ENERGY SEGMENT

SCOPE

The chapter *Energy Segment* includes Acea Produzione, the PV Companies under Acea Sun Capital, Areti, the Acea Ambiente and Ecogena energy production plants (Ecogena is only included for data on energy produced and Energy Efficiency Certificates). Waste-to-energy activities are also described in the chapter *Environment Segment – waste management*.

916 GWh TOTAL ENERGY PRODUCED: **68%** FROM RENEWABLES (**625 GWh**)

210,000 t OF CO_2 SAVED THROUGH PRODUCTION OF **electricity** FROM **renewables** INSTEAD OF TRADITIONAL SOURCES

16 MW OF **PV** PURCHASED, FOR A TOTAL OF **52.5 MW installed**

The Group **oversees the entire electricity supply chain** thanks to the operations of independent Companies, as required by the regulation of the electricity market. In particular, Acea is active in the **production** of electricity and heat, in the **distribution** of electricity in the Rome and Formello areas, including the management of public lighting; and in the **sale** of electricity, heat and gas.
Acea focuses on **innovation applied to network management** – remote control, IoT and smart grids – which also supports an **increase in resilience of infrastructure** and optimal management of **prosumers** connected to its energy distribution network, which are constantly increasing in number (see also the chapters *Customers and communities and Institutions and the Company*).

ENERGY PRODUCTION: FOSSIL AND RENEWABLE ENERGY SOURCES

Acea intends to promote and **increase production of electricity from renewables** and has launched a path of growth in the **photovoltaic** generation sector, with the goal of reaching an installed capacity of 747 MW in 2024, as set out in the 2020-2024 Business Plan. In 2020, 16 MW were purchased, thus reaching 52.5 MW of installed capacity.

GROUP PLANTS

Through the Companies **Acea Produzione, Acea Sun Capital** and **Acea Ambiente, the Group produces electricity** primarily from renewables. **The majority of production is provided by hydroelectric plants and another significant portion**, also partially renewable, **from waste-to-energy plants utilising paper-mill waste and Solid Recovered Fuel (SRF)**[111].

Acea Produzione is equipped with plants for generation from renewables, both hydroelectric and photovoltaic, and fossil fuels (thermoelectric), with the latter primarily involving the **high-efficiency co-generation plant**. The power park includes:

- **7 hydroelectric power stations** located in the Lazio and Abruzzo regions for a total of **122 MW**;
- **2 thermoelectric power stations**, located within the Municipality of Rome area: Montemartini (78.3 MW)[112] and Tor Di Valle (19.0 MW), for **97.3 MW_e total available installed capacity**;
- one **photovoltaic park**, for a total of **52.5 MW_p**, of which 16 MW purchased in 2020[113].

The generation of energy from waste-to-energy processing is assigned to **Acea Ambiente**, taking place at **two plants** located in San Vittore del Lazio and Terni, and both with percentages of **biodegradable** material (renewable source) varying between 40% and 50%. The total gross electrical power currently available is approximately **58 MW_e**.
In addition, Acea Ambiente produces electricity using **biogas** derived from the anaerobic digestion process at the Orvieto Technology Hub and the composting plants of Aprilia and Monterotondo Marittimo.

TABLE NO. 50 – INSTALLED POWER OF THE ELECTRIC POWER STATIONS OF ACEA PRODUZIONE

hydroelectric power stations	thermoelectric power stations
A. Volta di Castel Madama (Rome) power station – gross power **9.4 MW**	Tor di Valle power station: high-efficiency cogeneration (CAR) section (*) (Rome) methane fuel – gross power **19.0 MW**
G. Ferraris di Mandela (Rome) power station – gross power **8.5 MW**	Montemartini power station (Rome) gas oil fuel – gross power **78.3 MW**
Salisano power station (Rieti) – gross power **24.6 MW**	
G. Marconi di Orte power station (Viterbo) – gross power **20.0 MW**	
Sant'Angelo power station (Chieti) – gross power **58.4 MW**	
Cecchina power station (Rome) – gross power **0.4 MW**	
Madonna del Rosario power station (Rome) – gross power **0.4 MW**	
general total: gross capacity 219 MW	

(*) The CAR plant in Tor di Valle provides district-heating service in the area south of Rome.

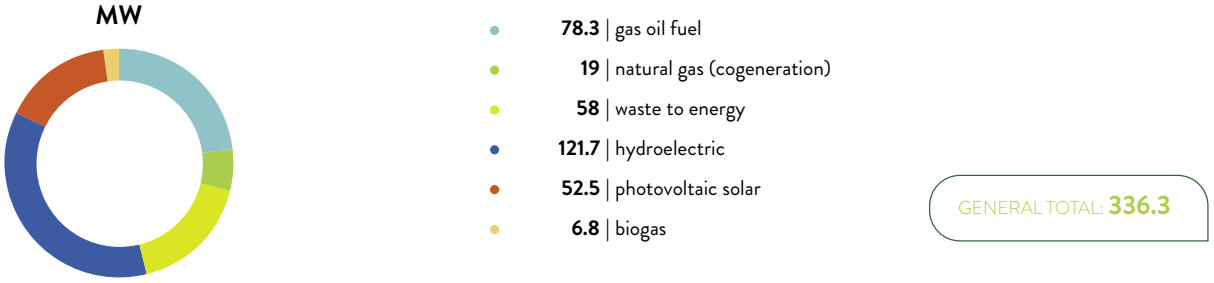
111 A primary energy source, derived from waste.

112 The power station is operational only in the event of extraordinary energy demand, and operation can also be managed remotely from the control room at the Tor di Valle Power Station.

113 The photovoltaic plants purchased are the property of the Company Acea Sun Capital.

The installed capacities of the Group, which **overall amount to approximately 336 MW**[114], are presented in chart no. 48, distinguished by energy source.

CHART NO. 48 – INSTALLED ELECTRICAL POWER OF THE GROUP BROKEN DOWN BY ENERGY SOURCE (MW) (2020)



ELECTRICITY PRODUCED

In 2020, total gross electricity production remained stable, around **916 GWh**, -0.4% compared to the 920 GWh of the previous year. On the one hand, low rainfall reduced hydroelectric production and certain issues with the line turbines of the waste-to-energy plants led to reduced energy performance. Meanwhile, there was greater photovoltaic production, due to plants purchased during the year, and biogas production, due to production almost at full capacity for the composting plants of Monterotondo Marittimo and Aprilia, in addition to production of the Orvieto plant.

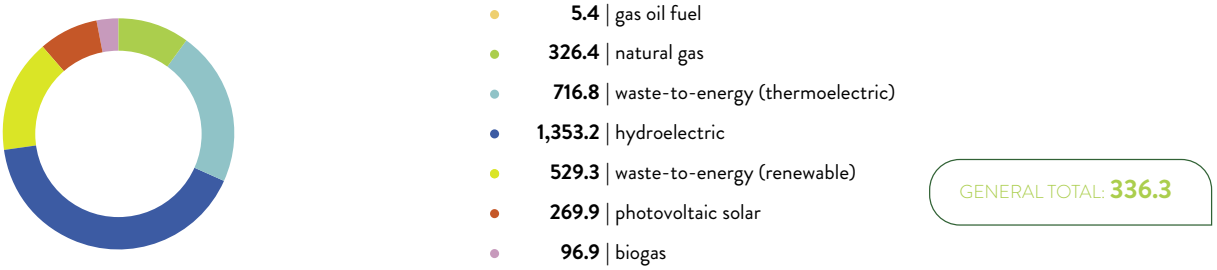
The share of electricity generated by **renewable sources**, about **625 GWh**, is **predominant**, corresponding to approximately **68% of the total**, with the following contributions:

- 376 GWh from hydroelectric power;
- 147 GWh from waste-to-energy;
- 27 GWh from biogas (Orvieto, Aprilia and Monterotondo Marittimo plants);
- 75 GWh from solar panels (see chart no. 49 and table no. 51).

In January 2020, Acea Produzione completed work to **upgrade and increase the efficiency of hydroelectric plants**: the last being the **Galileo Ferraris di Mandela hydroelectric power station** in the province of Rome. This made it possible to optimize the use of available water resources, under the same conditions of installed and licensed power.
The Company also implemented a project at the Tor di Valle High Efficiency Cogeneration Plant (CAR), involving installation of a further two 1.5 MW_e internal combustion engines, that **will be powered by the biogas from the adjacent** Acea Ato 2 Roma Sud **treatment plant**. The Tor di Valle plant will in turn provide the **treatment plant with thermal energy to heat the sludge in the digesters**[115]. Construction of a 267.3 kW_p photovoltaic plant has been authorised at the same power station. Works began in November 2020 and will be completed by April 2021.

With regard to the **share of green energy from waste-to-energy** production, in 2020 the figure was approximately 42% for both plants, being associated to the combustion of the **biodegradable fraction of waste** used as a primary source. In particular, the **renewable share of the fuel** (SRF) entering the **San Vittore del Lazio plant** was equal to **42.5%** of the total of waste-to-energy, while in the **Terni plant** this share was around **42.4%**. The percentage **was lower** than in recent years, particularly at the San Vittore del Lazio plant, **due to the change in the composition of SRF for reasons connected to the Covid-19 pandemic**: municipal waste was altered, probably due to closures in the initial months and the significant restrictions in subsequent months in the restaurant sector and public services, such as schools, as well as in commercial and industrial settings regarding canteens.
The decrease in energy produced by hydroelectric power plants, equal to about 12% compared to 2019, is primarily due to the lower rainfall recorded during the year.
With regard to thermoelectric energy, the increase in production is due to a greater availability of the Tor di Valle plant.

CHART NO. 49 – ELECTRICITY PRODUCED SUBDIVIDED BY PRIMARY ENERGY SOURCE (TJ) (2020)



NOTE The values reported in the chart are expressed in TJ (1 GWh = 3.6TJ).

[114] The total installed power includes the Acea Produzione plants, the waste-to-energy plants and the Orvieto, Aprilia and Monterotondo Marittimo plants (Acea Ambiente) for the production of biogas.

[115] In January 2021, the request was submitted to the Ministry for the Environment (MATTM) for preliminary verification for application of an EIA.

TABLE NO. 51 – ELECTRICITY PRODUCED (BY PRIMARY ENERGY SOURCE) (2018-2020)

	2018	2019	2020
PRIMARY ENERGY SOURCE		TJ (GWh) (*)	
ELECTRICITY PRODUCED (BY PRIMARY ENERGY SOURCE)			
gas oil fuel	2.0 (0.6)	4.9 (1.4)	5.4 (1.5)
natural gas (cogeneration)	261.9 (72.8)	320.1 (88.9)	326.4 (90.7)
waste-to-energy (approximately 58% of the total in 2020)	718.4 (199.5)	643.8 (178.8)	716.8 (199.1)
total thermoelectric	**982.3 (272.9)**	**968.8 (269.1)**	**1,048.6 (291.3)**
hydroelectric	1,715.5 (476.5)	1,533.4 (426.0)	1,353.2 (375.9)
waste-to-energy (approximately 42% of the total in 2020)	684.6 (190.2)	642.2 (178.4)	529.3 (147.0)
biogas	67.1 (18.6)	71.2 (19.8)	96.9 (26.9)
photovoltaic solar (**)	36.7 (10.2)	95.0 (26.4)	269.9 (75.0)
total renewables	**2,503.9 (695.5)**	**2,341.8 (650.5)**	**2,249.2 (624.8)**
general total	**3,486.2 (968.4)**	**3,310.6 (919.6)**	**3,297.8 (916.1)**

(*) 1 GWh = 3.6 TJ.

(**) Photovoltaic includes the production at the plants located on sites of the water area (Acea Ato 2 and Acea Ato 5) and at the Orvieto hub, for a total of 1.9 GWh produced. The figure for 2019 has been updated to include energy produced by the plants purchased in the second half of the year.

THERMAL ENERGY PRODUCED

The **Tor di Valle** thermoelectric power plant generated **approximately 94 GWh of thermal energy**. The heat generated was used to serve 39,852 residents in the area south of Rome (Mostacciano, Torrino and Mezzocammino) by means of a district-heating network which provides a volume equal to 3,627,911 cubic metres[116]. In 2020, **30 of the current 361 thermal substations serving the district-heating network were replaced**, with the goal of constantly increasing process efficiency and service reliability for users (see also the paragraph *Strategy and sustainability*, the *2020-2024 Sustainability Plan* and the *operational goals*). were replace

The Company **Ecogena**, certified as an ESCo (Energy Services Company) in accordance with UNI CEI 11352:2014, **develops the energy efficiency initiatives for the Group** and reports their results to Gestore dei Servizi Energetici (GSE) for the awarding of Energy Efficiency Certificates (EEC).

The activities assigned to Ecogena include also the design and building of cogeneration and trigeneration plants[117] for the production, in combined mode, of **electrical, heat and cooling energy**.

In **2020 cogeneration plants were managed**, combined with **district-heating networks for a total of 4.9 MW of electrical power**. The production of electricity and thermal energy saw a decrease due to the **drop in power draw following the restrictions imposed to contain the Covid-19 pandemic, the closure of many manufacturing and commercial enterprises** and also due to the milder winter compared to the previous year (see table no. 52).

TABLE NO. 52 – THE PRODUCTION OF ENERGY BY ECOGENA PLANTS AND ENERGY EFFICIENCY CERTIFICATES EEC (2018-2020)

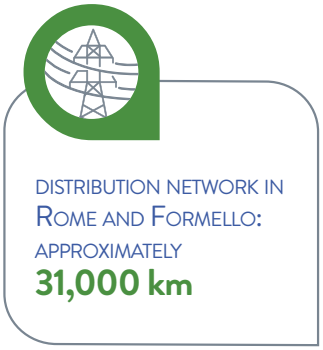
	2018	2019	2020
energy produced		**TJ (GWh)**	
electricity	54.1 (15.0)	51.5 (14.3)	36.0 (10.0)
of which plants owned by Ecogena	*50.3 (14.0)*	*49.0 (13.6)*	*32.2 (8.9)*
of which plants owned by third parties	*3.9 (1.1)*	*2.7 (0.7)*	*3.9 (1.1)*
thermal energy	95.4 (26.5)	103.3 (28.7)	87.2 (24.2)
of which plants owned by Ecogena	*81.1 (22.5)*	*89.2 (24.8)*	*73.2 (20.3)*
of which plants owned by third parties	*14.3 (4.0)*	*14.0 (3.9)*	*14.0 (3.9)*
refrigeration energy (all owned plants)	34.5 (9.6)	37.6 (10.5)	37.6 (10.5)
		EECs	
Total EECs (all from plants owned by Ecogena)	**1,359**	**954**	**943**

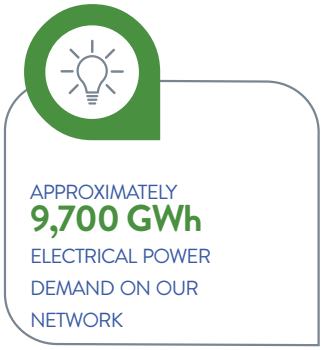
NOTE Other information on EECs is provided in the *Energy savings* section of the chapter *The use of materials, energy and water*.

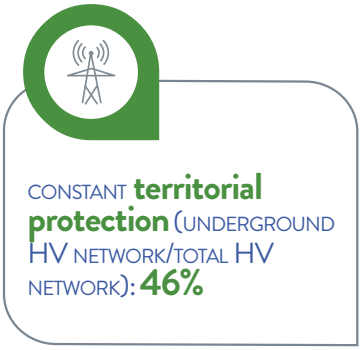
116 The data is from December 2020.

117 Cogeneration, i.e. the combined production of electrical and thermal energy, allows high efficiencies to be achieved, between 80 and 90%. Trigeneration, which is a special application of cogeneration, allows use of a part of the thermal energy recovered in order to produce cooling energy in the form of cooled water for air conditioning in rooms or for industrial processes.

ENERGY DISTRIBUTION







THE DISTRIBUTION NETWORKS

Areti manages the **electricity distribution network** of Rome and Formello, extending over **approximately 31,000 km** and capable of supplying about **2.8 million residents**. In terms of volumes of electricity distributed, about 9,700 GWh in 2020, Acea is the third largest Italian operator in the sector.

Table no. 53 presents the principal plant data of the Company, including the number of primary and secondary substations, the transformers[118] and the km of overhead and underground distribution lines. **The environmental indicator** related to the **protection of the region**, calculated as a percentage share of the **underground high-voltage network** (HV) **in relation to the total of the HV lines in use** (overhead and underground), **has improved in recent years, and in 2020 was stable compared to the previous year**, equal to **46%.** This also as a result of the ongoing **transformation and modernisation** of the high and very-high-voltage electricity distribution grid.

TABLE NO. 53 – NUMBER OF OVERHEAD AND UNDERGROUND DISTRIBUTION LINES AND PLANTS (2018-2020)

Areti

SYSTEMS AND OUTPUT	u. m.	2018	2019	2020
HV/HV – HV/MV primary substations	no.	70	70	70
HV/HV and HV/MV transformers	no.	166	170	171
transformation power	MVA	7,631	7,781	7881
substations in use	no.	1,3211	13,238	13,292
MV/MV – MV/LV transformers	no.	12,838	12,883	12,897
transformation power	MVA	6,236	6,282	6,298
OVERHEAD AND UNDERGROUND NETWORKS				
high voltage network – overhead lines	km	282	282	282
high voltage network – underground lines	km	243	243	243
medium voltage network – overhead lines	km	424	422	421
medium voltage network – underground lines	km	10,166	10,470	1,0211
low voltage network – overhead lines	km	1641	1642	1,642
low voltage network – underground lines	km	18,306	18,417	1,8511

MEMORANDUM OF UNDERSTANDING FOR THE REARRANGEMENT OF THE ELECTRICITY NETWORK

2020 saw the continuation of the **plan to modernize the high voltage electricity distribution grid (150 kV)**, defined in the ***Memorandum of Understanding*** signed in 2010 among Areti SpA, the Municipality of Rome and Terna SpA. The activities conducted are aimed at the pre-defined targets for reduction of environmental impacts, in particular through the demolition of lines and the removal of pylons, as well as energy savings with the completion or launch of works for rearrangement and optimisation of the HV network:

- works continued for dismantling of HV lines no longer in use, with removal of 12 pylons on the 150 kV Flaminia 2 – Smistamento Est 2 line (total of 22.6 km and 74 pylons);
- works were completed for construction of the 150 kV Roma Nord-San Basilio line, involving the new stretch from the Roma Nord Electrical Station for a length of 4 km;
- works have begun for creation of the new underground stretch of the 150 kV Roma Nord-San Basilio line between the Latte Station and the Parco Azzurro terminal area, with a planned length of 3.4 km.

On completion of the works set out in the Plan, in addition to improved service quality, there will be environmental benefits due to lower energy losses and expected energy savings (estimated at approximately 58,000,000 kWh, which is equivalent to the average annual consumption of approximately 20,000 households).

[118] With regard to polychlorinated biphenyls (PCBs), pursuant to Legislative Decree no. 209/99 and Law no. 62/05, Acea disposed of transformers with PCBs above the 500 ppm threshold in 2009. In 2020, 122 transformers with PCBs above 50 ppm but below the 500 ppm threshold, including 28 for public lighting, were reported to Arpa, and 8 transformers were disposed of, for a total weight of 11,320 kg and a quantity of PCBs of 681 ppm.

The management of the electricity distribution network of Rome and Formello is characterized by the **continuous improvement of the performance**, with a particular focus on energy efficiency. Areti implements **initiatives to reduce network losses**, which include the reclassification of medium voltage levels from 8.4 kV to 20 kV and the installation of MV/LV transformers with very low losses. For further information see the *Energy savings* section, in the chapter *The use of materials, energy and water*.
The initiatives launched to **improve the resilience of networks and optimise their management, through technological innovation** applied to the infrastructure, are illustrated in the chapter *Institutions and the Company*.
Also as a result of the activities mentioned above, **energy losses on the network** during the year amounted to **approximately 6% of the total transported**, a decrease compared to the 7% of 2019.

Furthermore, in 2020 Areti began the **replacement of traditional meters with 2G electronic devices**, for a total of 1.7 million units. In addition to the expected benefits for customers (see the sub-section *Service quality* in the paragraph *Customers and communities*), the initiative will also generate positive environmental impacts, with a **forecast reduction in emissions by 2024 of 200 t of CO_2** due to the convergence of several factors:

- a reduction in operational actions, with consequent decrease in vehicle journeys and kilometres travelled by personnel in the field or by personnel of the contractors performing readings of meters that cannot be reached remotely;
- a reduction in paper bills, no longer issued to end customers upon replacement of the meter;
- a reduction in polluting emissions and carbon dioxide output with the obligation to use electric or low-emissions vehicles, imposed on contractors involved in mass replacement of meters.

ENVIRONMENT SEGMENT – WASTE MANAGEMENT

SCOPE

The chapter includes ACEA Elabori, for the project "Smart Comp"; the activities of the waste treatment hub, waste-to-energy plants and compost production plants, all within Acea Ambiente; and the activities of Aquaser and Acque Industriali.

19,347 t OF **high-quality compost** PRODUCED (**+33%** COMPARED TO 2019)

MORE THAN **17,100 kNm³** OF BIOGAS PRODUCED AND, FROM THIS, **27 GWh** OF ENERGY

waste-to-energy processing: MORE THAN **409,300 t** OF WASTE INPUT AND APPROXIMATELY **87,400 t** OF WASTE OUTPUT **21% output/input**

THE LOCAL **composting project** CONTINUES: **"Acea Smart Comp 2.0"**

Acque Industriali COORDINATES THE **"NANOBOND"** PROJECT: INNOVATION IN THE TREATMENT OF CONTAMINATED SLUDGE AND DREDGING SEDIMENTS

Acea Ambiente COORDINATES THE **"SLUDGE MINING"** PROJECT FOR RECOVERY OF THE ORGANIC COMPONENT AND **critical raw materials** FROM TREATMENT SLUDGE TREATMENT

Acea manages the end part waste cycle in order to **recover, recycle and reuse waste in the best possible way** and, when possible, **recover energy**. Specifically, it oversees:

- **the treatment of municipal solid waste** (MSW) and other types of waste (like green waste from separate collection, industrial waste, etc.), **for the recovery of material** and disposal of only the residues in landfills;
- **the treatment of liquid wastes** such as leachates and liquid sludge;
- **incineration with energy recovery** with consequent reduction of the soil needed for disposal;
- **the production of high quality compost** for agriculture.

The management of solid and liquid waste is performed **using advanced technology and modern systems**, recently upgraded or expanded, in order to improve and renew processes and increase recovery of material and/or energy. The Companies operating in waste management **carry out research**, also in collaboration and partnerships with university institutions and Companies in the circular-economy field. Included in this context is the "**Acea Smart Comp**" **local composting** activity performed by Acea Elabori, the "Sludge Mining" project for the **recovery of *critical raw materials*** coordinated by Acea Ambiente and the "**NANOBOND**" project coordinated by Acque Industriali (see specific info. boxes).

During 2020, **Acea Elabori**, with the support of the University of Tuscia and Enea, has continued with the **"Acea Smart Comp" local composting** project. This project will enable the Company to become organic waste free during 2021 and to patent the system for its industrialisation. In 2020, research and development activity led to the creation of a new Smart Comp Unit prototype, which will form the basis of the new version "Acea Smart Comp 2.0", and there are plans for the creation and installation of new-generation machines at Enea, FS, Porte di Roma, Centro ELIS and serving barracks of the Italian Carabinieri military police force.