6

Manufacturing capital

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Manufacturing capital

INPUTS

1.7 Mt material treatment and recovery capacity

9.5 GW of electricity generation capacity

26,546 km of networks for distribution of electricity, gas and heat

52 Mm³ wastewater treatment capacity

A2A SERVICES AND PROCESSES

Acquisition of the first wind farm for the Group (8.2 MW), located in Campania

Authorization for the Brindisi (6 MW) and Gissi (15 MW) electrochemical plants

Start of the site for the construction of the new plant for the production of SSF at the Cavaglià site

Abandonment of the use of coal at the Lamarmora Plant of Brescia

OUTCOME

The strategic role of *multiutilities*

Multiutilities play a central role in the sustainable transition process. The areas of activity cover the key dimensions of the transition towards a sustainable development paradigm. Italy, however, has a significant gap compared to European countries, combined with an uneven picture at territorial level.

In the field of **energy production**, for Italy, the share of RES in 2030 – deriving from a subdivision of the overall target among EU Member States – is estimated to be 30% in final consumption, divided as follows: 55% in the electricity sector, 33.9% in the heat sector and 22% in transport. If the trend of the last 5 years is confirmed, the 2030 target is estimated to be missed by more than 7 percentage points. Photovoltaic and wind power are the main RES from which growth is expected from now until 2030: at current rates, the gap in installed capacity is estimated to be about 2,400 MW in 2030 for wind power and over 23,000 MW in 2030 for photovoltaic.

On the **circular economy** front, Italy has a high rate of landfill disposal (21.5%), while the most advanced European countries have achieved substantial zeroing. The number of waste treatment plants is extremely heterogeneous throughout the country and not necessarily in line with the volume of municipal waste generated by the individual regions. It is estimated that 2.2 million tonnes of municipal waste going to landfill will exceed disposal capacity by the end of 2020, requiring alternative allocation. The incidence of waste at risk of non-allocation on the total amount of municipal waste generated, today 7.3%, could reach 21.4% in 2025.

Italy has an obsolete infrastructural **water network** (60% of the infrastructures are more than 30 years old and 25% more than 60 years old) and half of the water distributed is lost (47.9%, compared to a European average of 23%), with a very heterogeneous situation among the different regions. Italy also has an uneven situation with regard to the capacity to purify and treat wastewater, with an average Italian coverage of 85%. This percentage is further reduced considering not so much capacity as the load treated, reaching 78.5% at Italian level, with negative peaks of 68.9% in the southern regions.

18%
RES SHARE ON FINAL CONSUMPTION IN ITALY IN 2018

49.8%
AVERAGE RATE OF MUNICIPAL WASTE RECYCLING IN ITALY IN 2018

40€/inhabitant
ANNUAL AVERAGE CAPEX IN THE WATER SECTOR IN RECENT YEARS

SDGs IMPACTED

MATERIAL ISSUES

Efficient management and innovative infrastructure development

STRATEGIC PLAN @2030

5.7 TW of installed RES capacity

2.2 Mt waste sent for material recovery

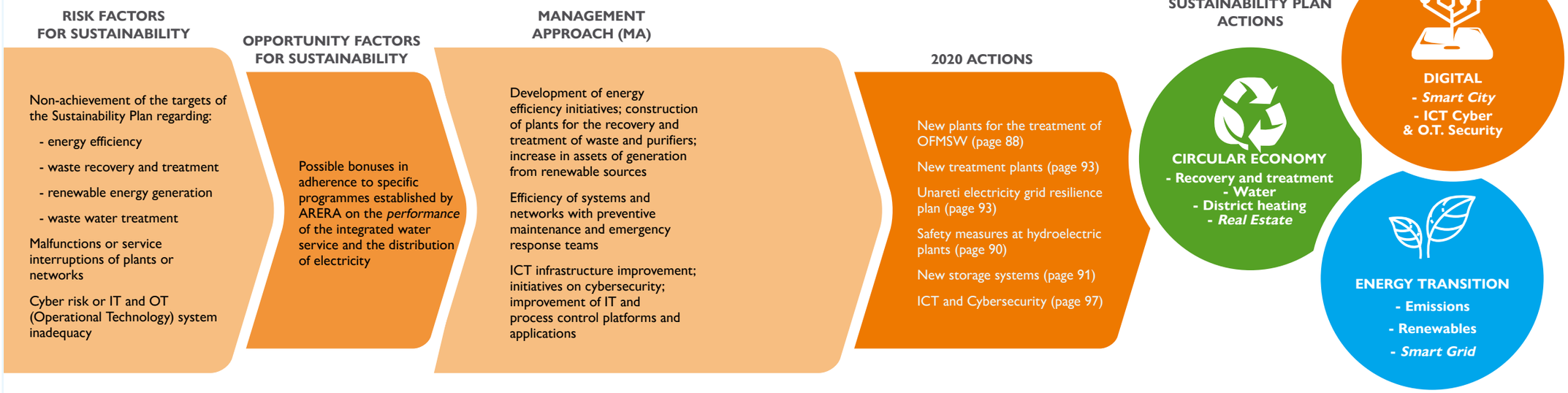
1.9 M of inhabitants served by treatment

SOURCES
Paper A2A – The European House - Ambrosetti: The key role of multiutilities for the sustainable relaunch of Italian territories.

6
Manufacturing capital

Efficient management of Group infrastructures

Promotion of technological innovation, improvement of the performance, continuity and reliability of the service, also through the acquisition of new companies that are strategic for the Group; guarantee of high standardsof security in the management of IT infrastructures (Cybersecurity).



6.1 The manufacturing capital in the Environment Business Unit

The plants managed by the Environment Business Unit cover all phases of the integrated waste cycle: from recycling management, ecological platforms and landfills through to energy and material recovery and processing plants.

Figure 16 Plant types and geographic location of the Environment BU

PLANT TYPE	NUMBER OF PLANTS	LOCATION	CAPACITY	u.m.
Material treatment and recovery	22	Lombardy Piedmont	1,683,600	tonnes/year
ITS	7	Lombardy Piedmont	652,000	tonnes/year
Waste-to-energy	7	Lombardy	260 622	MW_e MW_t
Landfills (available capacity)	10	Emilia - Romagna Lombardy Piedmont	1	Mm^3
Biogas production	18	Emilia - Romagna Lombardy Piedmont	22	MW_e
Biomass	3	Lombardy Puglia	27 9	MW_e MW_t

In all, waste treated in Group plants amounted t about 4.6 million tonnes, of which: 3.6 at the Group's plants (+1.6% compared to 2019) and approximately 1 million at the plants managed on behalf of third parties (Acerra waste-to-energy plant and Caivano plant).
Although there has been a slight but steady increase, the BU's production of both thermal energy and electricity remains stable at 1,288 GWh_e and 1,530 GWh_t respectively. Instead, the portion of waste treated in bio-drying plants remains constant.
Compared to the previous year, the Group has further strengthened its presence along the supply chain, increasing the treatment and material recovery capacity of the
BU, thanks to external acquisitions. However, from 2020 onwards there will be a phase of implementation of "green field" projects that will bring new additional capacity, useful for the recovery of both materials and energy from waste.

In December 2019, A2A Ambiente completed the acquisition of 90% of **Electrometal, a company specializing in the treatment and recovery of industrial waste**, and Areslab, a chemical analysis laboratory, both located in Castegnato in the province of Brescia.
A2A Ambiente's production sites will also be increasingly attentive to aspects of energy efficiency. On the basis of agreements with the ESCo Suncity (a Group company), the latter will install photovoltaic systems on the roofs of A2A Ambiente buildings. The first, in 2020, involved the installation of a 425 kW plant at the Asti glass sorting centre. The energy produced is mainly self-consumed.

A2A AND SUEZ, PARTNERSHIP FOR AN INDUSTRIAL WASTE MANAGEMENT SYSTEM

The A2A Group – through its subsidiary A2A Ambiente – and Suez signed a Memorandum of Understanding aimed at creating a player of excellence for the management of waste from the Italian production and industrial system. The two partners will bring together in the new vehicle their Italian assets in the special hazardous waste sector and premises at foreign plants.

The process initiated by the signing of the MoU will allow the respective competences to be pooled. The collaboration will create an **operator capable of handling over 250,000 tonnes of industrial waste**.

New plants for the treatment of OFMSW and the production of biomethane

Following the authorization obtained for the construction of two plants for the treatment of the organic fraction of municipal solid waste (OFMSW) at **Lacchiarella (Mi)** and **Cavaglià (Bi)**, the respective sites were opened in 2020. Through the anaerobic digestion of this type of waste, **compost and biomethane will be produced**. The two plants will have a treatment capacity of 100,000 (Lacchiarella) and 55,000 (Cavaglià) tonnes per year. In addition, other initiatives are in the planning stage that aim to achieve, in the years of the 21-30 Strategic Plan, **over one million tonnes of OFMSW treated**.
The biomethane produced, fed into the national transport network, is intended for use as a renewable fuel in transport. In this context, the Group's waste collection companies are increasing the percentage of methane vehicles in their fleet from year to year. The biomethane generated by the plants can therefore also be used by company vehicles, creating a **perfect example of circular economy**. Once the development of all projects is complete, **the system will be able to power approximately 900 vehicles**.

The new SSF plant in the centre of Cavaglià

The year 2020 also saw the start of the site for construction of the **new plant for the production of secondary solid fuel** (SSF) at the Cavaglià site.
Using the waste from the sorting of plastic from separate waste collection, which cannot be sent for material recovery, and also some non-differentiated waste, the plant, through optical scanning, mechanical separation and shredding, produces a fuel of variable size (called Plasmix). The latter, according to the *"End of Waste"*regulations, is no longer considered waste, but a product, useful for co-combustion in cement factories. This partial **substitution of fossil sources** (fuel oil or coal) helps to reduce the impact of CO_2 emissions from the cement industry.

6.2 The manufacturing capital in the Generation and Trading Business Unit

The Generation and Trading Business Unit is responsible for managing the Group's portfolio of generation plants and fortrading in all energy commodities (natural gas, electricity and environmental certificates) on domestic and foreign markets.
The production of electricity (and the balancing of the grid), takes place in an increasingly diversified and sustainable way through different types of plants, whose capacities are shown in the table below.

Figure 17 Plant types and geographic location of the Generation and Trading BU

PLANT TYPE	NUMBER OF PLANTS	LOCATION	CAPACITY	u.m.
Hydroelectric units	5	Lombardy; Friuli Venezia Giulia; Calabria	2,071	MW_e
Thermoelectric	9	Piedmont; Lombardy; Friuli Venezia Giulia; Emilia Romagna; Abruzzo; Puglia; Sicily	6,896	MW_e
Photovoltaic	92	Italy	99	MW_e
Wind	1	Campania	8	MW_e
Synchronous compensators	2	Puglia	286	MVar

In 2020, the BU slightly decreased energy production mainly due to reduced demand, due to the pandemic (-8.3% compared to 2019). The mix of sources used has varied in favour of renewables, but with continued greater use of natural gas from CCGTs than coal and HFO. Hydroelectric production was also slightly down (4,388 GWh), due to reductions in inputs in catchment areas. There was also a marked reduction in the production of the Monfalcone plant (coal-fired) given that it operates for only two months of the year.
For the third consecutive year, it is important to note the significant contribution of photovoltaic production (+3.3% compared to 2019), linked to the Group's new strategy in the sector.

The process of change required in recent years in the energy production sector covers many areas: from the transition to low-carbon, to the adaptation to climate change and the needs of the market, to the safety and modernization of the plant fleet.

The decarbonization process, which A2A has already undertaken, requires coal-fired plants to be shut down by 2025. The energy transition envisages that part of the energy previously produced by coal-fired plants will be supplied by **new-generation natural gas-fired plants**, which reach efficiency values of 64%, with **an average CO_2** emission factor lower than 40% of a coal-fired plant, and which, also thanks to their flexibility and speed of response, play the role of "enabling systems" or **plants necessary for the development of renewable sources,** with a view to maintaining the security and stability of the electricity production system.

A2A Energie Future submitted, in December 2019, a request for authorization to MATTM for the construction of a high-efficiency combined cycle at both the Monfalcone thermoelectric plant, now operating with coal, and the San Filippo del Mela (ME) plant, currently fuelled by heavy fuel oil. Both projects aim towards ensuring a sustainable future for production sites, significantly reducing the environmental and landscape impact and meeting the reliability and flexibility requirements of the national electricity system.
Reference should also be made to page 156 for details of the MoU (*Memorandum of Understanding*) signed by A2A to enable hydrogen technology to be used also at the aforementioned plants.

In addition, A2A Energie Future won the tender called by Terna for the supply, from 2020 onwards, of the **continuous and automatic voltage regulation and stabilization service** by means of absorption/injection of reactive power **for the national transmission grid** in the Brindisi area, **through the installation of two synchronous**

compensators (machines connected to the electricity grid that produce or absorb reactive power in order to stabilize the grid voltage) at the Brindisi coal-fired plant, which has been out of service since 2012. This service is particularly important due to the increasing weight of renewable sources, which are not programmable and subject to discontinuity in power output. The two Brindisi synchronous compensators entered commercial operation in March and June 2020 respectively, the latter one month ahead of the contractual deadline. The following were also built from scratch: start-up and excitation systems, medium- and low-voltage distribution systems, control and regulation systems for electrical machines, and communication interfaces with Terna.

Also with regard to energy security, **A2A was fully awarded the capacity offered, equal to about 5 GW at national level, in the second *capacity market* auction** called by Terna for the 2022-2023 delivery year. Both existing and new plants are eligible to participate in the Terna auctions, **provided they are able to comply with certain CO_2 emission limits**. Of the 5 GW of capacity offered, 0.2 GW relates to newly built capacity, thanks to the **"*repowering*"** of the 800 MW units of the Cassano, Chivasso, Sermide and Piacenza plants.

The Group also **completed the unloading of the first load of liquefied natural gas** (LNG) at the Adriatic LNG terminal in Rovigo. The characteristic of LNG is that it has a reduced volume compared to that which it has in its gaseous state and this allows – while respecting the environment – greater ease of transport and delivery by sea, freeing itself from gas pipelines. In this way, too, A2A contributes to ensuring the country's energy security.

Growth in the photovoltaic sector

As already reiterated in the new 21-30 Strategic Plan and in the policy to reduce emissions, the Group confirms its **intention to grow in the renewables sector, confirming itself as a key *player*** in the energy transition.

The year 2020 saw a reorganization of A2A Rinnovabili, the Group company that controls all the vehicles holding photovoltaic plants acquired on the secondary market.

At the end of 2019, A2A had also signed a co-development agreement with the Talesun Group, for the **acquisition of a development *pipeline* of "*green field*"** photovoltaic projects, for a total capacity of up to 1 GW. This agreement provides for the construction of plants without incentives and will enable A2A to reach almost a third of the target for new renewable installed capacity set in the 2021-2030 ten-year Plan.

In 2020 was the acquisition by A2A Rinnovabili of the **Group's first wind farm**. The plant, located in Campania, has a capacity of 8.2 MW.

Improvement and safety of hydroelectric plants and dams

The constant change of climate in an area at risk of hydrogeology, such as our country, has as its main principle the raising of safety levels for plants most exposed to this risk. Therefore, activities continued in 2020 to guarantee the **safety of dams and plants in extreme hydraulic situations** (floods, flooding events, earthquakes, etc.), through the precise application of procedures defined in accordance with the directives and requirements of the regulations and the Bodies in charge (Ministries, Prefectures, Regions, Civil Protection), verifying its effectiveness on the occasion of real events that occurred during the year.

Moreover, during the year, **work was carried out on the design and implementation of interventions on some dams** (Trepidò, Ambiesta and Orichella) and on the related ancillary works, focused on the issue of **anti-seismic safety**, as well as on the implementation of remote control systems also through the laying of dedicated fibre optics.

In April 2020, the Group also started the operation of emptying the San Giacomo reservoir, which has a capacity of approximately 60 million cubic metres of water, in order to carry out inspection and maintenance work to clean the submerged hydraulic works, in order to guarantee their security, as well as the functionality of the plant, as provided for by the Management Project.

EXPERIMENTS TO ENSURE HYDRAULIC CONTINUITY ON RIVER SPOEL DERIVATIONS

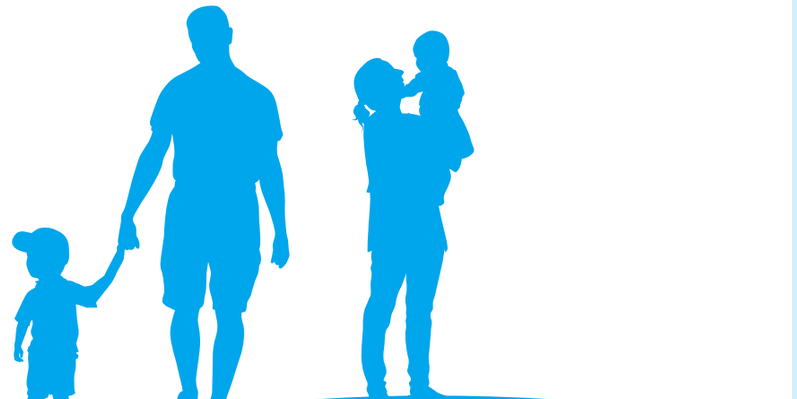
During the summer period, in Valtellina, checks were carried out on the naturalistic conditions of the Spoel River. The Spoel River is involved in hydroelectric derivations by A2A in Italy and by EKW in Switzerland. The river, in relation to the seasonal climatic trend and the consequent availability of water, has a section in which the flows infiltrate into the sub-bed, thus causing localized and temporary phenomena of "dryness". In recent years, and in particular in the three-year period from 2016 to 2018, the River Spoel has been the subject of a **voluntary experiment by A2A. It has involved the release, during the summer period, from its intake works of different flows**, for a different duration, with the aim of verifying the response of the surface and groundwater flows in the stretch affected by the phenomenon. In 2020, experimentation was repeated, introducing the previously untried variant of differentiated releases. The results obtained from the **2020 experimentation showed complete hydraulic continuity over the period of the releases**, similar to as observed previously.

The new frontier of storage systems

The growing trend of renewable generation plants (intermittent, dispersed and connected to both transportand distribution grids) is challenging the current paradigm of electricity system management, with an increasing risk to the stability, quality and security of the system.

In this context, Terna, as operator of the electricity system, has initiated in agreement with the Regulatory Authority for Energy, Networks and Environment (in particular with Resolution 300/2017/R/eel) a **process of gradual opening of the services market to new resources** (loads, production plants from renewable sources, non-relevant or non-qualified cogeneration plants, storage systems, etc.), which calls for a review of grid services and the methods for participating in the dispatching services market (MSD), including through the **definition of pilot projects** aimed at gathering useful elements for an organic reform of this market.

For this reason, in 2020, A2A initiated procedures at the relevant ministries to authorize the **installation of electrochemical storage systems for a portfolio of projects of around 60 MW to be built at sites it owns**. In particular, the first proceedings concerned the Brindisi (6 MW), Gissi (15 MW), San Filippo del Mela (20 MW) and Chivasso (20 MW) sites. The Brindisi and Gissi electrochemical storages obtained the Single Authorization in 2020.



6.3 The manufacturing capital in the Networks & District Heating Business Unit

The Networks & District Heating Business Unit is responsible for developing and maintaining the electricity, gas, heat and water cycle distribution infrastructure as well as for telecommunications and Smart Cities. The maintenance and evolution of these infrastructures are amongst the key factor necessary to achieve the national and European energy policy goals.

Electricity and natural gas distribution service

The electricity distribution network has an extension of 15,472 km in high, medium and low voltage, 87% of which is underground. The network is also supported by 31 primary stations and substations and more than 9,456 secondary stations.
The length of **the gas distribution infrastructure** is 9,852 km in medium and high pressure, with a significant decrease compared to the previous year due to the transfer, in November, of part of the assets to the AEB Group, by virtue of the agreement signed for the merger of the two Groups. The network has 164 primary stations (REMI) and 2,121 secondary stations.

Figure 18 Plants of the Networks & District Heating BU for the distribution of electricity and gas

NETWORK TYPE	EXTENSION
Electricity networks	15,472 km *of which 13,451 km underground*
Gas networks	9,852 km

The electricity distribution activity is managed by Unareti and LD Reti in Lombardy, in the provinces of Milan, Brescia and Cremona. The gas distribution activity is managed by Unareti, LD Reti and ASVT with the most important share of the networks located in Lombardy, in the provinces of Milan, Brescia, Bergamo, Cremona, Lodi and Pavia, and also, with smaller network sections, in Veneto, Trentino, Emilia Romagna, Campania, Abruzzo and Molise.

In 2020, electricity distributed amounted to 10,497 GWh (-9.3% compared to 2019), while gas distribution amounted to 2,300 Mm^3, also slightly down compared to the previous year (-2.4% compared to 2019).
Through the subsidiary Retragas S.r.l., the Group also manages the regional transmission of natural gas in Lombardy, Trentino Alto Adige and Piedmont, with more than 407 km network and moving 355 million cubic metres of natural gas each year.

With reference to the **plan to replace new gas meters**, launched in 2015, with the achievement of more than 90% coverage, the Group is effectively in line with the objectives set by the Authority.

With reference to the gas distribution network, the new 21-30 Plan outlines a clear objective of maintenance – with more than 78% of cumulative capex, compared to 22% dedicated to its development – with a view to future qualification for the transport of gas as hydrogen.

TENDER ATEM MILAN 1 – GAS DISTRIBUTION

In September 2020, the Council of State upheld the appeals filed in February 2020 by Unareti and the Municipality of Milan against the sentence of the Lombardy Regional Administrative Court of December 5, 2019, which had led to the annulment of the award by Unareti of the tender for the concession of the natural gas distribution service in the territorial area of "Milan 1 – City and Plant of Milan".
The Council of State, on the one hand, rejected the legal and administrative elements that had led the Regional Administrative Court to exclude Unareti (and also to overrule the exclusion of the competitor 2i Rete Gas) from the proceedings and, on the other hand, confirmed the assessments of the tender committee that had awarded the bid (score of 98.2/100).

In 2020, the plan was also effectively launched for the installation of the new 2G smart meters, with **new and improved data acquisition** and **transmission** functions and **network monitoring**, which will allow: **sales companies** to formulate customized offers based on customer consumption and improve processes for billing and management of commercial transactions; **distributors** to promptly identify anomalies on the network; ***end customers*** themselves, through the UD (user device), easier monitoring of consumption by acquiring greater awareness.

The start of the massive installation activities started in the city of Brescia at the end of July with a total of over 43 thousand new meters replaced. The replacement of approximately 1.1 million meters will be carried out over a period of 15 years (however, massive replacement will be concentrated in the first 5 years) for a cumulative investment of 197 million euro.

UNARETI TESTING THE RESILIENCE OF ELECTRICITY GRIDS AGAINST EXTREME EVENTS RELATED TO CLIMATE CHANGE

The risks to which Unareti is exposed in case of accidental interruptions of the service provided, are related both to the **Physical and Transition climate scenarios** of TCFD Recommendations. The phenomena that have the greatest impact on the likelihood of such risks occurring are as follows:

- **peaks in demand for summer air conditioning as a result of heat waves** (prolonged periods of heat and/or days with very high daytime and night-time temperatures), particularly when these hit densely populated metropolitan areas;
- **flooding caused by heavy rainfall** (water bombs), to which the stations that, in past years, were built underground to optimize the use of public land in the cities are exposed;
- **increased demand for energy** as a result of the dissemination of policies and instruments to encourage energy efficiency and the electrification of services;
- falling tall trees on overhead lines;
- snowfall of particular intensity capable of causing the formation of sleeves of ice or snow (wet snow).

The economic and financial consequences of this risk for Unareti and the Group are related to the possible increase in penalties related to the Quality of Service, also because the Regulatory Authority for Energy, Networks and Environment (ARERA) provides for more restrictive target values in the coming years. In addition, the A2A Group also takes into consideration the possible reputational impacts in relation to the probable increase in the number, duration and territorial extension of the interruptions for the causes mentioned above.

Strategies and management approach
Unareti has prepared a three-year plan to increase the resilience of its networks, which is updated annually. The plan is prepared – **on a voluntary basis** – in accordance with an ARERA program.

With reference to the **risks of interruption due to peaks in demand** on the Milan network, which is the most critical area, the company has completed an extraordinary plan for the remediation of critical components, with more than 10,000 joints being checked or replaced in 2020 alone.

Precisely the study of the "behaviour" of the joints to the change of different environmental parameters is one of the aspects analysed at the new Laboratory of Diagnostic Medium Voltage Cables realized by RSE – Research on the energy system – in collaboration with Unareti and inaugurated in November 2020. RSE laboratories were able to create simulation environments to actually verify what happens in our subsurface, so as to evaluate diagnostic mechanisms that increase even more the resilience of the network.

There are also plans to rationalize the medium-voltage networks and build 9 primary stations and substations. These interventions will achieve structural benefits and mitigate the impact and likelihood of accidental interruptions of the electricity distribution service.

The flood resiliency program consists primarily of: bringing underground stations above ground; making embankments on the hatches of underground stations that are not brought above ground; and replacing components that are lower with waterproof components. Unareti is also expanding the remote control system of the stations in order to enhance the possibility of carrying out remote manoeuvres in order to reduce the time required to resume service. With the same aim, the number of emergency response teams was doubled on the days of the year when the city was flooded.
>>

With reference to the last two "physical" risks listed above (falling trees and the formation of ice sleeves), in the 2020-2021 two-year period, it is planned to carry out **investigation activities using helicopters and drones** (just over 100 km of overhead lines) **in order to identify, along the route of the critical lines, the portions of the network that could be more exposed to the event of falling trees (or ice sleeves)**. For the sections identified as critical, it was decided to intervene by replacing portions of the network made with bare conductors with underground conductors or insulated overhead conductors.

The **capex** foreseen in the Plan presented to ARERA, an integral part of the Unareti Development Plan to increase the resilience of electricity distribution networks, amount to approximately **20 million euro**.

Integrated water service

The A2A Group, through its subsidiaries A2A Ciclo Idrico and ASVT, manages services related to the integrated water cycle in almost the entire province of Brescia.
In all, in 2020 the Group distributed 54 million cubic metres of water. In the municipalities overseen for the sewage and treatment service too, approximately 52 million cubic metres of waste water were treated.

Figure 19 Plants of the Networks & District Heating BU for integrated water service

PLANT TYPE	EXTENSION
Aqueduct network	4,044 km
Sewers network	3,911 km
Purifiers	59
Treatment capacity	52 Mm^3

Also in 2020, actions continued to achieve the objectives of the Plan that reflect an integrated logic, aimed at improving the entire service in terms of quality of water distributed, reduction of network leaks and extension of the number of citizens served.

Among the many activities implemented to reduce losses (both real and apparent), the **Aquarius project** for the city of Brescia stands out for its highly innovative nature. During 2020, **170 sensors ("*noise loggers*")** were **installed in the city centre area**, covering 60 km of the water supply network, **capable of detecting the "noise" of a leak** escaping from a pipe (see also page 155).

As regards the detection of unaccounted for volumes (apparent losses), the installation of meters on fire-fighting utilities continued with an additional 50 units in 2020, with an expected reduction in unaccounted for consumption of about 10,000 m^3.

The installation of the new ***smart water meters*** continued, which in 2020, between A2A Ciclo Idrico and ASVT, reached an overall total of about 52 thousand units compared to a 2020-2024 plan that envisages a total target of about 170,000 smart meters equipped with a transmission module for periodic remote communication of metered data.

With reference to treatment activities, A2A Ciclo Idrico has completed work on the **new treatment plant in the Brescia municipality of San Paolo**, capable of serving 6,000 equivalent inhabitants, which is fully prepared for the doubling of its capacity, since the civil works relating to the second line have also been completed. The **Offlaga treatment plants** were also completed, with a nominal capacity of 8,000 equivalent inhabitants, treated in two twin and interchangeable treatment lines, and **the San Gervasio treatment plant** was upgraded through the installation of a new modular treatment line with MBR technology with a capacity of 1,200 equivalent inhabitants. The modularity of the plant, entirely built in stainless steel, will allow, after the construction of the new final plant, reuse, if needed, on other territorial realities.

In February, ASVT **began work on the construction of the Valtrompia district treatment plant**, which will make it possible to overcome the problem of European infringements for the municipalities in the area that are not covered by the treatment service. The treatment plant was designed with particular attention to integration into the existing landscape, minimizing noise, odours and environmental impact, being located under a prefabricated structure covered by a layer of natural greenery. It will also be a state-of-the-art plant from a technological point of view: the treatment process using **membrane technology with ultra-filtration** (MBR) provides one of the highest performance levels. The project envisages a first phase, already underway, which will allow treatment of the wastewater generated by 85,000 equivalent inhabitants, while the second phase of further expansion will be able to serve up to 138,000 equivalent inhabitants. The total investment (first phase plus upgrading) amounts to 36 million euro.

Work also continued on the construction of the sewerage and water supply system for the Calvisano agglomeration, which is expected to be completed by 2023 (at the end of 2020, the project had reached 70% progress).

Figure 20 Plants of the Networks & District Heating BU for district heating service

NETWORK TYPE	NUMBER OF PLANTS	CAPACITY	u.m.
Cogeneration	11	133	MW_e
		716	MW_t
Thermal	22	684	MW_t
Heat exchange	6	224	MW_t
Heat pumps	2	33	MW_t
Heat accumulators	12	654	MW_t

District heating plants and networks

Through its subsidiaries A2A Calore e Servizi and Linea Green, the Group develops and manages the **district heating plants and network**[1] in Milan, Sesto San Giovanni (Mi), Novate (Mi), Cassano d'Adda (Mi), Cologno Monzese (Mi), Brescia, Bovezzo (Bs), Concesio (Bs), Bergamo, Crema (Cr), Cremona, Lodi and Rho (Mi), for a length of over 1,200 km, with a service capacity of 477 thousand equivalent apartments and a volume of 115 million cubic metres served.
In 2020, the distributed heating and cooling energy stood at a value in line with the previous year of 3,146 GWh_t.

In 2020, A2A Calore e Servizi entered into an agreement with the REA DALMINE industrial plant, owned by Greenthesis Group, which provides for a 50% increase in the heat available in the district heating network of the city of Bergamo for a total of 90 GWh_t. The recovered heat will be transported to the plant in Via Goltara in Bergamo, where the pumping station of the district heating network will also be upgraded and a new heat storage will be built, for better management of the available heat. All this will make it possible to connect a further 11 thousand equivalent homes in the city's areas, increasing the Bergamo district heating network by over 22 km. In order to encourage the connection of new customers in this area, a very advantageous *ad hoc* offer has been prepared (see page 176). The environmental impacts will also be evident with a reduction in emissions, due to the reduced use of fossil fuels, of about 15 thousand tonnes of CO_2 per year.

In addition, since the end of 2019, a working group has been set up to develop an evolved Decision Support System which, knowing the heating demand, plans the load of the various generation units, in order to maximize the economic margin of the plant while respecting the existing constraints. The system is based on cloud-based optimization of plant, weather and price signals, returning optimized hourly loads for each asset through profit & loss models and machine learning. The pilot, launched in 2020 on the east Milan network, has margins for scalability to all Group plants, which will be tested in 2021. Initial results show a potential increase in plant gross operating margin (MOL) of over 33%, also ensuring optimized system production. See page 155 for further details.

1 Network consisting of a double pipe for the distribution of heat, in the form of hot or superheated water, located capillarily in the urban area.

REVAMPING OF THE FUME TREATMENT PLANT OF THE BRESCIA WASTE-TO-ENERGY PLANT

The project involves the construction of an **innovative system for the treatment of combustion fumes** aimed at **reducing emissions and recovering the residual heat still present in the fumes**. The intervention of integration of the existing filtration system includes the installation of:

- a new state-of-the-art DeNO$_x$ SCR catalytic plant for the abatement of nitrogen oxides with very high efficiency, and a flue gas cleaning tower with further abatement of hydrochloric acid and ammonia;
- a "flue gas condensation" heat recovery section on the purified fumes, which **will be used in the district heating network**.

The intervention, therefore, in addition to increasing the overall energy efficiency of the waste-to-energy plant, will contribute to the reduction of emissions from the district heating system in Brescia. In fact, during the project, it is estimated that the **CO_2 avoided will amount to 185 thousand tonnes per year, in addition to a 50% reduction in nitrogen oxides (NO_x).**

LOMBHE@T INNOVATIVE PROJECT

A2A Calore e Servizi will participate, thanks to the LombHe@t project, in the Lombardy Region's "Call Hub Ricerca e Innovazione" call, financed with POR FESR 2014-2020 funds. The project, started in December 2019, will run for 30 months and has seen 33 winning excellence initiatives.
LombHe@t is based on an **R&D programme aimed at identifying heating solutions with low environmental impact**.
The project, which stands as a pilot example for the decarbonization of the urban fabric, envisages the development of high efficiency technologies that envisage the use of both renewable energy sources, for new and existing buildings, and optimized and efficient district heating on the A2A network in East Milan.
The pilot involves the development of a **heat recovery system from industrial sources and a smart district heating network** (replicable across all networks) for optimized management. In addition, through a self-powered, underground, wireless apparatus with remote data transmission, and thanks to innovative valves and sensors, it will be possible to **monitor operations in real time, improving efficiency and operating conditions, as well as accelerating leak detection**.
Analysis, classification and modelling of the heat demand profiles of users will also be carried out, which will allow the management of the district heating system to be refined in anticipation of future developments. The experimentation will allow validating an economically competitive approach where the urban fabric is densely populated. The first beneficiaries of the experiment will be about 3,000 citizens. Together with industrial partners, Universities and Institutions, technologically advanced vapour compression heat pumps (EHP) and optimal control algorithms will be developed. The experimentation will also include actions to increase energy efficiency, test the use of refrigerants with low environmental impact and reduce noise pollution.

6.4 *Cybersecurity*

Since 2017, the Group has had an organizational unit dedicated to cybersecurity in order to implement security processes and infrastructures internally. The activities carried out mainly consist in:

- defining IT security policies, processes and standards to be applied within the Group;
- **assessing cybersecurity risk**, defining and monitoring mitigation activities;
- enabling the secure design of services, applications and infrastructures through the Security by Design process, by means of which **security measures are provided commensurate with IT risk**;
- **identifying potential** security **weaknesses** that, if exploited, would allow to obtain access to A2A Group information, and assess the associated IT risks, identifying and implementing appropriate mitigation actions (Vulnerability Assessment and Penetration Test on critical infrastructures and applications);
- analysing and updating **the access privileges associated with the Group's systems/applications** to ensure that these arrangements are still based on a specific need;
- designing and implementing the infrastructures for the protection of corporate information security, like anti-malware systems on workstations and networks;
- carrying out continuous monitoring of the Group's security through the Security Operation Center unit, i.e. through proactive analysis of IT security systems and technologies (IPS, *firewalls, servers,* etc.).

The **monitoring, security and IT incident management service** has evolved into a highly specialized structure, equipped with the best skills, which oversees all areas of Security Operations with an "intelligence driven" logic, also through a team of "white hats" for the execution of active defence activities (security assessment, read teaming, threat hunting).

It should be noted that 143 incidents of high and critical severity were monitored in 2020, none of which was such as to compromise the company's business. Of these, there are 2 cases of data breach managed in a timely manner and with an estimated impact that is not serious for customers. These occurrences, in the cases provided for by law, have been communicated to the relevant authorities and have not given rise to sanctions at the moment.