WATER MANAGEMENT

A COMPARATIVE ANALYSIS

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WATER MANAGEMENT

A comparative analysis

Finland | Greece | Italy | Poland | Portugal | Spain

- Water sources
- Water storage
- Water treatment
- Water as a source of energy
- Unique features

WATER SOURCES | Finland – Mäntsälä

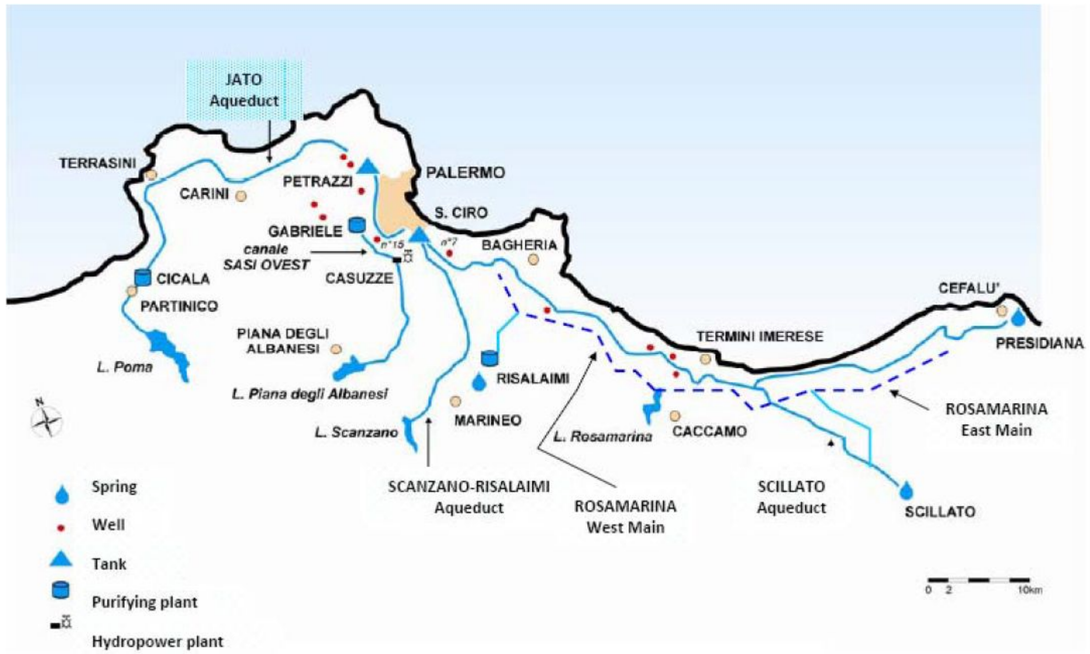
- In Mäntsälä center, the household water comes from Lake Päijänne from Central Finland, through the second largest water tunnel in the world via Hyvinkää refinery (120km);
- Outside the center, in the surrounding villages, people have their own wells drilled in the ground.

WATER SOURCES | Greece – Thessaloniki

- **The springs of Aravissos** supply the city of Thessaloniki with drinking water through the natural karstic cavity of the mountain;
- The second main source of water supply of Thessaloniki is the **dam of the river Aliakmonas**.

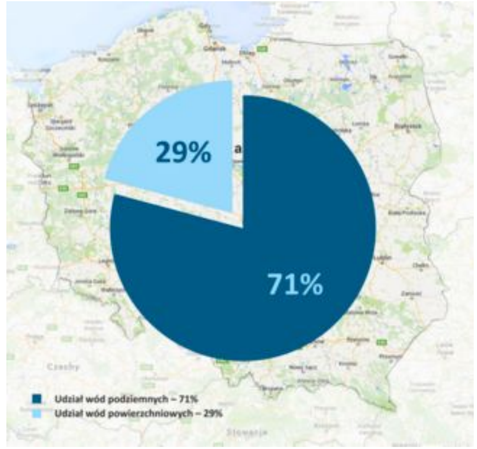
WATER SOURCES | Italy – Palermo

- Drinking water in Palermo and the surrounding municipalities is supplied both from surface and groundwater sources;
- These include four weirs, four reservoirs, four spring groups and twenty-nine wells.



WATER SOURCES | Poland – Sosnowiec

- In Poland, about 70% of water intended for consumption comes from groundwater intakes;
- Almost 90% of Poland's water resources are created within the country's borders;
- Freshwater sources are mostly rivers and lakes. The rivers and lakes that make up surface water are the source of drinking water for about 50% of Poland's population;
- Disposable groundwater resources in Poland amount to 33.7 million m3 per day;
- Rural water consumption currently contributes to over 33% of total water usage in Polish households.



WATER SOURCES | Portugal – Madeira

- Galleries (4)
- Wells (23)
- Surface water harvesting (4)
- About 80% of the drinking water in Madeira comes from the endemic forest, due to these specific plants' ability of absorbing surface water.




WATER SOURCES | Portugal – Porto Santo

- The desalination plant is the only source of drinking water;
- The sea water is treated by a reverse osmosis desalination process.

WATER SOURCES | Spain – Elche

- The municipality doesn’t have enough water resources to supply the necessities of the inhabitants, which is why all the water supplies are external:
  - Rivers Tajo-Segura transfer provides between 90% and 95% of the supplied water;
  - Villena’s Aquifer, an underground water supply, provides between 5% and 10% of the water.

WATER STORAGE | Finland – Mäntsälä

- There is no need for water storage in Finland;
- Water towers used to be a common sight in almost every community but these days few of them are still in use. These water towers today serve other purposes such as belvederes, observatory towers or telecommunication masts.

WATER STORAGE | Greece – Thessaloniki

- After special treatment, the drinking water is collected in a 75,000 m3 tank before being distributed through the water supply network to the tanks of Diavata, Evosmos, Polichni, Neapoli, Vlatada, Toumpa, Kalamaria...;
- This network includes 41 Pump Stations and 45 Tanks.

WATER STORAGE | Italy – Palermo

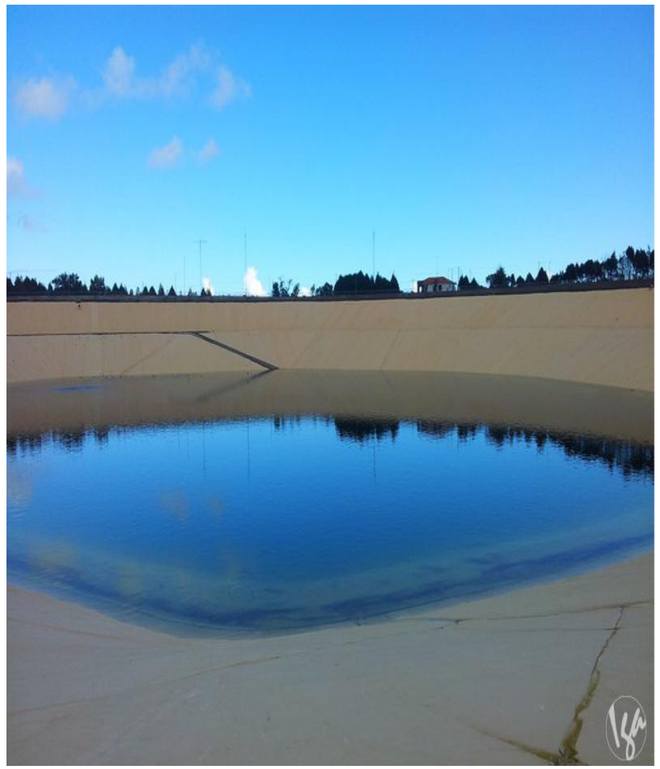
- Before being available to users, surface water is treated in four purifying plants and then, together with the rest of the water, it is collected in storage tanks (nine tanks with a total storage capacity of 247,000 m3) and fed into the distribution network;
- Water from the sources to the storage tanks is carried by four main water pipes and two recently built systems, amounting to an overall length of about 400 km of pipes.

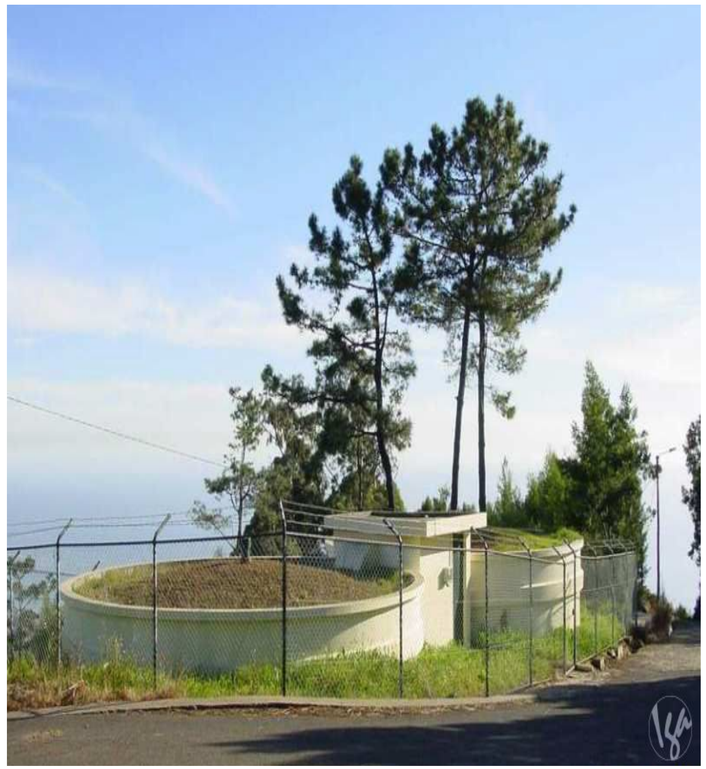
WATER STORAGE | Poland – Sosnowiec

- There are over 9000 lakes and over 50 rivers in Poland to store water;
- The water is also stored in **Biebrzański Park Narodowy**, where a lot of bogs are located;
- Poland has serious problems with water storage. The biggest lake is drying up.

WATER STORAGE | Portugal – Madeira

- There are 4 lagoons and nearly 50 reservoirs spread throughout the island to store water.



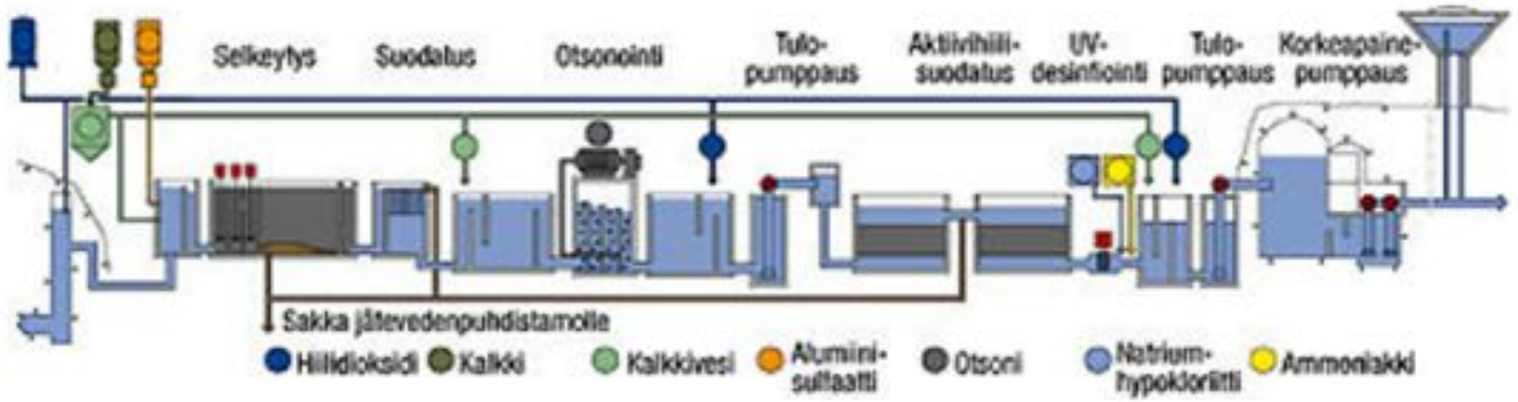


WATER STORAGE | Spain – Elche

- There are twelve dams in the Valencian Community, with a total storage capacity of 1.956hm3. At the moment they are at 61.96% of their capacity, that is 1.212hm3 of water.
- Elche’s dam has a capacity of 0,4 hm3.

WATER TREATMENT | Finland – Mäntsälä

- Water used in households goes to sewage treatment plants, where most of the organic material and phosphorus are removed;
- The quality of water is controlled throughout the treatment.



WATER TREATMENT | Greece – Thessaloniki

- In Thessaloniki, at the most important wastewater reuse site, the secondary effluent of the city’s Waste Water Treatment Plant (165,000 m3/day) is used for agricultural irrigation after mixing with freshwater at a 1:5 ratio.

WATER TREATMENT | Italy – Palermo

- Palermo has two full-scale wastewater treatment plants that treat the urban wastewater produced from the Palermo population: Fondo Verde and Acqua dei Corsari;
- The treated water is then discharged into the ocean through submarine outfalls.

WATER TREATMENT | Poland – Sosnowiec

- Urban waste water treatment - Polish modernised treatment plants are usually among the most modern in Europe
- mechanical cleaning => biological cleaning => water restoration

WATER TREATMENT | Portugal – Madeira

- There are six main water treatment stations throughout the archipelago.
- The treated water is then sent into the ocean, through underground pipes.

WATER TREATMENT | Spain – Elche

There are 3 treatment stations in Elche:

- Edar Algorós, for the urban area of the city. This plant provides reused water for agriculture.
- Edar Arenales, for three districts. The reused water coming from this plant is for environmental use at the natural park El Clot de Galvany.
- Edar Carrizales, for the three remaining districts. This plant provides reused water for agriculture.
- A total of 9.624.349 m^3 of water is reused per year.

WATER AS A SOURCE OF ENERGY | Finland

- There are about 250 hydroelectric power plants in Finland, which cover approximately 15-25% of the electricity generated nationwide.
- It is very unlike that new hydroelectric power plants will be built due to environmental reasons. However, it is possible and more reasonable to increase the capacity of the existing power plants.

WATER AS A SOURCE OF ENERGY | Greece

- In Greece, only 1% of the water is used for the production of energy;
- The participation of hydroelectricity in the whole production reaches 5-6%, while the other kinds of renewable energy sources reach 23%.

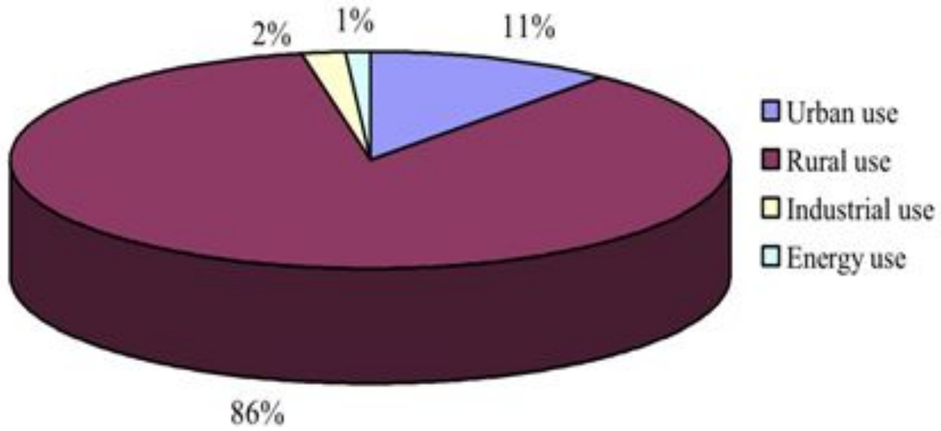
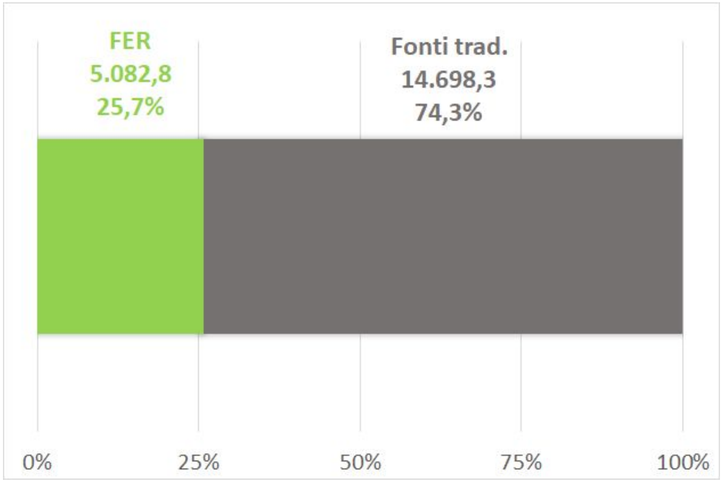
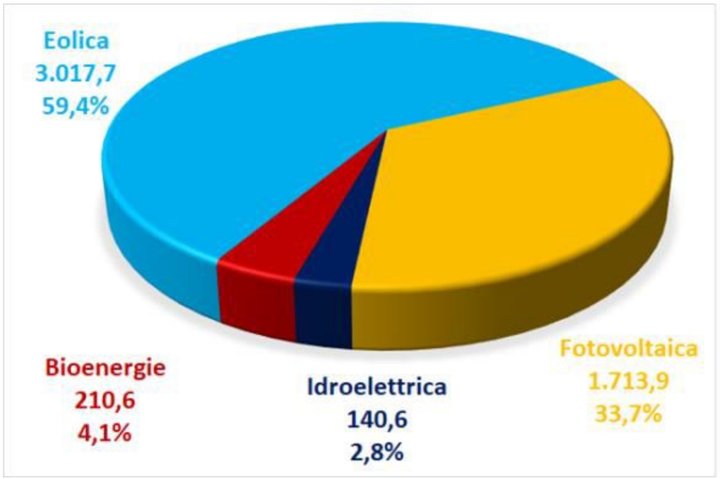


Figure 2. Water use in Greece

WATER AS A SOURCE OF ENERGY | Italy

- **Hydroelectric power** is Italy's main source of renewable energy: there are more than 4000 power plants in the country;
- 29 of these hydroelectric power plants are in Sicily;
- 25,7% of the energy in Sicily comes from renewable sources;
- 2,8% of that amount is from hydropower resources.



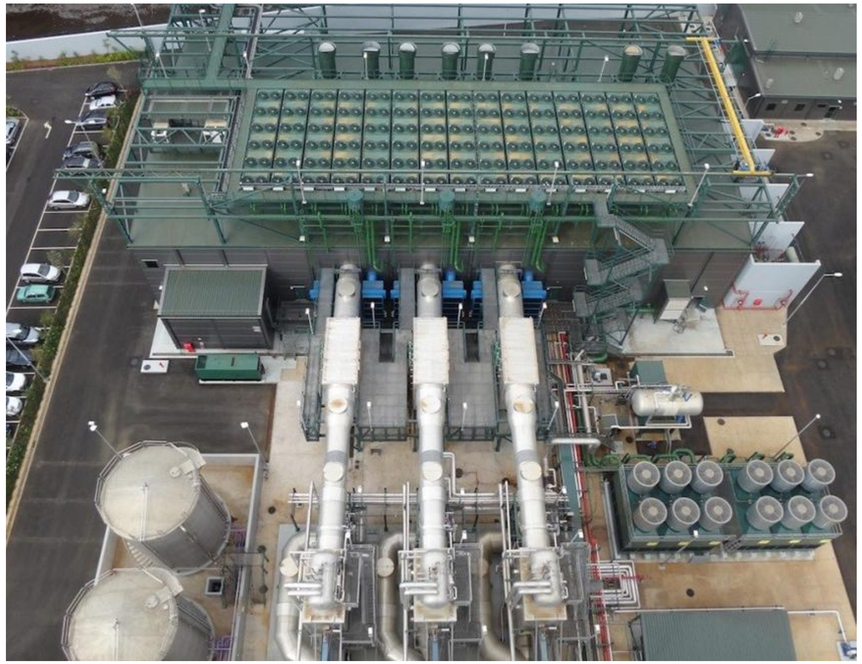


WATER AS A SOURCE OF ENERGY | Poland

- 727 hydroelectric power plants operate in Poland;
- Hydropower resources are only 13.7 TW-h per year and represent 12% of the energy produced;
- This is strongly influenced by the lowland nature of the country, as well as the low gradient of rivers and their low flow.

WATER AS A SOURCE OF ENERGY | Madeira

- There are three hydroelectric stations in the archipelago;
- 15% of the energy produced in Madeira has water as its source.



WATER AS A SOURCE OF ENERGY | Spain

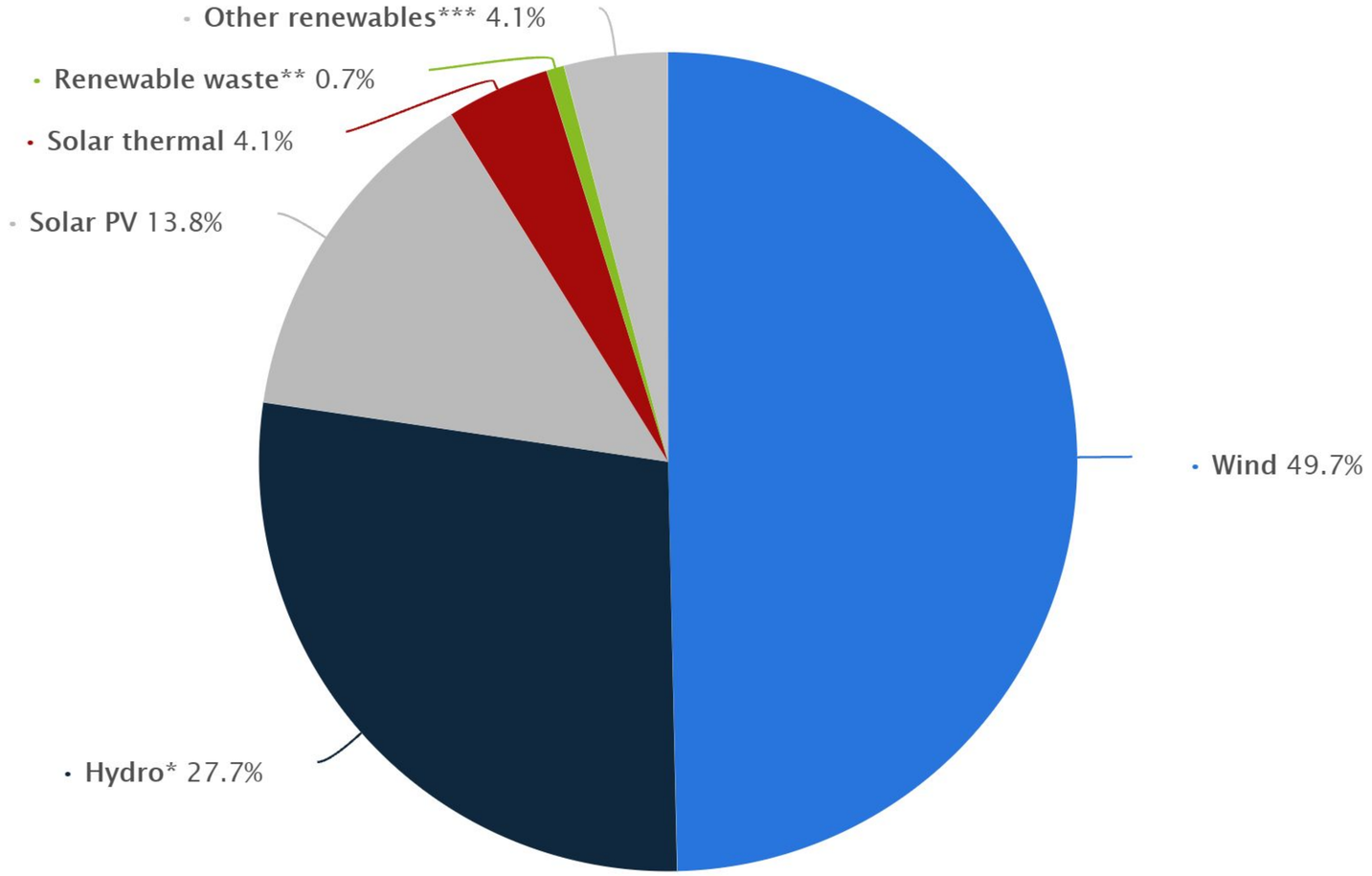
- In the Valencian Community, the Júcar is one of the rivers that provide water to produce hydroelectric energy;
- In its basin there are a series of reservoirs that are used for the production of hydroelectric energy, the regulation of the river to prevent floods and the use for irrigation and human consumption.

WATER AS A SOURCE OF ENERGY | Spain

- The Cofrentes nuclear power plant uses the waters from the Júcar to cool the plant;
- The excess energy in hours of low consumption is used to pump water to the La Muela reservoir, located on the Cortes de Pallás mill, which contributes to increasing the hydroelectric potential of the plants in the Júcar riverbed itself.

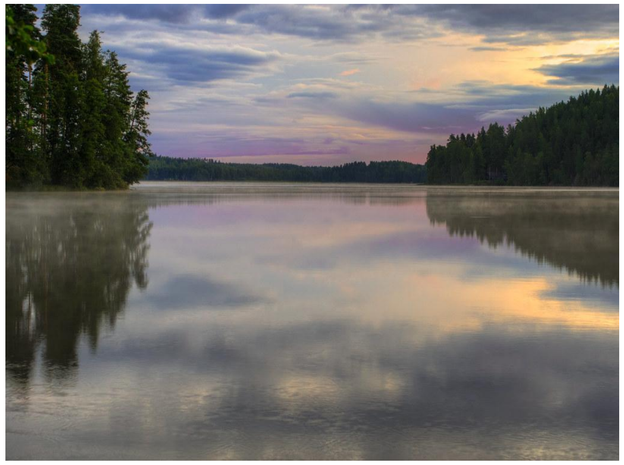
WATER AS A SOURCE OF ENERGY | Spain

- Electricity generation from renewable sources in Spain in 2020:



UNIQUE FEATURES | Finland – Mäntsälä

- Mäntsälä has a total of 30 lakes that take about 2.6% of its area. The most significant ones are Hunttijärvi, Isojärvi, Kilpijärvi, Sahajärvi and Iso-Vuotava;
- The lakes serve as important recreation areas for the locals;
- Generally, the lakes have plenty of plantation and the ecological condition of many of them is decent.



UNIQUE FEATURES | Greece – Thessaloniki

POZAR THERMAL BATHS

- These are spectacular natural hot springs in the Pella district, the birthplace of Alexander the Great;
- This impressive site features hot springs, natural pools and rivers with thermal waters – at 37°C (98°F) – plus a network of natural and artificial waterfalls.

UNIQUE FEATURES | Italy – Palermo

WATER TANKS OF SAN CIRO

- The storage tanks of San Ciro of Amap were the very first to be built in Palermo at the end of the 19th century.
- There are two storage tanks that can hold more than 35,000 cubic metres of water and are covered by barrel vaults, supported by arches and pillars.

UNIQUE FEATURES | Italy – Palermo

GABRIELE'S SOURCE

- It's an underground treasure of the city of Palermo, which for centuries has enchanted anyone who had the opportunity to see it with their own eyes.

UNIQUE FEATURES | Poland – Sosnowiec

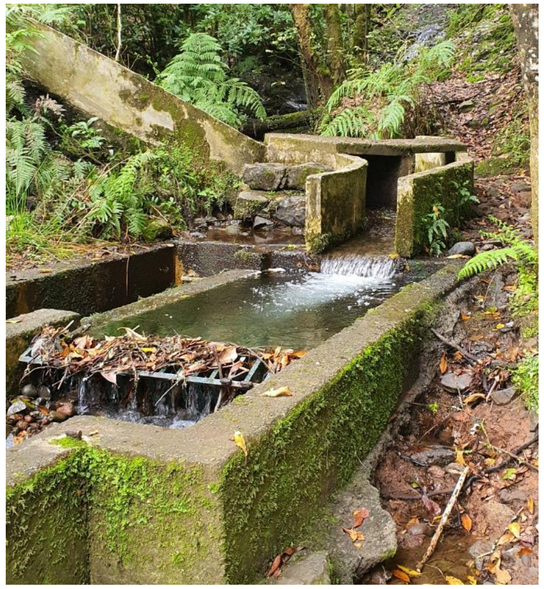
- The foaming river, bends reaching up to 180 degrees, and on both sides steep rock walls rising 300 meters above the water - the **Dunajec Gorge** in Pieniny is one of the most picturesque mountain gorges in Europe.

UNIQUE FEATURES | Portugal – Madeira

- ***Levadas*** are a system of channels or aqueducts built to bring water from the mountains down to the coastal areas;
- The water is then used to irrigate the agricultural land.

UNIQUE FEATURES | Portugal – Madeira

- The network of ***levadas*** today has an impressive length of 3100 km of waterways, of which 80kms pass through tunnels and offer unique pedestrian pathways;
- 800 kms of these canals are being considered to qualify for inclusion in the **World Heritage List**.



UNIQUE FEATURES | Spain

- One of Spain's tallest structures, the Almendra Dam, in Salamanca, is considered one of the 13 most fascinating dams in the world;
- This concrete gravity arch dam is part of the hydroelectric system known as the Duero Drops;
- The spillway can disperse water at a rate of 3,039 cubic meters per second.

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