



**WBA**

**WORLD BIOGAS  
ASSOCIATION**



# **ANAEROBIC DIGESTION MARKET REPORT**

## **ITALY**

## Introduction

The Italian biogas industry is one of the largest in Europe, and is set to realise its potential thanks to increasing rollout of separate food waste collections and existing natural gas infrastructure for heat and vehicle fuel. With 1,924 digesters and landfill gas plants in operation, Italy is second only to Germany and China in the number of medium- and large-scale facilities operating in any country.

## Current status

- There are close to 1,591 anaerobic digestion plants (Gestore dei Servizi Energetici, 2017) in Italy, of which 47 treat mainly food waste or biowaste. In addition, 333 landfills capture landfill gas to convert it into energy (CIC, 2017).
- Lombardy, Emilia-Romagna and Veneto together produce over 60% of the total biogas produced in Italy.
- **Food waste collection and digestion in municipalities:** Over 6 million tonnes of food and green waste, amounting to 100 kg per person per year, is separately collected in Italy. As of 2015, 47 anaerobic digestion (AD) plants in Italy collectively had the capacity to digest 3 million tonnes of food waste (69% of the total), sludge (15%) and green waste (10%). There is increasing demand for these facilities in the southern regions as most existing facilities are concentrated in the north (CIC, 2017).
- **Feedstock:** 1,466 of the 1,591 biogas plants in operation in Italy are on-farm, using animal manures and forestry-agricultural byproducts.
- **'Biogas Done Right' model:** With the high number of operating agricultural farms in Italy and scope for many more, there is a focus on using farming practices that ensure that energy production from crops does not interfere with food or feed production. The 'Biogas Done Right' model promotes production of biogas from cover (second harvest) crops, crop rotation, minimum tillage, and integration of crop residues with livestock effluents, sub-products and organic waste.



## CURRENT DIGESTERS IN ITALY

Feedstock	Number of biogas plants (2015)	Installed power (MW) (2015)
Waste (AD)	47	68
Waste (landfill)	333	331
Sludge	78	44
Livestock manure	493	217
Agricultural and forest residues	973	746
<b>Total</b>	<b>1,924</b>	<b>1,406</b>

- **Composting of digestate and fertirrigation (liquid fraction of digestate added to irrigation water):** Most AD plants treating food and green waste in Italy separate the digestate into solid and liquid fractions. The solid fraction is composted producing a carbon-rich soil improver, while the liquid fraction is either recirculated in the plant (in the digester or on the composting piles) or treated in a wastewater treatment plant. On on-farm biogas plants, digestate is generally directly applied as a mineral nitrogen-rich fertiliser.

## Potential

- **Biomethane:** Italy has an extensive infrastructure of 800,000 methane-fed compressed natural gas (CNG) vehicles and 1,000 service stations. Roughly 31% of all natural gas refuelling stations in Europe are in Italy. There are financial incentives in place for the production of biomethane for use as transport fuel, which combined with the above infrastructure provide the perfect conditions for rapid growth of biomethane. According to the Italian Biogas Consortium (CIB), by 2020 the number of biomethane service stations could double to 2,000, simultaneously doubling the use of biomethane as a vehicle fuel.
- **(Bio)waste:** CIC forecast an increase of biowaste collected of 3 megatonnes by 2025 (a 50% increase on current levels) and a significant upgrading of current composting facilities to incorporate AD.
- **Energy crops:** Marginal and degraded land which is unsuitable for agriculture can be used for growing biogas energy crops.
- **South Italy:** 85% of existing biogas plants are located in the northern part of the country. There is therefore an opportunity to capture and digest feedstocks in southern Italy such as livestock effluents, agro-industrial byproducts, and organic fraction of municipal solid waste (MSW) that is currently going to landfill.
- **Inclusion in the national greenhouse gas (GHG) inventory:** The inclusion of AD in Italy's national GHG inventory acknowledges the GHG abatement benefit of biogas. Moving forward, the Italian AD industry may be able to make use of capital funds and incentives for renewable energy production as well as those allocated for climate change mitigation.

## Drivers

- **Waste targets:** The target of 65% separate MSW collection set by the Italian Waste Framework Legislation together with the 50% recycling target set by the EU Waste Framework Directive 2008/98/EC require municipalities to implement food waste source separation de facto. Where this is applied (in around 60% of municipalities), good results are expected in terms of effectiveness and efficiency of separate collection. 100 kg of food waste per person per year were collected in 2015.
- **Digestate classification:** Referring to on-farm AD plants, the recently published 'Digestate decree' classifies "agricultural" digestate as a by-product of AD. Digestate produced from food waste, meanwhile, is still classified as a waste, requiring an aerobic step in order to turn this into compost, which can be marketed freely.
- **Financial support for biomethane:** Since December 2013, financial incentives have been in place for the generation of biomethane based on final use of the gas (whether injected into the gas grid, used in transport, or used in high-efficiency cogeneration plants), the size of the plant, and the types of feedstock utilised. A new incentive scheme is expected to be implemented by the end of 2017.
- **Financial support for electricity:** In 2012, a feed-in tariff replaced the green certificates that were previously awarded for electricity produced by biogas. Awards are given and penalties applied to biogas plants that do or do not comply with efficiency standards set by law.

## Barriers

- **Insufficient financial support:** After the revision of the feed-in tariff in 2012, there has been a dramatic drop in installed capacity added per year. Operators' focus has shifted from adding new capacity to sustainably managing existing capacity under the current tariff regime.

## CASE STUDIES

### City of Milan (Amsa SpA, 2016)

- **Inputs:** 130,000 tonnes of food waste collected from residents of Milan.
- **Outputs:** Biogas for fossil fuel-substitution and compost (under CIC's quality-assurance system) for use in agriculture.
- **What is unique:** The scale and success of Milan's food waste collection has set an example for other large cities to follow.
  - The digestion and composting of the collected food waste results in a reduction of 8,760 tonnes of CO<sub>2</sub> emissions per year.
  - Thanks to education, awareness campaigns, and quality analysis, food waste recycling rates are up to 85%, with contamination levels down to around 4.5%.

### SESA Plant, City of Este (AD and Composting Facility, 2017)

- **Inputs:** 400,000 tonnes of food waste and green waste collected from municipalities.
- **Outputs:** Biogas upgraded to biomethane, and compost (under CIC's quality-assurance system) for use in agriculture.
- **What is unique:** The facility is a public-private partnership that has been increasing its throughputs for 20 years. It is currently the EU's largest facility accepting organic waste collected separately from households, commercial activities, and agro-industries. The excess heat produced is used for nearby greenhouses and for district-heating the Este municipality close to the plant.

### Palazzetto Farm (Ecofys, 2016)

- **Inputs:** Manure, maize silage, triticale silage, and soybean.
- **Outputs:** Biogas and animal feed.
- **What is unique:** An existing biogas plant switching from 'summer-only' crop to sequential cropping has led to:
  - increased food and forage production
  - increased carbon, potassium and phosphorus levels in soils
  - 86.5% GHG savings over conventional fossil-fuel operations
  - increased biodiversity
  - increased water use, which has been partly compensated for through use of rainwater and high-efficiency irrigation systems

"IN THE TWO DECADES BETWEEN 1997 AND 2017 THE AMOUNT OF ORGANIC WASTE COLLECTED SEPARATELY IN ITALIAN MUNICIPALITIES INCREASED BY A FACTOR OF 10. THIS WAS FOLLOWED BY THE DEVELOPMENT OF AN INDUSTRIAL SECTOR, REPRESENTED BY CIC, COMPRISING COMPOSTING AND BIOGAS FACILITIES.

IN 2015 THIS SECTOR INCLUDED MORE THAN 300 FACILITIES TREATING WASTE – TODAY THERE ARE AROUND 1400 FARM FACILITIES IN OPERATION, WITH THIS SECTOR REPRESENTED BY CIB. ONCE THE LEGISLATIVE FRAMEWORK IS COMPLETED, WITH THE MISSING TECHNICAL DECREES ADDED IN, ITALY CAN IMPLEMENT THE NEXT STEP OF UPGRADING BIOGAS TO BIOMETHANE.

WE FORECAST 8.5 BILLION M<sup>3</sup> WILL BE PRODUCED BY 2030 AND OF THIS AT LEAST 0.5 BILLION M<sup>3</sup> WILL BE GENERATED FROM BIOWASTE COLLECTED SEPARATELY IN ITALIAN MUNICIPALITIES. A SIGNIFICANT SHARE OF BIOGAS WILL BE PRODUCED AT LANDFILLS AND WASTEWATER TREATMENT PLANTS."

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