



Italian National Agency for New Technologies,
Energy and Sustainable Economic Development

Biomass Gasification for Energy Purposes Country Report – Italy Update

Task IEA 33

Petten – 7 May 2018

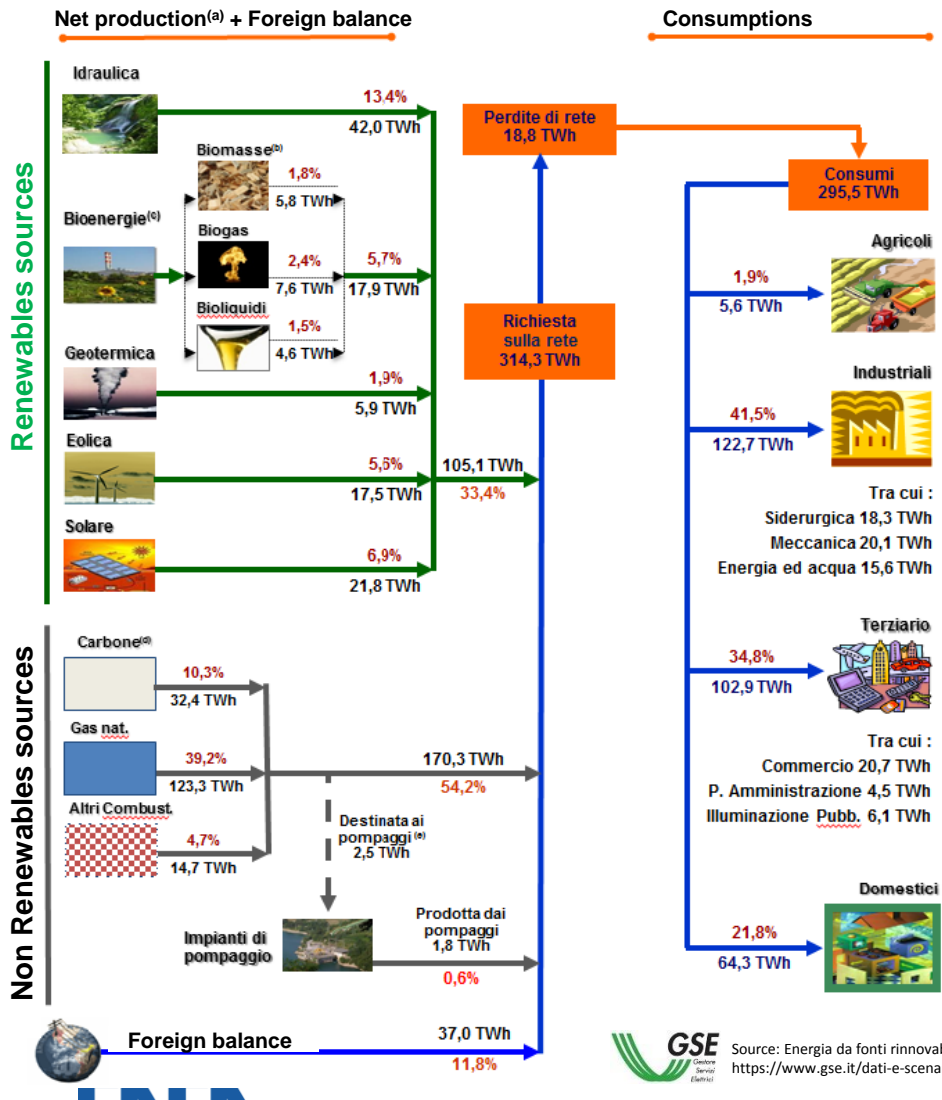
Donatella Barisano - Enea



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National Electricity Balance in 2016 vs 2015



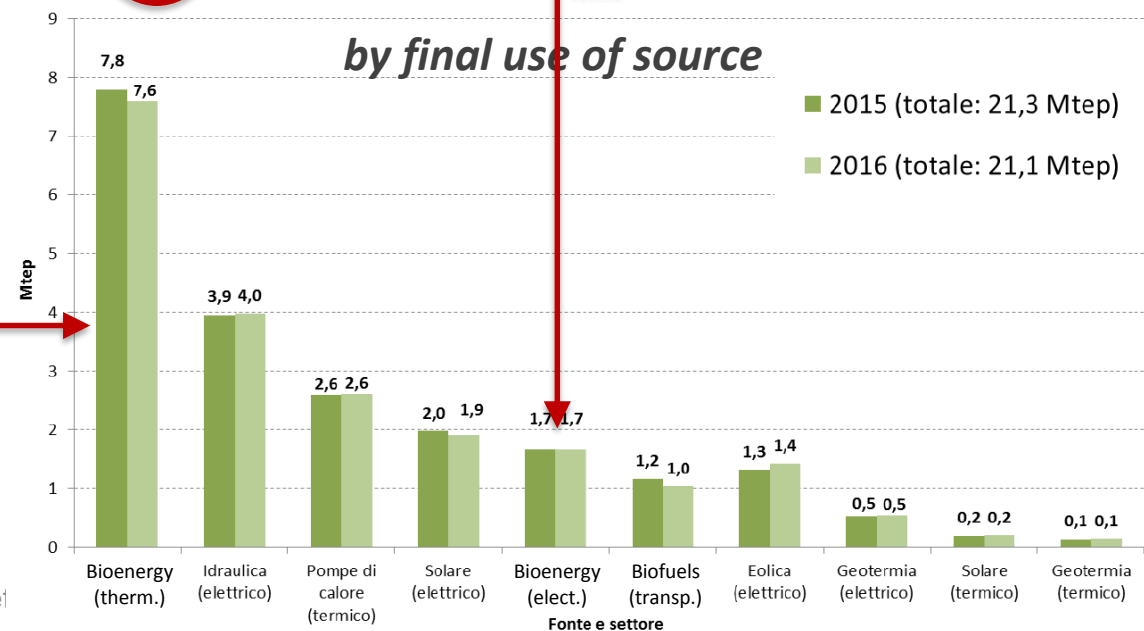
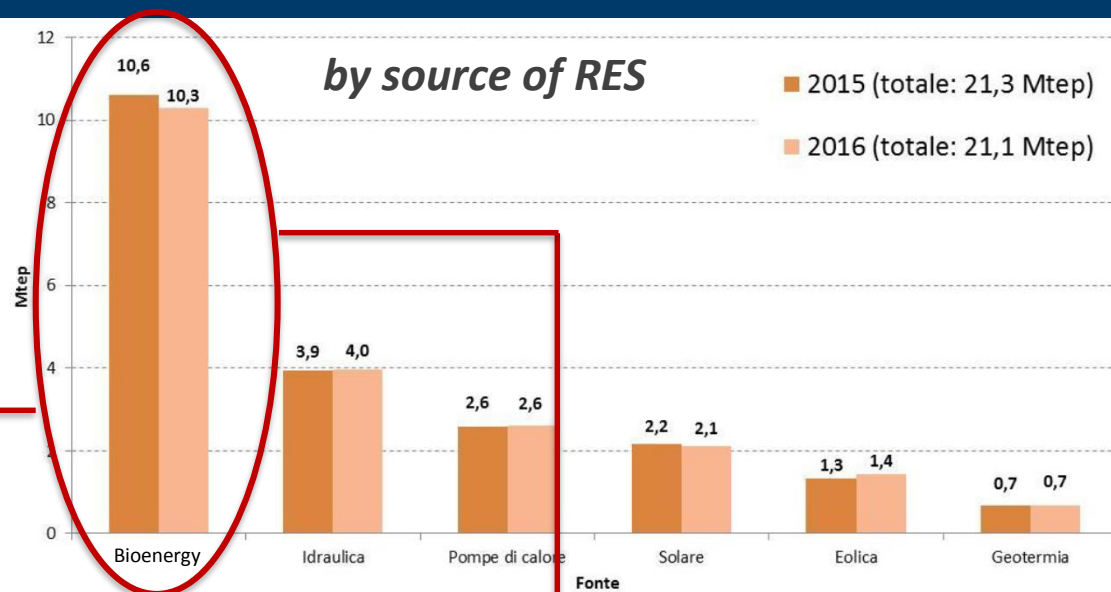
2016	2015
Total grid requirement 314.3 TWh	Total grid requirement 316.9 TWh
Share of Total RES 105.1 TWh, 33.4%	Share of Total RES 106.1 TWh, 33.5%
Share of Bioenergy 17.9 TWh, 5.7%	Share of Bioenergy 17.9 TWh, 5.7%
Share of Biomass 5.8 TWh, 1.8% (4.7 TWh Bioliq.)	Share of Biomass 5.6 TWh, 1.8% (4.8 TWh Bioliq.)



Source: Energia da fonti rinnovabili in Italia - Rapporto Statistico 2016, available at: <https://www.gse.it/dati-e-scenari/statistiche>; published on 20 December 2017.

(A) Net production: gross production net of auxiliary services; (B) Includes the biodegradable part of MSW; (C) Net of the non-biodegradable fraction of MSW accounted in other fuels; (D) Coal + Lignite; (E) The energy used for pumping is conventionally subtracted from the non-renewable thermal production.

Share of individual RES to gross final consumption: 2016 vs 2015



Energy and Environmental Strategies at National Level: updates

- **10 November 2017:** the National Energy Strategy (Strategia Energetica Nazionale, SEN) was **published** in its ultimate version, after a period of public consultation (started in June 2017);
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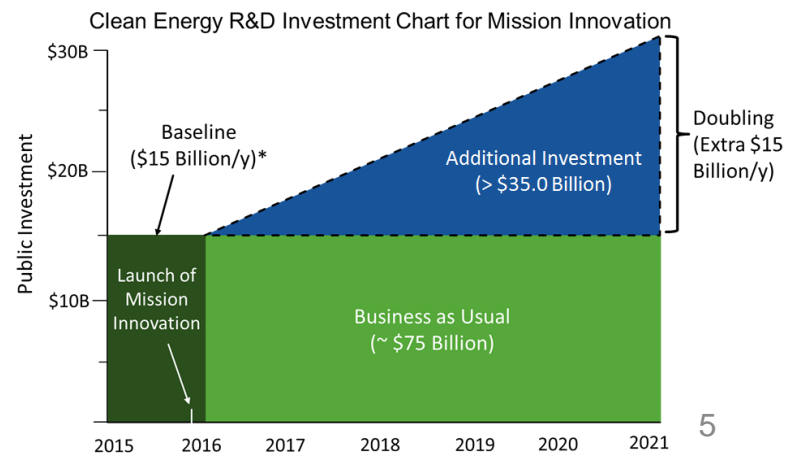
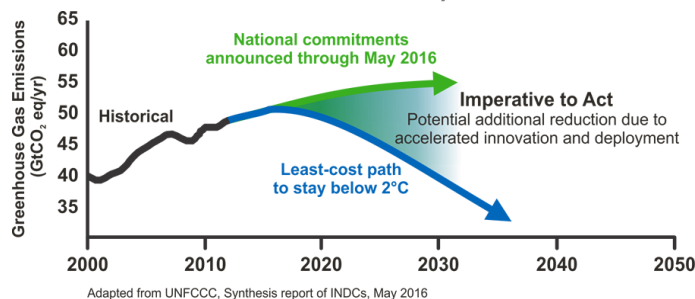
The two Plans synthesize the strategies and actions to be undertaken at national level to achieve the EU target by 2030.

- **2 March 2018:** the **Ministerial Decree** about the Promotion of the use of **biomethane and other advanced biofuels** in the **transport sector** was published in its ultimate version (**gasification** is now **eligible technology** for BioCH₄ production).
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The National Energy Strategy: additional items

By 2030

- Coal phase-out;
- Increase of the share of RES up to 28%, vs 24% originally fixed. In the electrical sector, this new target will result in covering at least 50% of consumption by RES;
- In the field of Bioenergy, attention will be devoted to the development of the **Biomethane** value chain. It will be intended for in-grid injection and as a biofuel in the **transport sector**, including Compressed and liquefied CH₄. (At EU level, Italy is the Country with the largest number of methane vehicles (~1M). The substitution of NG with biomethane will help Italy in achieving the EU target in the transport sector)
- Support to the production and marketing of advanced biofuels to gradual replacement of the fossil ones.
- Doubling investments in clean energy research and technological development: from 222 M€ in 2013 to **444 M€ in 2021** (Goals included in the **Mission Innovation** initiative);



"In support of economic growth, energy access and security, and an urgent and lasting global response to climate change, our mission is to accelerate the pace of clean energy innovation to achieve performance breakthroughs and cost reductions to provide widely affordable and reliable clean energy solutions that will revolutionize energy systems throughout the world over the next two decades and beyond."

<http://mission-innovation.net/the-goal/>

Clean Energy R&D Focus Area in Mission Innovation

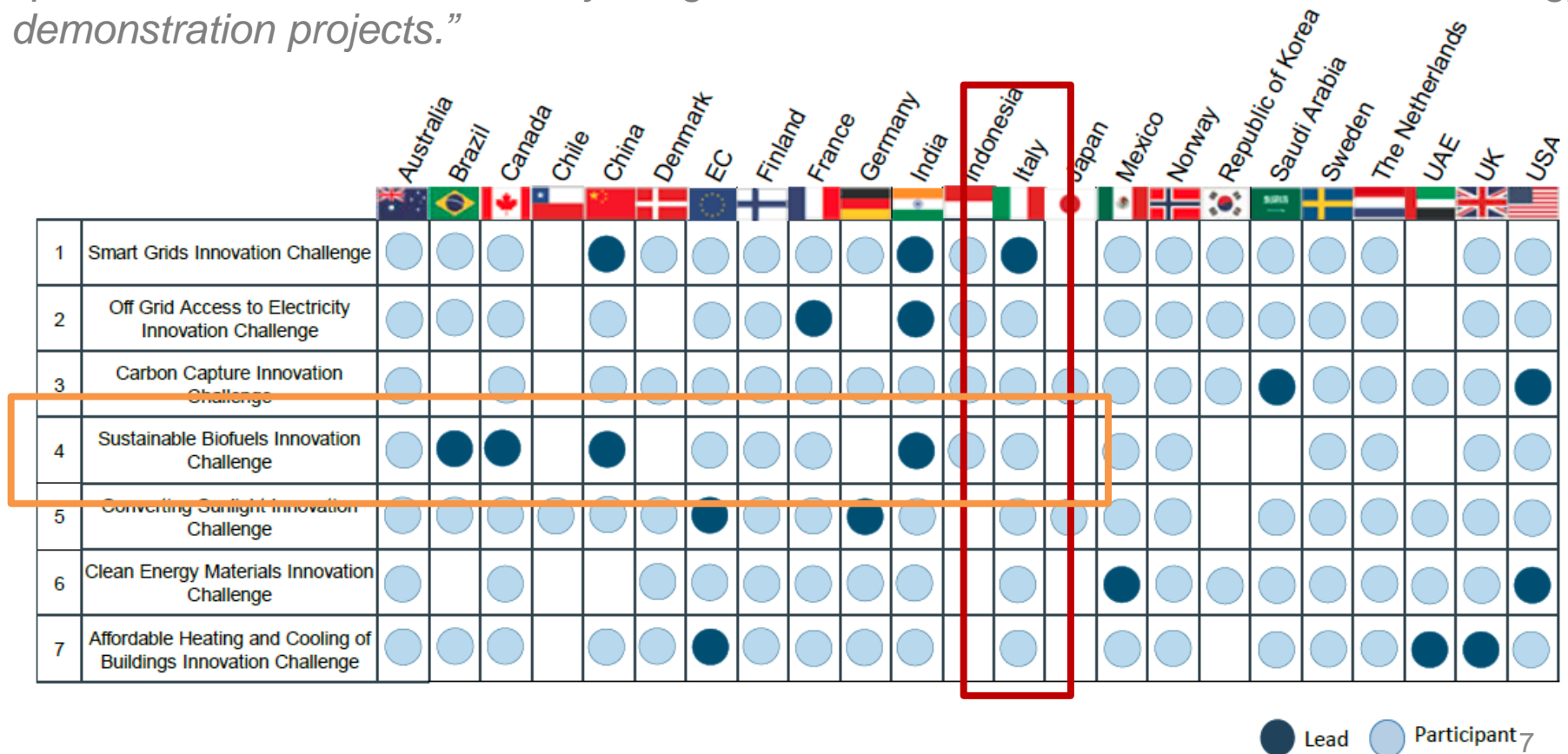
Mission Innovation Clean Energy R&D Focus Areas

	AUSTRALIA	BRAZIL	CANADA	CHILE	CHINA	DENMARK	EUROPEAN UNION	FINLAND	FRANCE	GERMANY	INDIA	INDONESIA	ITALY	JAPAN	KINGDOM OF SAUDI ARABIA	MEXICO	NETHERLANDS	NORWAY	REPUBLIC OF KOREA	SWEDEN	UNITED ARAB EMIRATES	UNITED KINGDOM	UNITED STATES
INDUSTRY & BUILDINGS	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
VEHICLES & OTHER TRANSPORTATION	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●		●
BIO-BASED FUELS & ENERGY	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
SOLAR, WIND & OTHER RENEWABLES	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
NUCLEAR ENERGY	●	●	●		●									●	●				●		●	●	●
HYDROGEN & FUEL CELLS	●	●	●		●	●	●	●	●	●	●		●	●	●	●	●	●	●			●	●
CLEANER FOSSIL ENERGY		●	●		●	●	●			●	●	●		●		●			●				●
CO ₂ CAPTURE, UTILIZATION & STORAGE	●	●	●		●	●	●		●	●	●	●		●	●	●	●	●			●	●	●
ELECTRICITY GRID	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
ENERGY STORAGE	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
BASIC ENERGY RESEARCH	●		●			●	●		●	●	●	●	●	●	●		●	●		●	●		●

Indicators are for key areas of R&D investment, but do not imply a comprehensive representation of a country's full R&D portfolio.

Innovation Challenges: Leads and Participants

“Innovation Challenges are global calls to action aimed at accelerating research, development, and demonstration (RD&D) in technology areas where MI members believe increased international attention would make a significant impact in our shared fight against climate change. The Innovation Challenges cover the entire spectrum of RD&D; from early stage research needs assessments to technology demonstration projects.”



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Ministerial Decree on biomethane and other advanced biofuels: Incentives

- Incentives to BioCH₄ are regulated by the Ministerial Decree published on 05 December 2013
- 3 types of incentives, depending on the final use:



Specific destination in **TRANSPORT**;



WITHOUT specific intended use;



For «**CAR**» **PLANTS**

(**CAR**: Cogenerazione ad Alto Rendimento = High Efficiency Cogeneration)



<https://www.gse.it/servizi-per-te/rinnovabili-per-i-trasporti/biometano/tipologie-incentivabili>



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Ministerial Decree on biomethane and other advanced biofuels in Transport sector (M.D. 2 March 2018)

ALLEGATO 2

SEZIONE A Determinazione del numero dei CIC spettanti al produttore di biometano				SEZIONE B Determinazione della maggiorazione prevista da articolo 6, commi 11 e 12			
Tipologia impianto	L'impianto di produzione del biometano è alimentato:	Gcal/CIC	I certificati vengono rilasciati su una quota percentuale del quantitativo di biometano immesso in consumo nei trasporti:	Determinazione	Durata		
New	esclusivamente da biomasse di cui all'art. 5, comma 5	5	100%	20% del numero CIC spettanti non comprensivi di maggiorazioni	fino al raggiungimento del 70% del valore del costo di realizzazione dell'impianto di distribuzione di gas naturale e comunque al massimo entro un valore di 600 mila euro ¹ e fino al raggiungimento del 70% del valore del costo di realizzazione dell'impianto di liquefazione e comunque al massimo entro un valore di 1,2 milioni di euro ²		
	da biomasse di cui all'art. 5, comma 5 in codigestione con altre materie di origine biologica, queste ultime in percentuale inferiore o uguale al 30 % in peso	5	70%				
	da biomasse di cui all'art. 5, comma 5 in codigestione con altre materie di origine biologica, queste ultime in percentuale superiore al 30 % in peso	10	30%				
	da altre biomasse, ovvero da biomasse di cui all'art. 5, comma 5 in codigestione con altre materie di origine biologica, queste ultime in percentuale superiore al 30 % in peso	10	100%				
Retrofitted	esclusivamente da biomasse di cui all'art. 5, comma 5	5	100%			20% del numero CIC spettanti non comprensivi di maggiorazioni	fino al raggiungimento del 70% del valore del costo di realizzazione dell'impianto di liquefazione e comunque al massimo entro un valore di 1,2 milioni di euro ²
	da biomasse di cui all'art. 5, comma 5 in codigestione con altre materie di origine biologica, queste ultime in percentuale inferiore o uguale al 30 % in peso	5	70%				
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	da altre biomasse, ovvero da biomasse di cui all'art. 5, comma 5 in codigestione con altre materie di origine biologica, queste ultime in percentuale superiore al 30 % in peso	10	100%				

BioCH4 in TRANSPORT sector

Producers are supported according to the number of assigned **CIC** (Certificati di Immissione in Consumo; **Certificates of Release for Consumption**):

- 1 CIC = 375 €
(1 CIC_(adv) = 5 Gcal; 1 CIC_(non-adv) = 10 Gcal)
- **Premiums** are included, depending on the used feedstocks (by-products and/or waste);
- **Further premiums** are provided if a new plant for gas distribution (compressed or liquid) is realised at own expense of the producer.

Biomethane producers can access the market throughout GSE (Energy Service System Operator) or directly (some differences in the selling price of BioCH4).

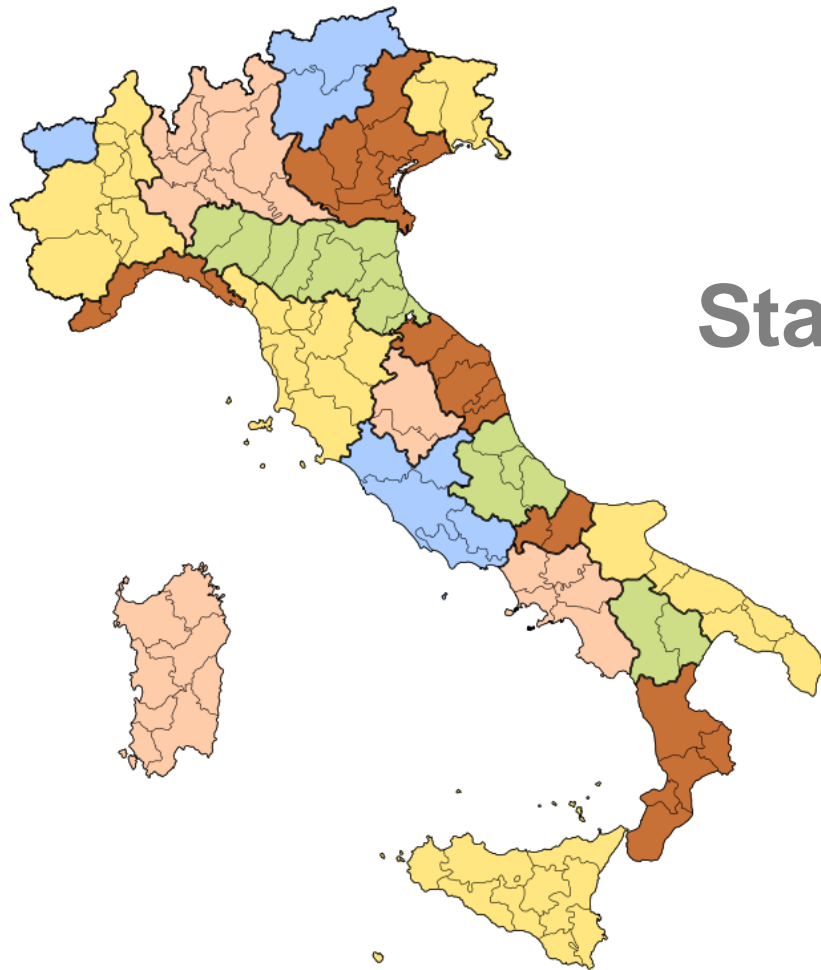
Source: <http://www.gazzettaufficiale.it/eli/id/2018/03/19/18A01821/SG>

The National ENERGY Technology Cluster

In November 2017 the national technology cluster on ENERGY was launched. It concerns a strategic alliance between enterprises and research organizations for innovation made in Italy on the theme of energy, **including renewables and bioenergy**.

This is the 9th cluster constituted since 2012 on areas considered of strategic interest to the national industry (i.e. Aerospace, Agrifood, Green Chemistry, Smart Factory, Means and systems for surface and marine mobility, Life Science, Technologies for Living Environments, Technologies for Smart Communities).





Status of Gasification in Italy

Italian projects on Gasification funded by National and EU initiatives

Italian Region	Name	Funding	Aim	Reactor design	Present Status	Note
Basilicata & Sicily	SPRING G2E	National (by MiSE)	Realizing a preindustrial gasification plant based on the ICBFB reactor with in-situ gas filtration for power production (200 kWe, ICE)	Internally Circulating Bubbling Fluidized Bed	Starting date: 20 March 2018 Ending date: Feb. 2021	Enea: Scientific Coordinator ASCOT Ind.: Consortium leader (Medium Enterp.)
Abruzzo & Lazio	HBF 2.0	National (by MiSE)	Realizing a small scale CHP system (25 kWe, 55 kWth)	Bubbling Fluidized Bed	Starting date: Dec. 2016 Ending date: Nov. 2018	Coordinator: Walter Tosto SpA (Large Enterp.) Partners: UnivAQ, Enertecna S.r.l., UniTuscia, Nuova Ma-Tec 2001 s.r.l.
Sardinia	Sotacarbo	National (MiSE)/ Regional)	Cogasification to efficient power production with CCS	Updraft Fixed Bed	In operation	http://www.sotacarbo.it/en/
Lombardy	EFFIGAS	H2020 (SME)	Innovative self-controlling biomass gasification technology to improve the biogas efficiency achieving a top quality syngas	na	From 2017-05-01 to 2017-08-31, closed project	LEGNO ENERGIA SRL (Small Enterp.)
Piedmont	SYNERGY	H2020 (SME)	Plugplay gasification plant for onsite conversion of otherwise unusable waste into renewable energy	na	From 2016-12-01 to 2017-02-28, closed project	HYSYTECH SRL (Small Enterp.)

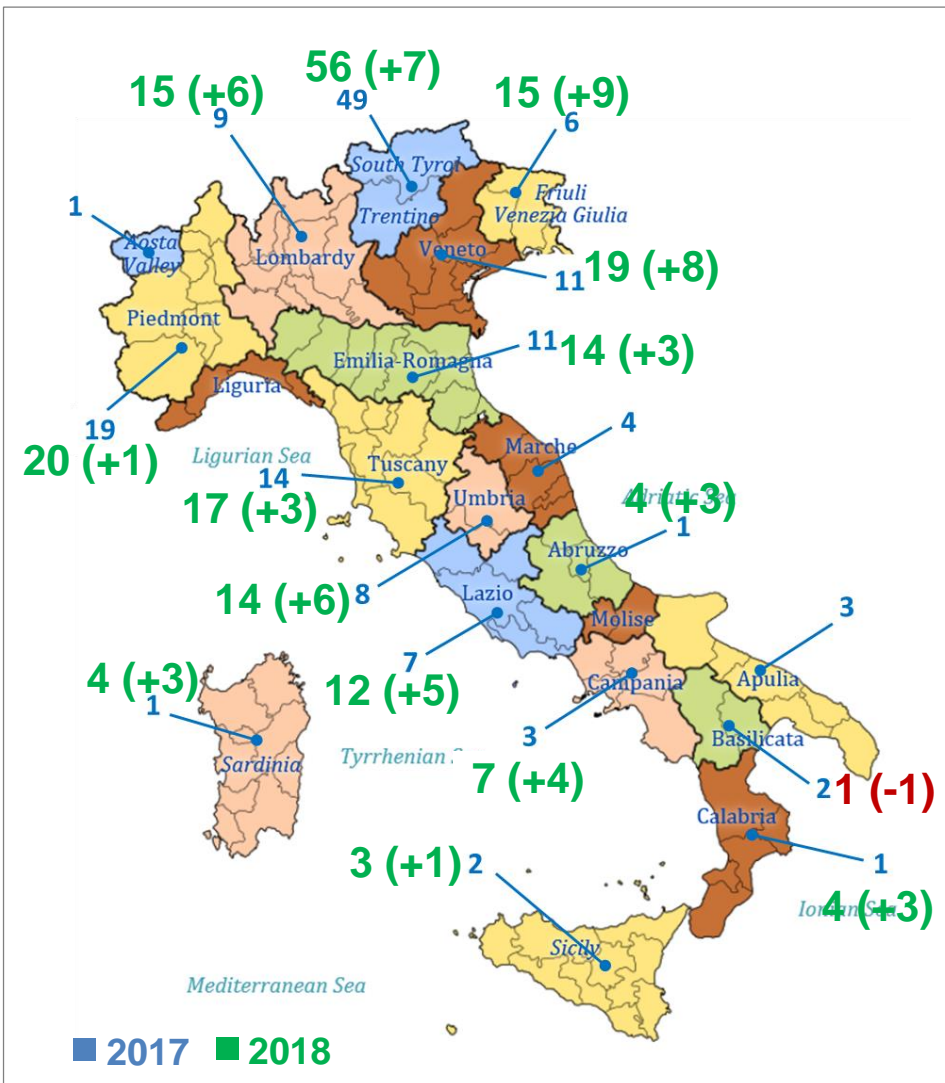
NB: This table is based on data available from the EU CORDIS database.

EU projects on Gasification involving Italy

Name	Funding	Aim	Reactor design	Present Status	Partners	link
Heat-To-Fuel	H2020	Biorefinery combining HTL and FT to convert wet and solid organic, industrial wastes into 2nd generation biofuels with highest efficiency	Dual circulating fluidized bed	From 2017-09-01 to 2021-08-31, ongoing project	GUSSING Energy Technologies , RE-CORD, TUV, BIOENERGY 2020+, PolITO, CRF et al. 14 partners	http://www.heattofuel.eu/
BECOOL	H2020	Brazil-EU Cooperation for Development of Advanced Lignocellulosic Biofuels (twinned with the Brazilian BioVALUE project)	--	From 2017-06-01 to 2021-05-31, ongoing project	UniBO , BIOCHEMTEX SPA, CREA, RE-CORD, BTG, ECN et al. 13 partners	https://www.becoolproject.eu/
COMSYN	H2020	Developing a new BTL production concept that will reduce biofuel production cost up to 35 % compared to alternative routes.	--	From 2017-05-01 to 2021-04-30, ongoing project	VTT Oy , AMEC FOSTER WHEELER ITALIANA SRL et al. 7 partners	--
BRISK II	H2020	Biofuels Research Infrastructure for Sharing Knowledge II	Fluidized and Fixed Beds	From 2017-05-01 to 2022-04-30 ongoing project	KTH , BIOENERGY 2020+ GMBH, ECN, KIT, ENEA et al. 15 partners	https://www.brisk2.eu/
AMBITION	H2020	Advanced biofuel production with energy system integration	Fluidized and Fixed Beds	From 2016-12-01 to 2019-11-30, ongoing project	SINTEF , ECN, DTU, ENEA, KIT et al. 8 partners	http://www.ambition-research.eu/
FLEDGED	H2020	FLExible Dimethyl ether (DME) production from biomass Gasification with sorption-enhanced processes	Dual circulating fluidized bed	From 2016-11-01 to 2020-10-31, ongoing project	PolIMI , ECN, CSIC, LUT et al. 9 partners	http://www.fledged.eu/
3EMOTION	7 FP	Hydrogen production by parallel operation of electrolyzers and biomass gasifier	Bubbling Fluidized Bed	From 2015-01-01 to 2019-12-31, ongoing project	VAN HOOL N.V. , UniLaSapienza, UnivAQ, ENEA et al. 22 partners	http://www.3emotion.eu/
ASCENT	7 FP	Producing H2 needed for highly efficient low-carbon power production by using sorbents for CO2 removal	Bubbling Fluidized Bed	From 2014-03-01 to 2018-02-28, closed project	ENEA , ECN, SINTEF et al. 16 partners	http://www.ascntproject.eu/index.php

NB: This table is based on data available from the EU CORDIS database and project websites.

Gasification plants across Italy



Year of ref.	2015-2016	2018
Total Power (kWel)	30978	43526
Total Number	152*	218§

May 2018		
Geographical area	N° Plants	%
Northern Italy	140	64,2
Central Italy	51	23,4
Southern Italy and islands	27	12,4

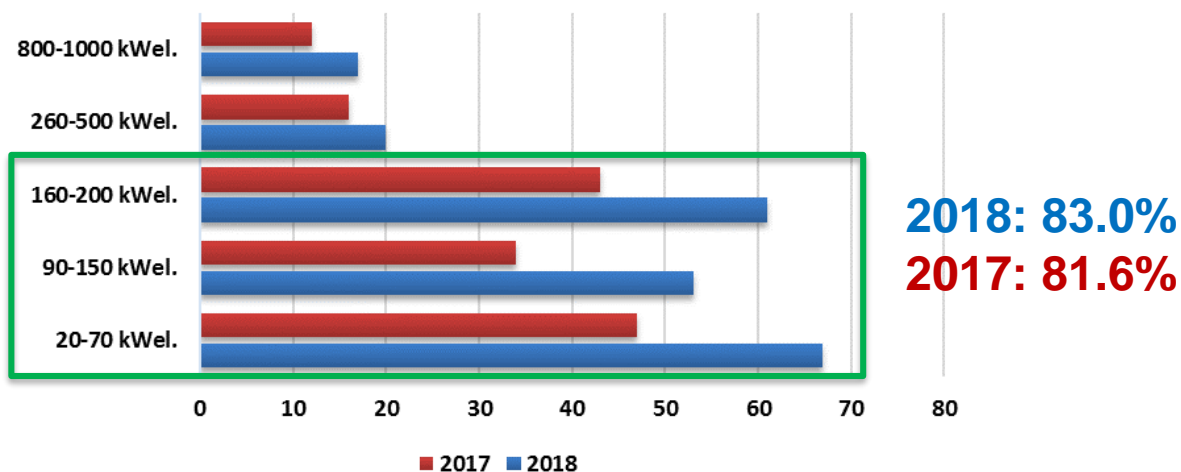
May 2018		
Geographical area	kWel.	%
Northern Italy	32141	73,8
Central Italy	7141	16,4
Southern Italy and islands	4244	9,8

* Census based on the comparison of different sources.
§ by GSE (Energy Service System Operator)

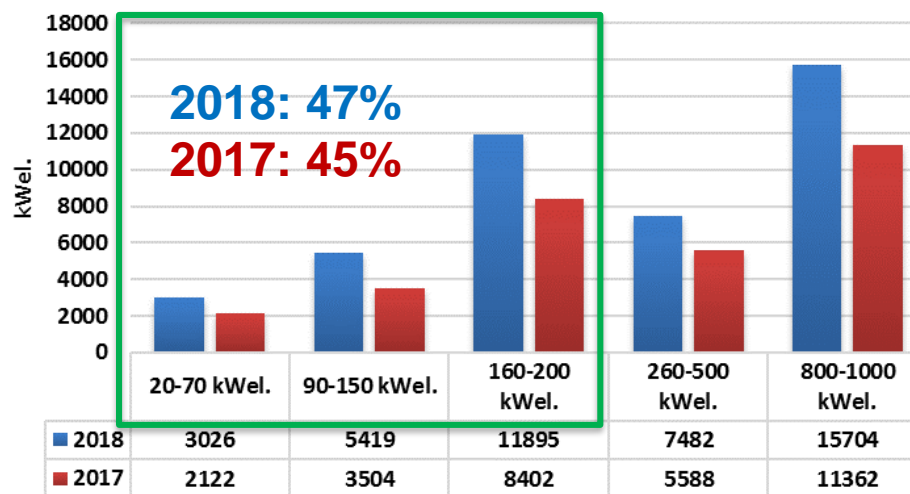


N° of gasification plants and power distribution

N° of plants by size

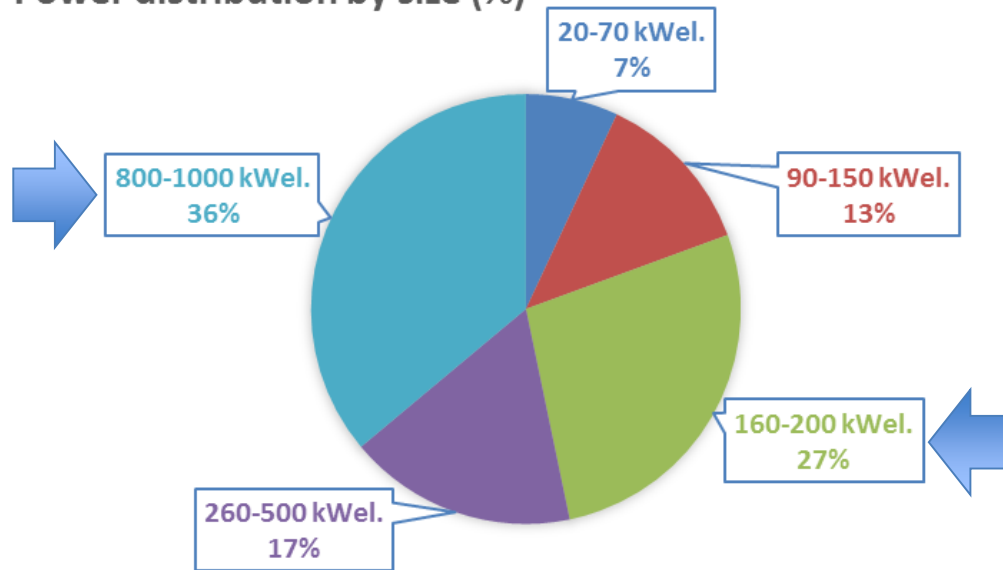


Power distribution by size

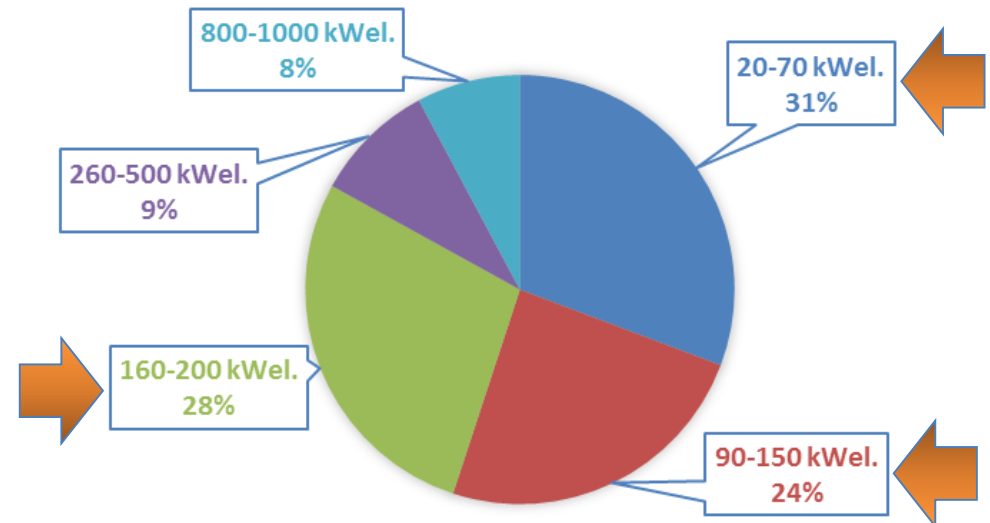


N° of gasification plants and power distribution

Power distribution by size (%)



N° of Plants by size (%)



**Thank you for
attention**



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