capacity and congestion management**

EUROPEAN AND ITALIAN TARGETS

NATIONAL ENERGY AND CLIMATE PLAN: MAIN TARGETS *

	2020 targets			2030 targets	
	EU	ITALY		EU	ITALY (NECP targets)
Renewables					
RES share in total gross final consumption	20%	17%		32%	30%
RES share in transport gross final consumption	10%	10%		14%	21,6%
RES share in gross final consumption for heating and cooling				+ 1,3% year	+ 1,3% year
Energy efficiency					
Reduction compared to scenario PRIMES 2007	- 20%	- 24%		- 32,5%	- 43%
Reduction of final consumptions through active policies	- 1,5% year (no transp.)	- 1,5% year (no transp.)		- 0,8% year (with transport)	- 0,8% year (with transport)
GHG emissions					
Reduction GHG vs 2005 for ETS plants	- 21%			- 43%	
Reduction GHG vs 2005 for non ETS sectors	- 10%	- 13%		- 30%	- 33%
Total reduction of GHG compared to 1990	- 20%			- 40%	

According to the Italian NPEC, the Natural gas sector will guarantee a **safer, flexible and resilient** system, to face a more uncertain and volatile market environment.

TARGETS:

- Optimization of the use of **LNG import capacity** in existing terminals
- Improvement of the safety margin in the event of **high peak demand**

MAIN POLICIES AND MEASURES

- Upgrading of the features of natural gas **transport** and **storage** network
- Diversification of supply sources also using **LNG** and development of **LNG** in the **maritime transport sector** and in the **port services**
- Fiscal stabilization of **LNG in the transport sector**
- Finalization of the **retail markets deregulation**
- **Smart meter**

*According to the EU Parliament and Council Regulation 2016/0375 on European Governance of Energy Union.

DECARBONIZATION PROCESS IN THE TRANSPORT SECTOR

LOWERING CO₂ EMISSIONS

TRANSPORT

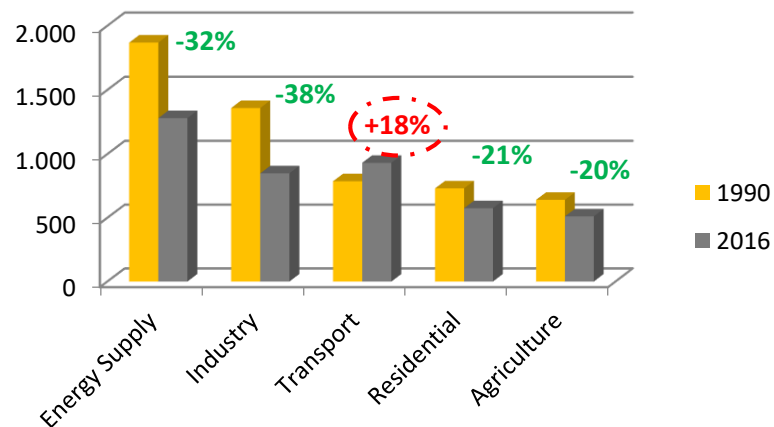
- Globally, transport accounted for about **25% of total emissions in 2016** (about 8 Gt CO₂ eq).
- **Road transport played the biggest role** (around 5,8 Mt CO₂ eq) *

Pursuant to EU Directives, **Italy set a double target to be reached by 2020:**

1. **Use of renewable fuels: 10% of total fuels** (Directive 2009/28/EC)
2. **A 6% reduction of emissions**, compared with the **standard value** of 94,1 gCO₂eq/MJ (Fuel Quality Directive 2009/30/EC, updated by Directive 2015/652/EU)

Furthermore, **infrastructures for refuelling vehicles with alternative fuels must be strengthened** (LPG, Methane, Electricity for transport) according to the **Deployment of Alternative Fuels Infrastructures Directive** (2014/94/EU)

Transport - CO₂ emissions in EU 28 (Mt CO₂ eq and %) **



The Renewable Energy Directive II (issued in 2018) provided that the NECPs of the EU Member States must set a **minimum target of 14% of renewables on final energy consumption of road and rail transport by 2030**, which Italy increased up to **21,6%**

- **Italy is the European country with the largest number of vehicles fed by CNG:** almost **1 million of vehicles**, representing about **2,4 %** of the total vehicle fleet nationwide (excluding commercial and 2-wheel vehicles and buses).
- **Refuelling stations in Italy:** about **1.400 CNG** and **20 LNG** filling stations - **53%** of which located in **Northern Italy** – against a total of **21.000 filling stations**.

* Source: www.iea.org/statistics/co2emissions/

** Source: Ambrosetti, 2019

DECARBONIZATION PROCESS IN THE TRANSPORT SECTOR

RES IN TRANSPORT SECTOR: MAIN POLICIES AND MEASURES



- **Biomethane** is identified as an important alternative fuel for the transport sector. The **M.D. 2/3/2018** sets incentives, having a duration of **10 years**, based on the emission of **Blending Obligation Certificates** (CICs). The certificates can be sold to oil companies subject to the blending obligation mechanism. For **biomethane** and **biofuels** from **wastes and non food feedstock (advanced)**, certificates are bought by GSE at a **fixed price**.



- A relevant role is expected to be played in 2030 by **electric and hybrid (plug-in) vehicles**. Improvement of **batteries performance**, decrease of the **costs** and development of **recharge infrastructure** will allow an increase of the penetration of such vehicles (6 mln vehicles by 2030, of which 1.6 mln EV). Legislative Decree 16/12/2016, transposing the Directive on Alternative Fuel Infrastructures, foresees an increase of recharge stations from the current **2.900** up to at least **6.500** in 2020.



- **Not only technologies**. To reduce the consumption in the transport sector, other strategies will also be very important: “**avoiding**” overall transport – i.e. **smart working, online services** etc. - and “**shifting**” to more efficient solutions – i.e. **upgrading local public transport, intermodal freight transport, intelligent transport system, car-sharing, car-pooling, cycling** etc..

3

LESSONS LEARNED

NEW REGULATORY OBJECTIVES

ISSUES

Coal generation phasing out and increasing natural gas role



Small plants fed by RES connected at distribution level and medium / big-size plants fed by gas connected at transmission level



Transition from natural gas to low-carbon alternatives such as advanced biomethane in specific sectors



REGULATORY TARGETS

- **Security of supply**
- **Efficiency and competition** within the gas market

- **Flexibility and reliability** of the electric system
- **High level of service quality**

- **Advanced biofuels deployment** as well as development of the **related infrastructures**
- **Electrification of consumption** in the **transport sector** as well in **other sectors** (e.g. heating/cooling)

KEY MESSAGES FOR IMPROVING REGULATION

GAS SECTOR

- **Information**
- **Unbundling**
 - ✓ Accounts
 - ✓ Management
 - ✓ Ownership
- **Investments in essential facilities** (e.g.: pipelines, LNG, storage units)
- **Organized markets**

ELECTRIC SECTOR

- **Information** (e.g. increasing digitalization and network observability, smart metering deployment etc.)
- **Centralized market vs. local market** (e.g. distributed generation management, aggregations on demand/supply side, fast-response reserve power etc.)
- **Output-based regulation approach** (definition of targets and investment revenues calculated according to the achieved results especially for innovative projects)

TRANSPORT SECTOR

- **Incentivizing policies** for **advanced biofuels** distribution/use/production
- **Creation of productive synergies** with **other sectors** (e.g. adoption of a virtuous waste-cycle management for waste-to-energy purposes)
- **Electrification of mobility** and **new sector-coupling** for increasing **efficiency** (e.g. power-to-gas, power-to-heating/cooling)

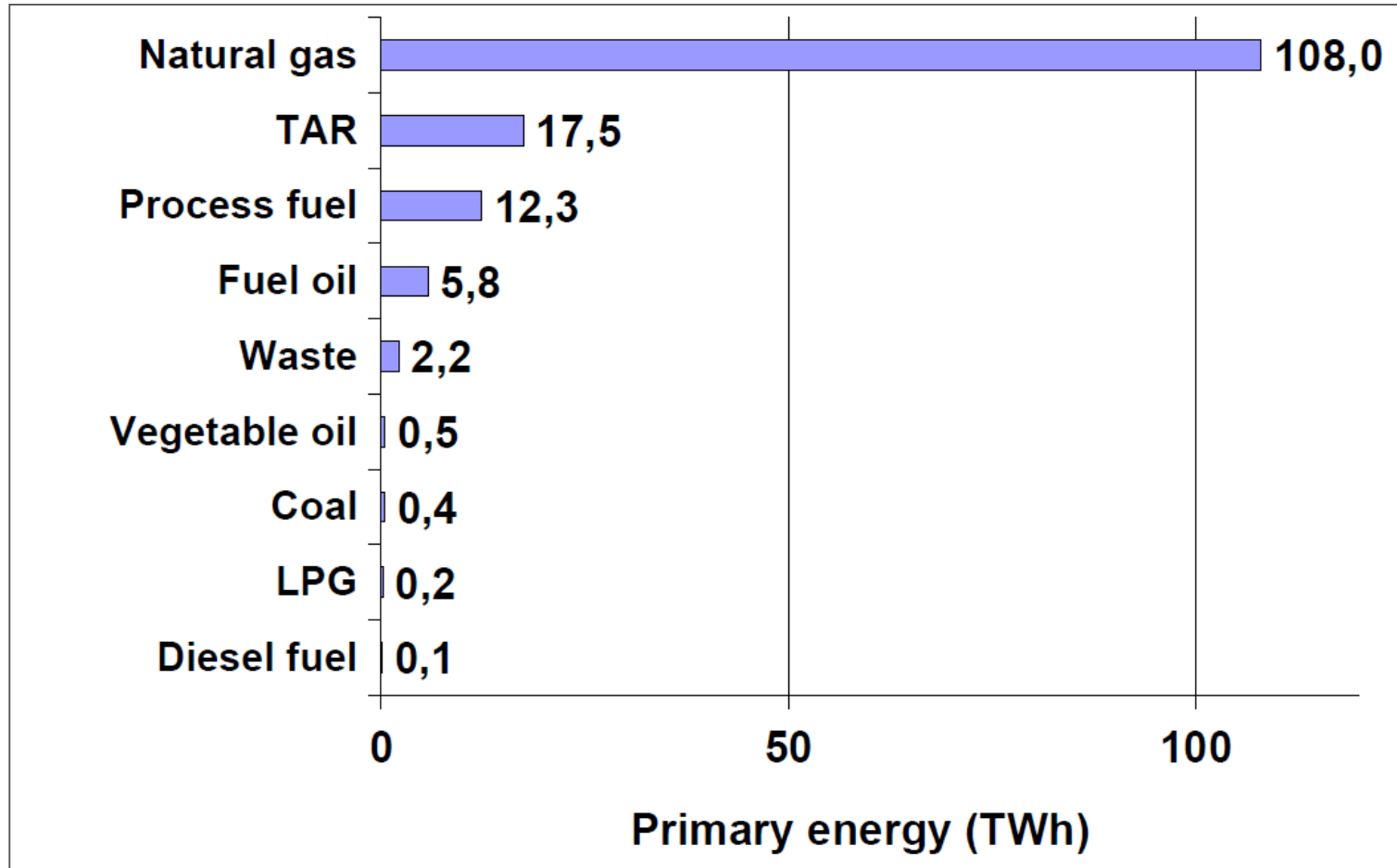
**THANK YOU
FOR YOUR KIND
ATTENTION**

**THE ENERGY OF THE
PRESENT**



THE ITALIAN EXPERIENCE IN ENERGY EFFICIENCY

Quantities of fuels consumed in 2010 in Italy for High Efficiency Cogeneration (combined production of heat and of electricity) - Quantities expressed as equivalent energy:



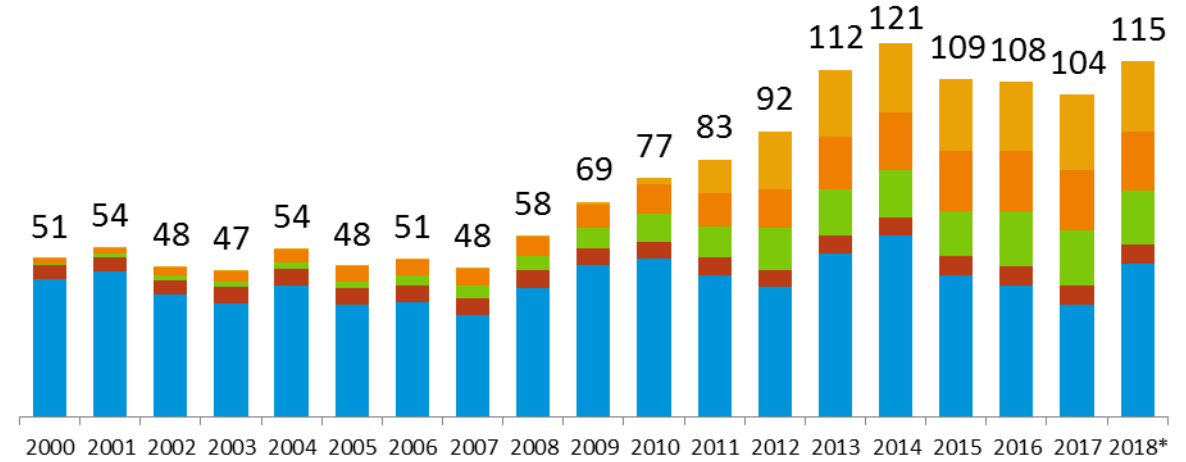
Source: GSE

THE ITALIAN EXPERIENCE IN RENEWABLE ENERGY DEVELOPMENT

Focus on renewable electricity deployment

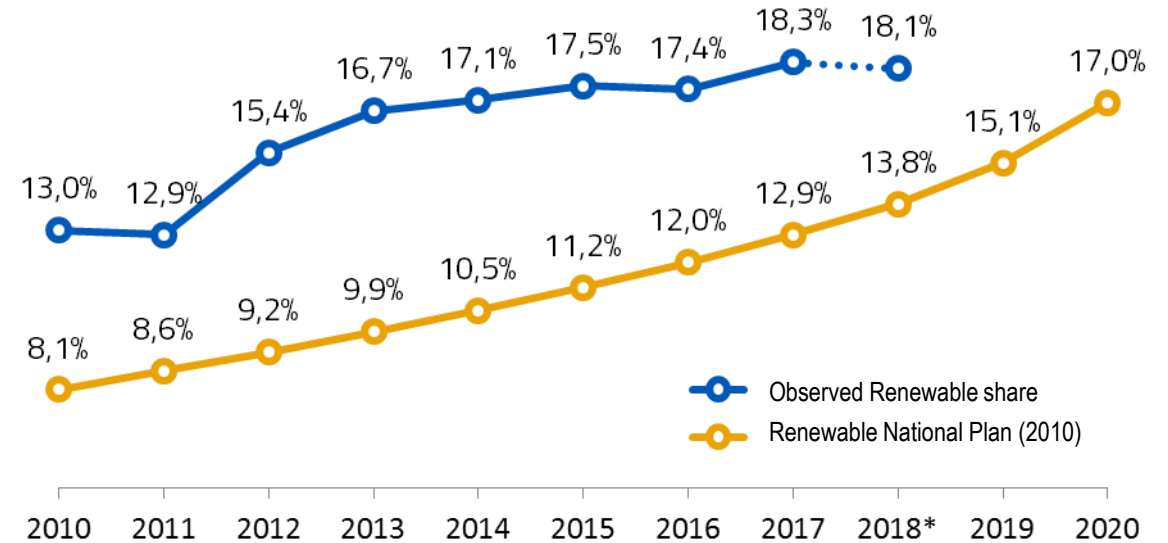
- Italy is deeply involved in the clean energy transition through the implementation of a **secure, sustainable and affordable energy system**. A variety of promotion/incentivising schemes have been deployed over the years: **Green Certificates** (old), **dispatching priority, feed-in tariffs, premium tariffs, auctions** etc.
- In 2018, **renewable energy power plants generated 115 TWh**, contributing to **34% of the electricity consumption**. **RES promotion policies** made an important contribution to these results: **67 TWh** (about 58%).
- In 2018, the **share of renewables in gross final energy consumption** was around **18%**, higher than the **2020 Italian mandatory target** set up by Directive 2009/28/EC (17%)

RES gross electricity production (TWh)

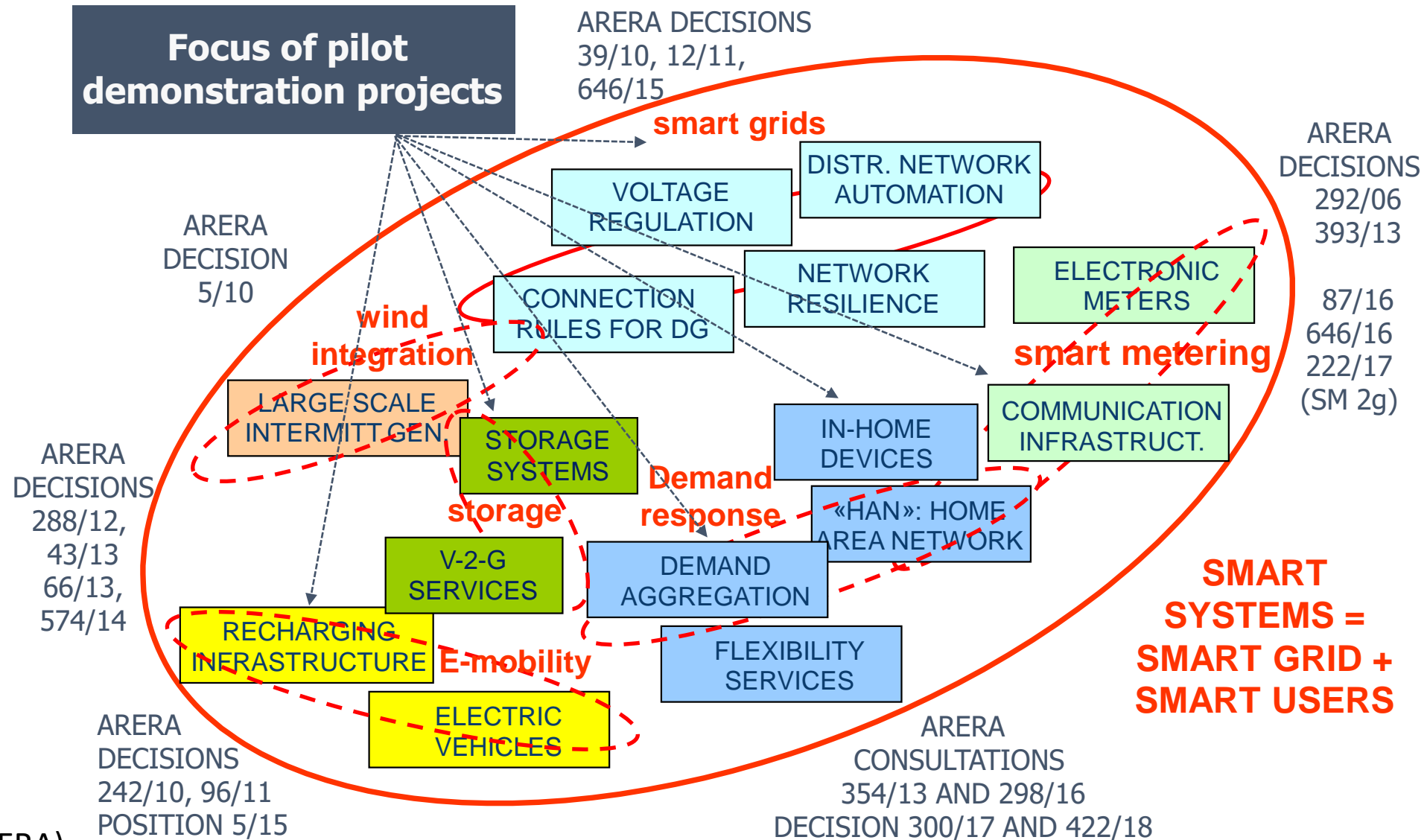


* Preliminary

RES share in gross final consumption and 2020 target



ENERGY REGULATORS CAN FOSTER INNOVATION: THE ITALIAN APPROACH



(source: ARERA)