№2018-1-IT02-KA229-048029

Let’s Use Energy Usefully

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LET'S USE ENERGY USEFULLY

AGRUPAMENTO DE ESCOLAS ABADE DE BAÇAL - BRAGANÇA

Wind Energy

To Produce energy: wind power plants are installed in places where the average annual wind speed is 6 m/s.

In Portugal that occurs in mountainous areas and near the coasts.

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Hydro energy

Hydric energy is the energy obtained from the potential energy of a body of water

- Currently, in the average year, about 25% of the electricity consumed in Portugal is of water origin.

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Solar Energy

The production of electricity using the sun is possible through photovoltaic solar panels or solar thermal panels.

1. electricity is produced directly from solar radiation without contamination or noise;
2. photovoltaic systems can operate at any scale and in any environment;
3. electric energy can be generated at the place where it will be used.

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Geothermal Energy

is the energy obtained from the heat coming from the interior of the Earth

The Islands of Azores produce, by volcanic action, geothermal energy

But: gases end up going into the atmosphere

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Oceans

This power source is being used only as a demonstration and experience. (the cost is very high)

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Biomass

It is the by-products of livestock, agriculture, forestry or timber industry, etc.

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Advantages of Renewable Energies

They can be considered inexhaustible on a human scale compared to fossil fuels;

Their environmental impact is less than that caused by fossil fuels (coal, oil and gas) because they do not produce carbon dioxide or other greenhouse gases;

They offer less risk than nuclear power;

They allow the creation of new jobs (investments in disadvantaged areas);

They allow the reduction of CO_2 emissions and contribute to improve the quality of Life (a clean Air);

They confer energy autonomy on a country, since its use does not depend on the import of fossil fuels;

They lead to research into new technologies that allow better energy efficiency.

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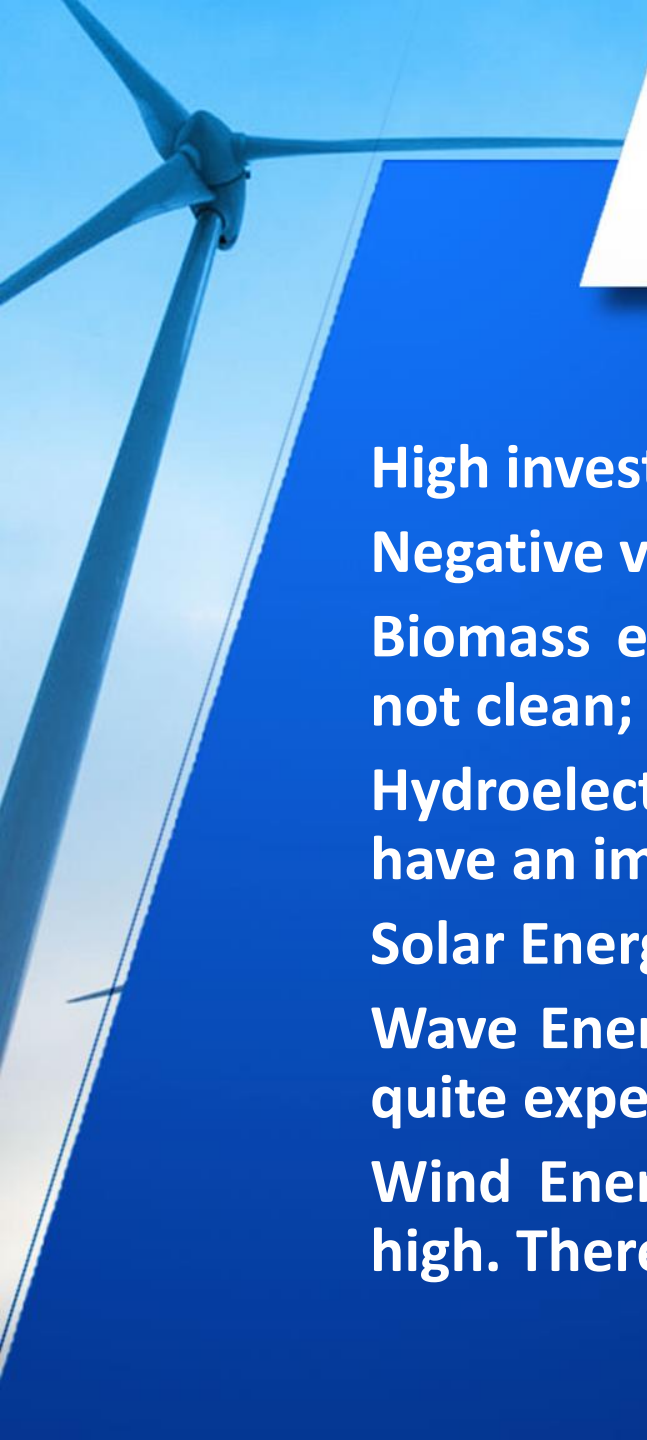
Disadvantages of Renewable Energies



High investment costs and appropriate infrastructure;

Negative visual impacts on the environment;

Biomass energy - the biomass combustion method is not clean;

Hydroelectric Power – it causes soil erosion that may have an impact on local vegetation;

Solar Energy - very high initial costs;

Wave Energy – it depends a lot on the location and is quite expensive;

Wind Energy - the initial cost of the turbines is very high. There is a lot of noise produced.

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Electricity Production in Portugal

52.7% is renewable energy

47.3% is fossil energy

total electricity generated is 45 873GWh

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The district of Bragança, with 1000 MW, is the one that registers greater production of electricity from renewable energy sources in Portugal.

In 2015 Portugal was the fourth country of the European Union with greater incorporation of renewable energies in the production of electric energy

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LET'S USE ENERGY USEFULLY

Different kinds of renewable energy

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Giovanni Malafarina
Istituto Tecnico Tecnologico

Renewable energy is generated from an always available natural process. This includes sunlight, geothermal heat, wind, tides, water and various forms of biomass. This energy cannot be exhausted, it is constantly renewed and exists infinitely.

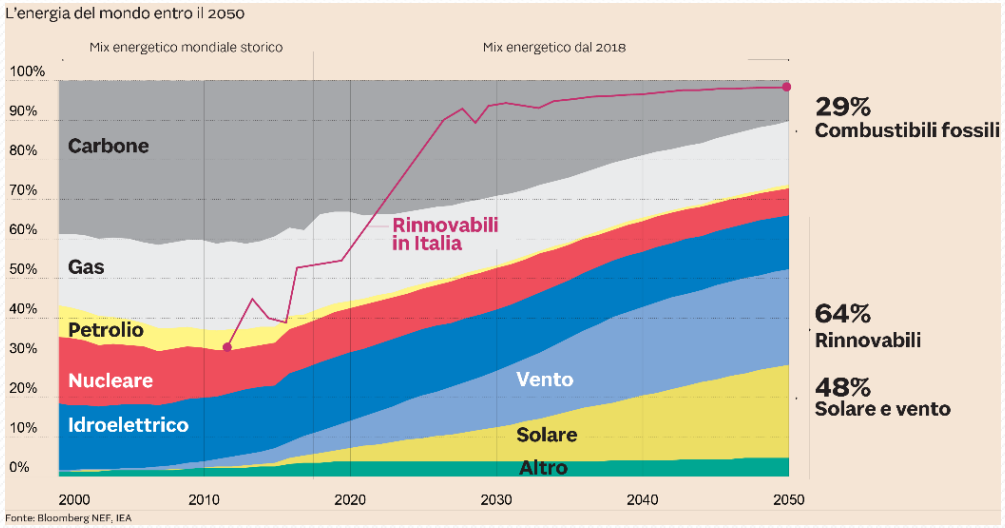
When can energy be called 'Renewable'?

When its source can never end (like the sun) or can be replaced;

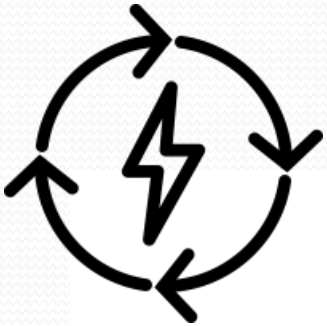
When it doesn't pollute the environment.

The situation in Italy

With an annual energy production of 84 terawatt-hours (TWh) Italy has become one of the leading European nations in the development of this industry.



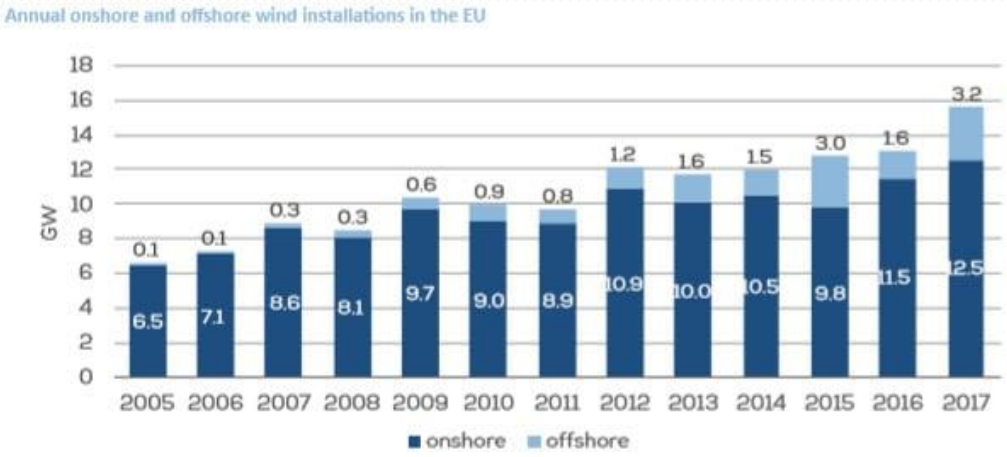
WIND ENERGY



- Wind is a clean, free, and readily available renewable energy source. Each day, over all the world, wind turbines are capturing the wind's power and converting it to electricity. This source of power generation plays an increasingly important role in the way we power our world.
- Wind turbine installations increase throughout the world constantly.

WIND ENERGY IN THE WORLD, IN EUROPE AND IN ITALY

Cumulative wind power in the world, with 52.5 GW installed in 2017, has reached 539.3 GW, in Europe 15,6 GW and in Italy 359 MW. 55% of European Union electricity derives from the wind turbines. China is the most important market in the world, while in Europe the record goes to Germany.

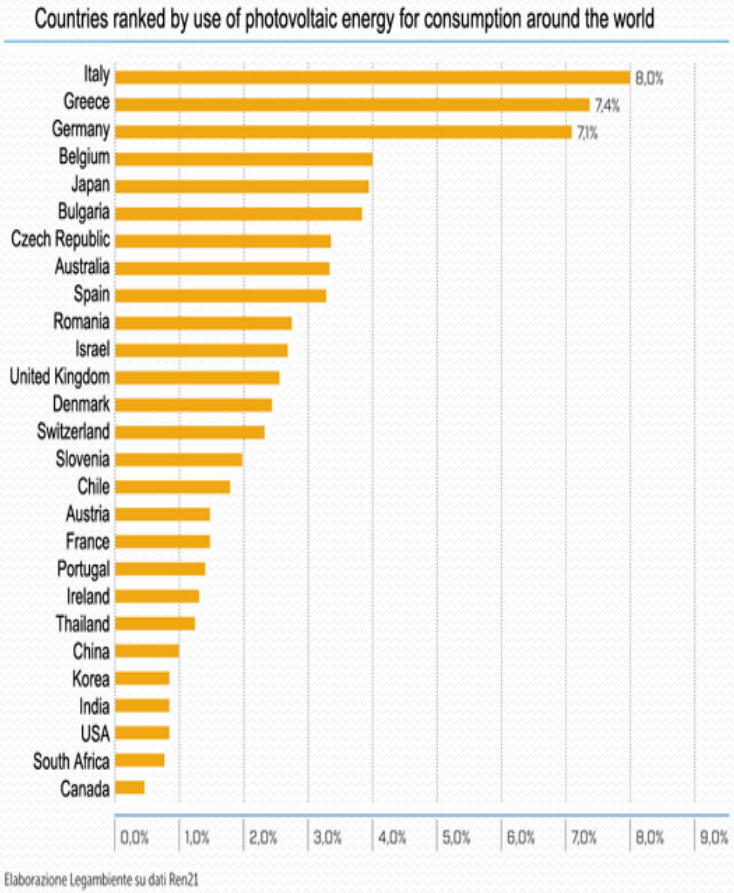


SOLAR ENERGY

This form of energy relies on the nuclear fusion power from the core of the Sun. This energy can be collected and converted in different ways. The range is from solar water heating with collectors or attic cooling with fans for domestic use to the complex technologies of direct conversion of sunlight to electrical energy, using mirrors and boilers or photovoltaic cells. Unfortunately these are currently insufficient to fully power our modern society.

SOLAR ENERGY IN OUR COUNTRY

Solar power accounted for 7% of the electricity generated in Italy during 2013, ranking first in the world. In 2017, that number was close to 8%, which was beaten only by Germany. More than 730,000 solar power plants are currently installed in Italy, with a total capacity of **19.7 GW**. Last year 24,4 TWh were produced.



BIOMASSES

Biomass is an organic material that comes from plants and animals, and it is a renewable source of energy.

Biomass contains stored energy from the sun. Plants absorb the sun's energy in a process called photosynthesis. When biomass is burned, the chemical energy in biomass is released as heat. Biomass can be burned directly or converted to liquid biofuels or biogas that can be burned as fuels.

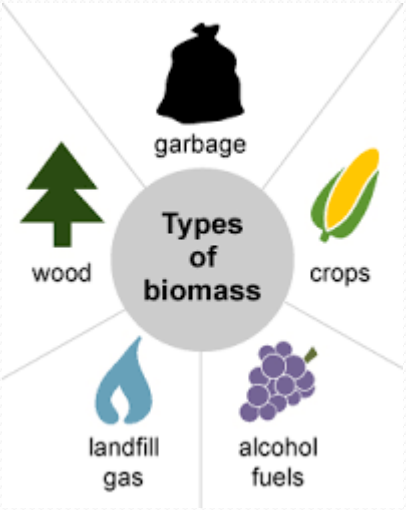
Examples of biomass and their uses for energy:

Wood and wood processing waste—burned to heat buildings, to produce heat in industry and to generate electricity;

Agricultural crops and waste materials—burned as a fuel or converted to liquid biofuels;

Food, yard and wood waste in garbage—burned to generate electricity in power plants or converted to biogas in landfills;

Animal manure and human sewage—converted to biogas, which can be burned as a fuel.



ENERGY FROM BIOMASSES IN OUR REGION

The current productive structure of two power plants active in Calabria has a capacity of an overall energy intake in the national grid of 73 electrical Megawatts (Biomasse Italia – 46 MW and Biomasse Crotone – 27 MW), that makes them ones of the biggest European Companies in the field of electric power production of biomass combustion. Crotone's production started in 2001 whereas Strongoli's started in 2003.

The total yearly production at full capacity is of about 600 GWh for a yearly turnover of about 100 millions euro.

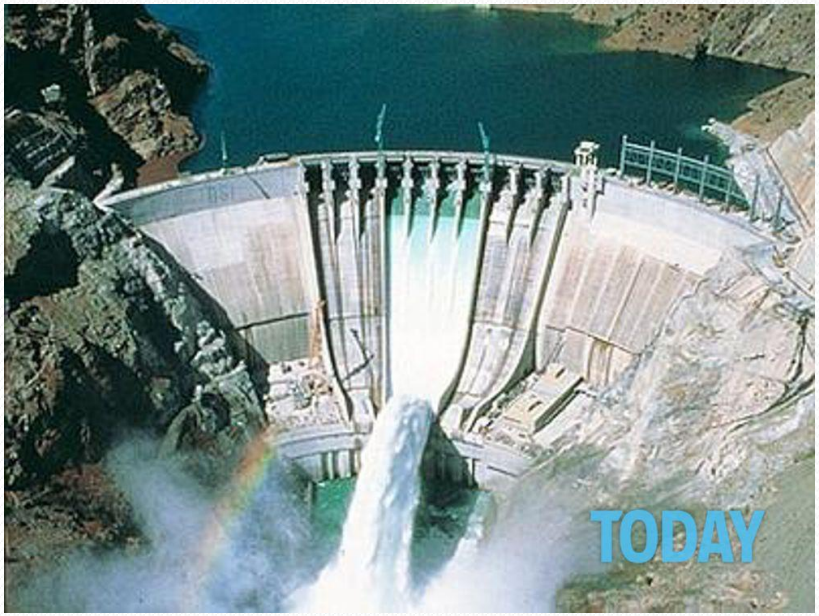
HYDROELECTRIC ENERGY

Hydroelectric energy is produced from generators driven by turbines that convert the potential energy of falling or fast-flowing water into mechanical energy.

The most common type of hydroelectric power plant uses a dam on a river to store water in a reservoir. Water released from the reservoir flows through a turbine, spinning it, which in turn activates a generator to produce electricity. Hydroelectric power doesn't necessarily require large dams. Some hydroelectric power plants just use a small canal to channel the river water through a turbine.

HYDROELECTRIC ENERGY IN OUR COUNTRY

In Italy 67% of energy produced by renewable sources comes from hydroelectric. In Europe, Italy is one of the three major producers of hydroelectric energy, together with France and Spain. According to the Italian Member Committee of WEC current installed capacity is 18 092 MW.

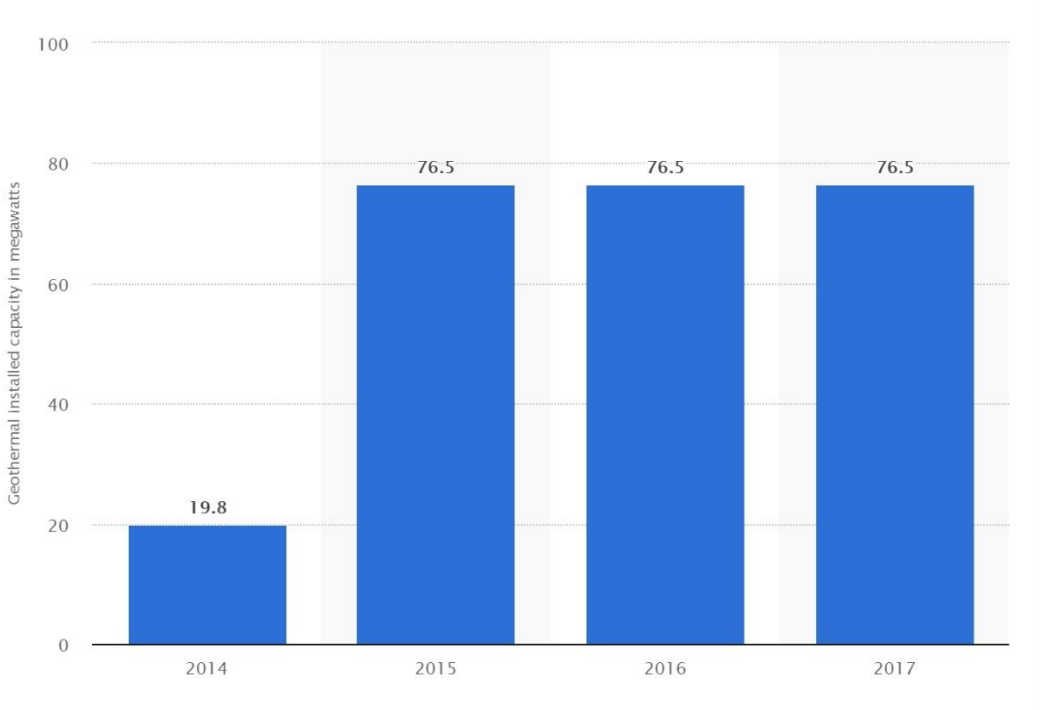


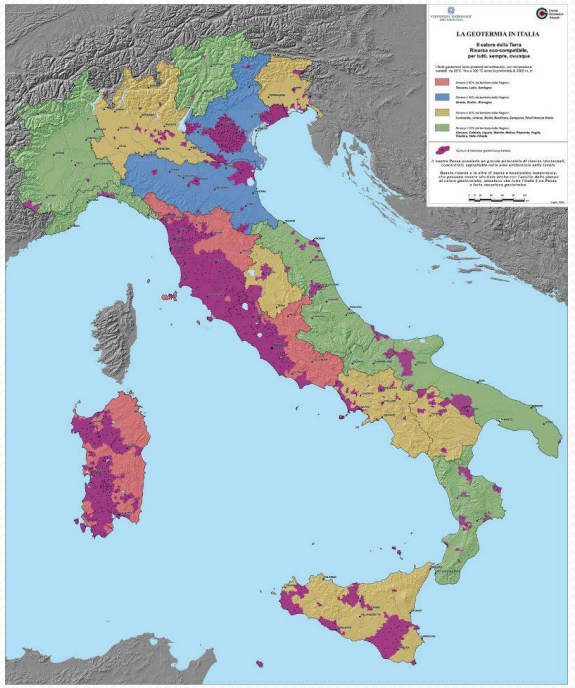
GEOTHERMAL ENERGY

Geothermal energy is heat within the earth. Geothermal energy is a renewable energy source because heat is continuously produced inside the earth. People use geothermal heat for bathing, to heat buildings and to generate electricity.

GEOTHERMAL ENERGY IN MY COUNTRY

Geothermal capacity installed in Italy from 2014 to 2017 (in megawatts)

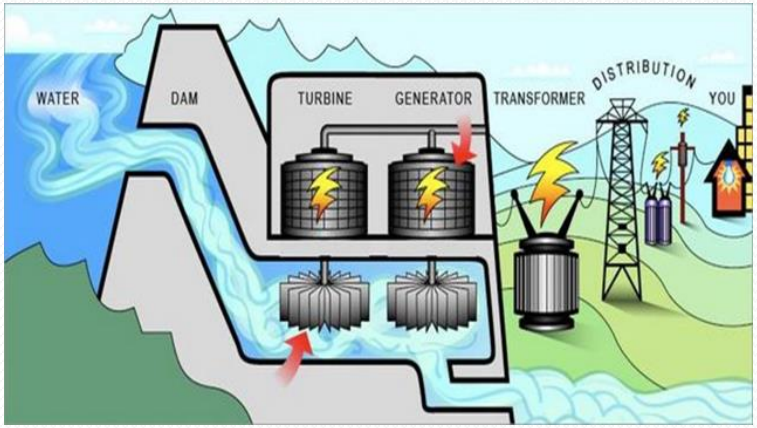


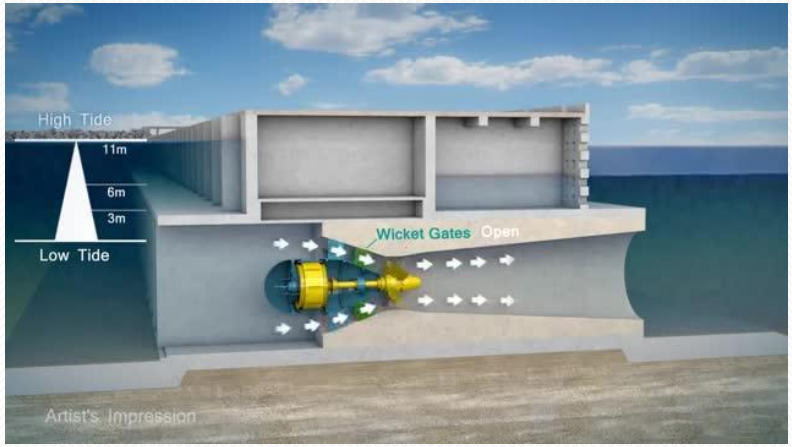


RENEWABLE ENERGY: TIDES

The gravitational pull of the moon and sun along with the rotation of the earth cause tides.

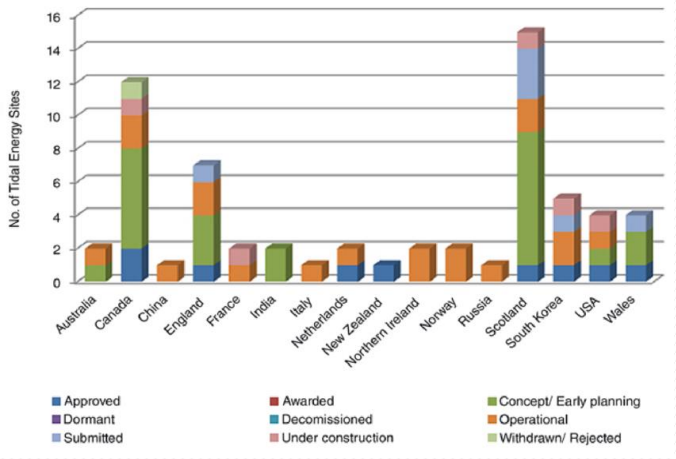
Tidal energy is one of the oldest forms of energy generation and it is a renewable form of energy that converts the natural rise and fall of the tides into electricity. Tides are caused by the combined effects of gravitational forces exerted by the Moon, the Sun and the rotation of the Earth. Tidal electricity can be created by several technologies, the main ones being tidal barrages, tidal fences and tidal turbines.





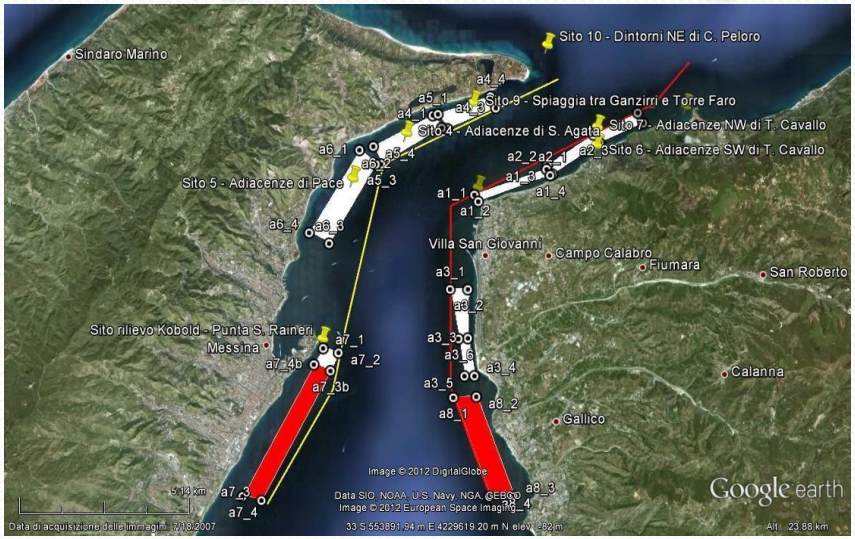
TIDAL ENERGY IN OUR COUNTRY

Fleets of 50 tidal power plants, each with an installed power of 20 megawatts (MW), anchored far out in the ocean could be used to generate electricity for hydrogen electrolysis, and so supply the world with vast quantities of clean energy in years to come if a pilot project in Italy is successful.
A 500-kilowatt (kW) tidal power prototype that could be scaled up for ocean use is set to be tested next August in the Strait of Messina, a stormy stretch of sea separating Italy's mainland from Sicily.



TIDAL ENERGY IN OUR REGION

The Consortium of private/ public SEAPOWER will manage an open-air laboratory in the Strait of Messina which will also host turbines coming from foreign countries in order to certify their performance. It is possible to install GEM turbines up to a power of about 19 MW and these can produce a total annual energy equal to 46 GWh (capable of powering about 18,500 homes)



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Let’s Use Energy Usefully

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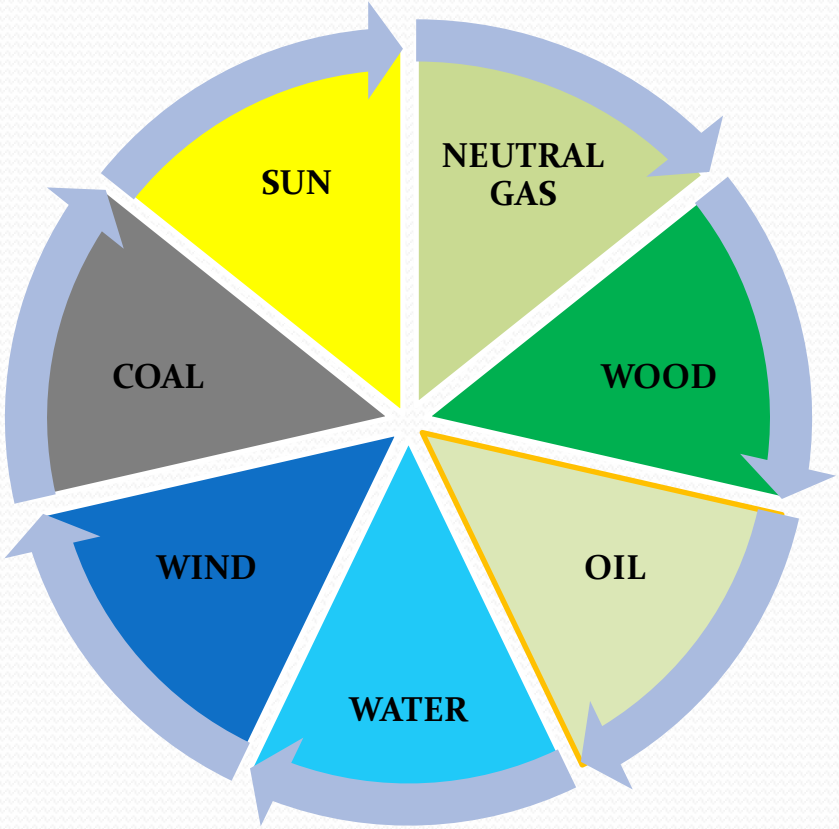
LET'S USE ENERGY USEFULLY

DIFFERENT SOURCES OF ENERGY



RENEWABLE ENERGY

- **Renewable energy(sources) or RES capture their energy from existing flows of energy, from on-going natural processes, such as sunshine, wind, flowing water, biological processes, and geothermal heat flows that are constantly replenished**

“CLEAN” ENERGY

DIFFERENT KINDS OF RENEWABLE ENERGY

SOLAR ENERGY

- Solar power means energy from the sun
- It is used to generate electricity, using solar panels
- “More energy from the sun falls on the earth in one hour than is used by everyone in the world in one year.”

DIFFERENT KINDS OF RENEWABLE ENERGY

WIND POWER

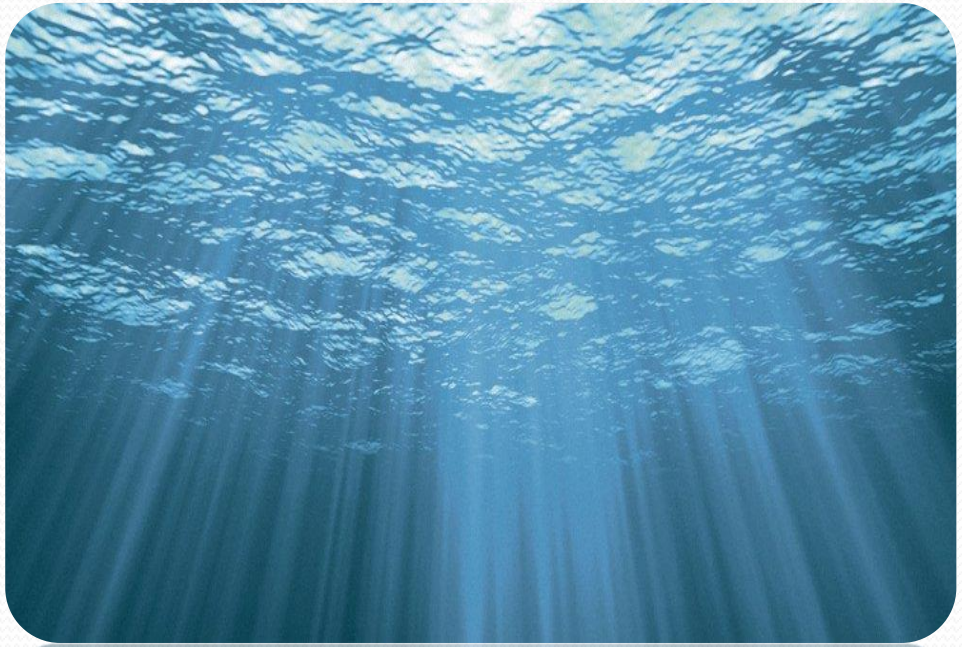
- Wind power is a new source of energy that's as old as the earth
- Most wind power is converted to electricity by using wind turbines
- Wind is a natural resource that never runs out

DIFFERENT KINDS OF RENEWABLE ENERGY

WATER POWER

- Energy of falling water or fast running water

- Energy from the ocean



DIFFERENT KINDS OF RENEWABLE ENERGY

HYDROPOWER

- **Hydropower is power derived from the energy of falling water or fast running water**
- **Used to create electricity by using dams**
- **Water is so plainful and it is replenished every time it rains**

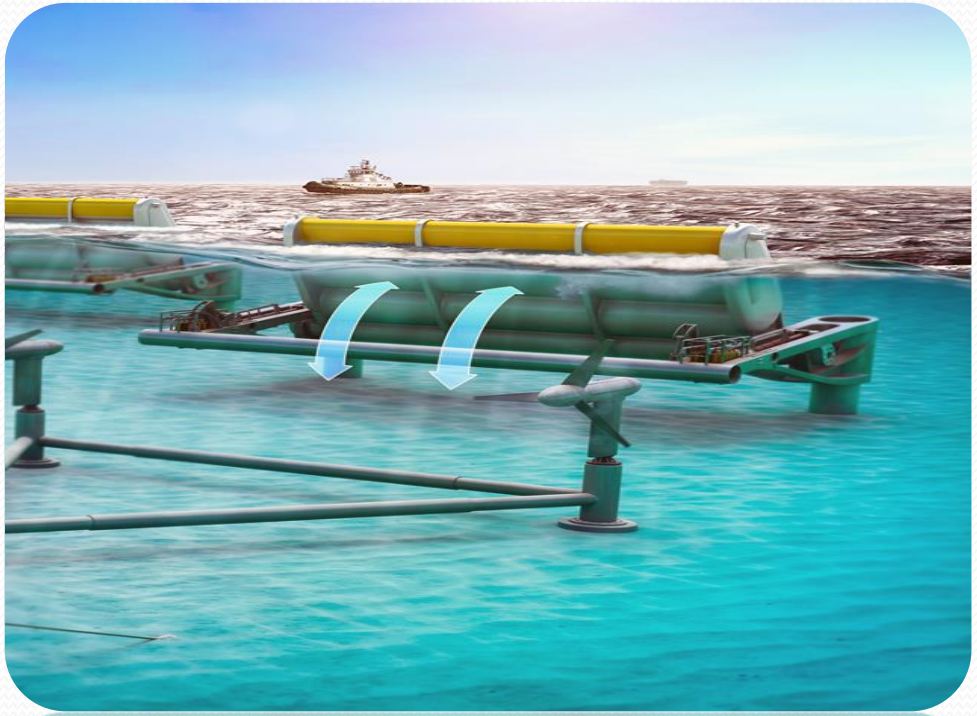
DIFFERENT KINDS OF RENEWABLE ENERGY

POWER FROM THE OCEAN

Two types of energy can be produced by the ocean:

- **Ocean thermal energy- from the sun heat**

- **Ocean mechanical energy- from the motion of tides and waves**



DIFFERENT KINDS OF RENEWABLE ENERGY

GEOTHERMAL ENERGY

- Heat from the earth
- Very efficient and doesn't hurt the environment
- Limited by its location- geothermal sources only occur in areas of the world that have volcanoes

DIFFERENT KINDS OF RENEWABLE ENERGY

BIOENERGY

- Biomass refers to any organic matter coming from recently living plants or animal

- A type of renewable energy derived from biomass to create heat and electricity or to produce liquid fuels such as ethanol and biodiesel used for transportation.

DIFFERENT KINDS OF RENEWABLE ENERGY

WOOD

- The earliest known energy source in human history
- Wood is heavily used to supply the energy for cooking and heating
- BE CAREFUL! Trees could be replaced! It takes years to grow

Is Nuclear Energy Renewable Energy?

Arguments FOR

- low carbon emission
- uranium resources would be enough to fuel the earth for another 5 billion years

Arguments AGAINST

- uranium deposit on earth is finite, unlike solar and wind.
- Nuclear generates waste that can be dangerous for human health and the environment

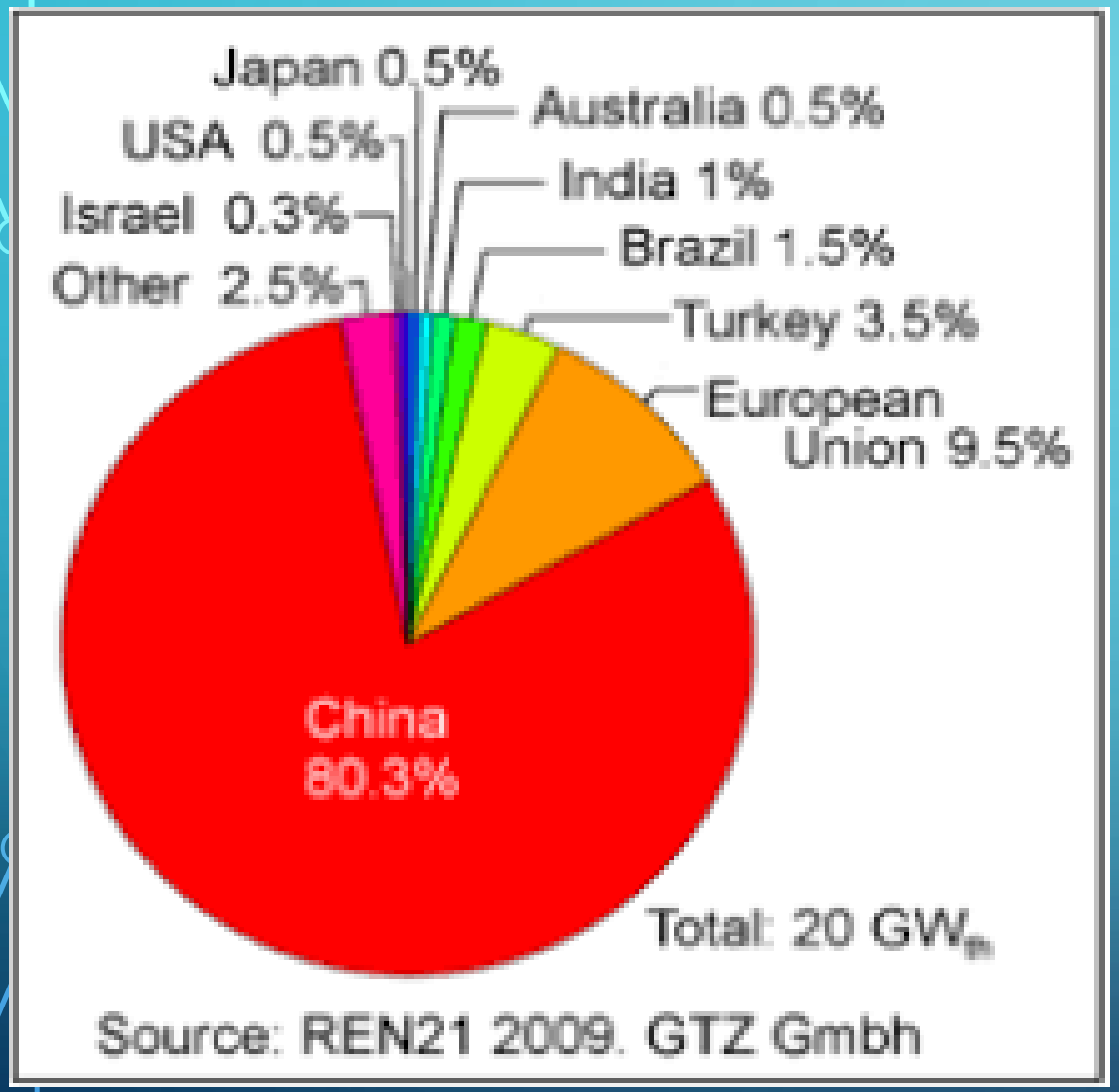
SOLAR ENERGY

CREATED BY : HUNGARIAN TEAM

RESEARCHERS AT MICHIGAN STATE UNIVERSITY HAVE DEVELOPED TRANSPARENT SOLAR PANELS THAT COULD BE APPLIED FOR EVERYTHING. THE RESEARCHERS HAVE SUGGESTED THAT THEIR CLEAR SOLAR PANELS COULD BE AFFIXED TO VEHICLES, BUILDINGS, WINDOWS, AND EVEN MOBILE PHONES.

BIG-NAME COMPANIES LIKE SOLARCITY (A TESLA SUBSIDIARY) AND DOW HAVE ENTERED THE SOLAR MARKET HOPING THAT THEY CAN BRING SOLAR ENERGY TO THE EVERYDAY PEOPLE.

Tesla solar roof →


Japan 0.5%
Australia 0.5%
USA 0.5%
India 1%
Israel 0.3%
Brazil 1.5%
Other 2.5%
Turkey 3.5%
European Union 9.5%
China 80.3%
Total: 20 GW
Source: REN21 2009. GTZ Gmbh

ÇARŞAMBA KIZ ANADOLU İMAM HATİP LİSESİ

Let's Use Energy Usefully

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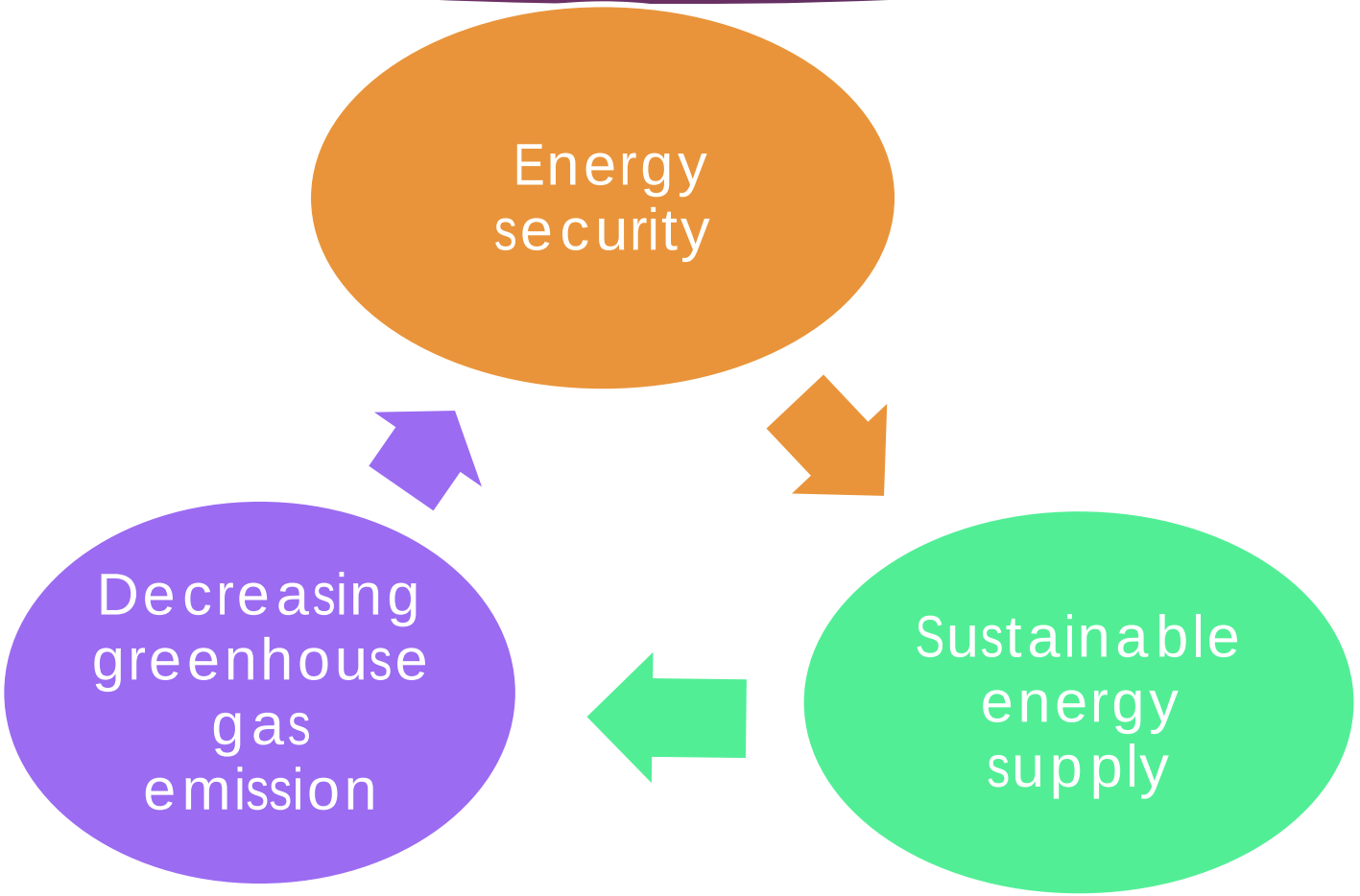
WHAT IS ENERGY?

“The ability to make any movement or ready to do is called energy.”

MAIN POLICY OF TURKEY'S CONCERNS



TARGETS FOR 2023

The whole economically feasible hydropower potential of Turkey will be provided for generating electrical energy.

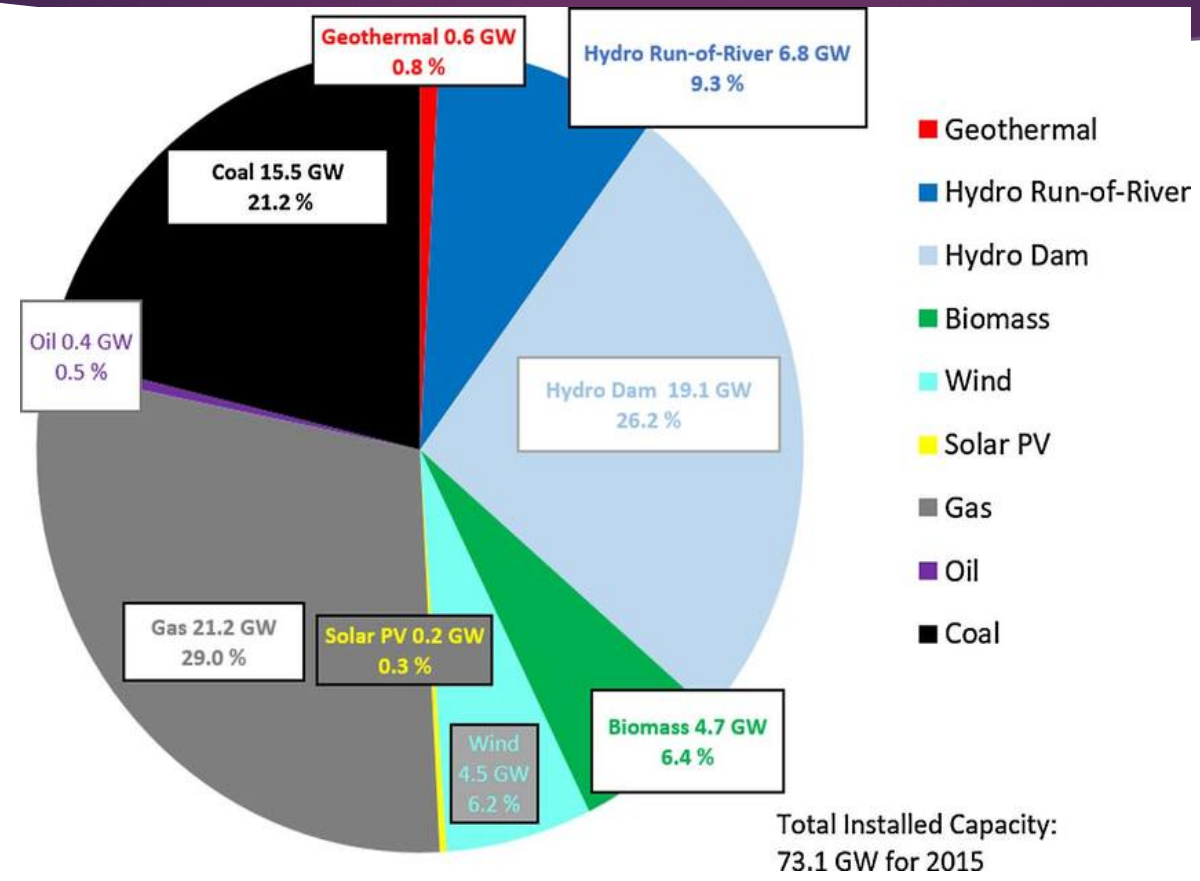
20,000 MW capacity of wind power plant will be in operation.

Minimum 3000 MW of solar energy capacity will be reached.

1500 MW installed capacity for Biomass energy.

Minimum 600 MW geothermal will be implemented.

TOTAL INSTALLED CAPACITY OF TURKEY



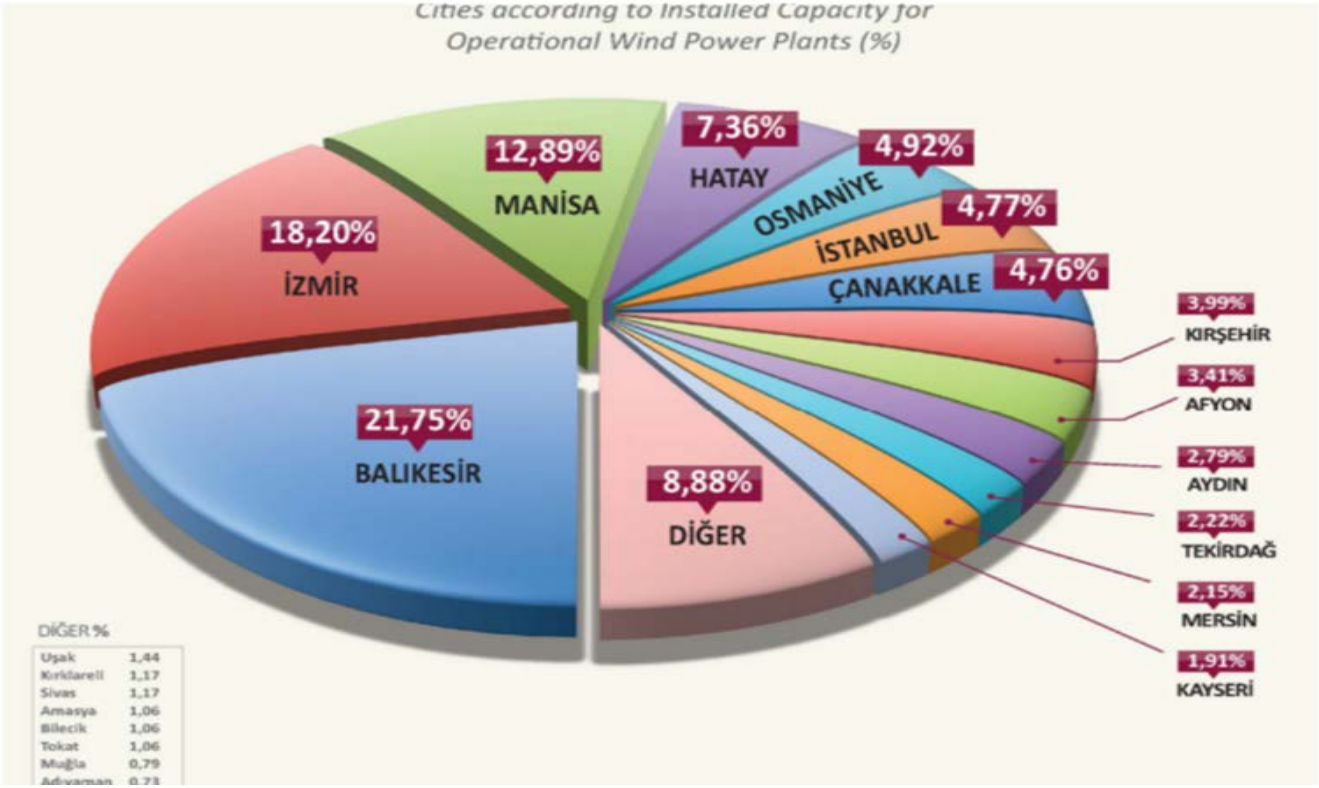
Total Installed Capacity:
73.1 GW for 2015

EOLIC ENERGY IN TURKEY

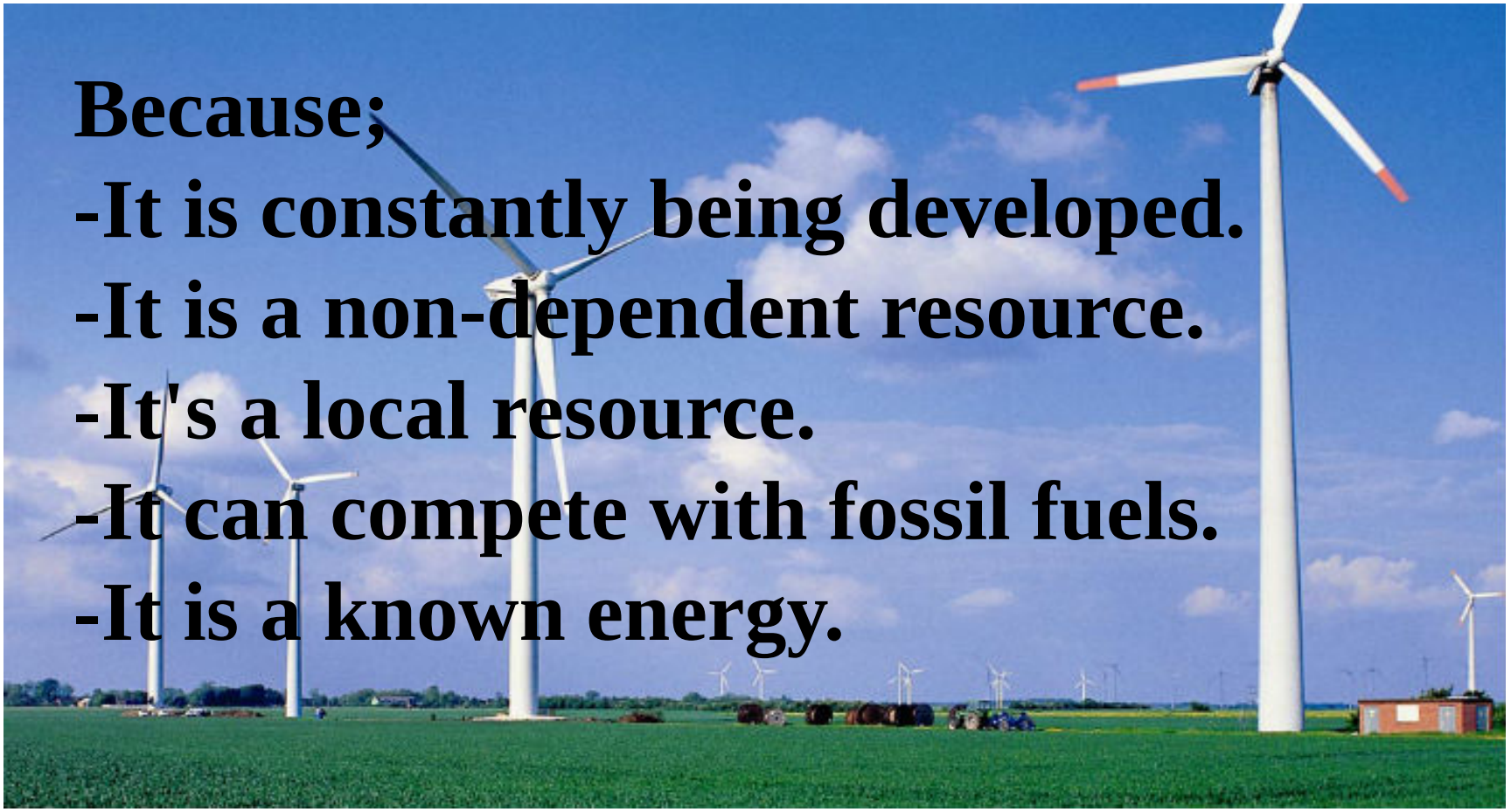
The first wind power plants in Turkey has been started in 1998.Turkey has the serious wind energy potential. Turkey has 11GW stock of the current project and the capacity of 20 GW for the national targets in 2023 in terms of Eolic Energy, therefore, Turkey plays a vital role in the European market. In the future Turkey will probably play an important role in shaping the investment opportunities.

TOTAL CAPACITY **47,849.44**

Below you will find the cities according to installed capacity for operational wind power plants (%)



WHY EOLIC ENERGY?



Because;

-It is constantly being developed.

-It is a non-dependent resource.

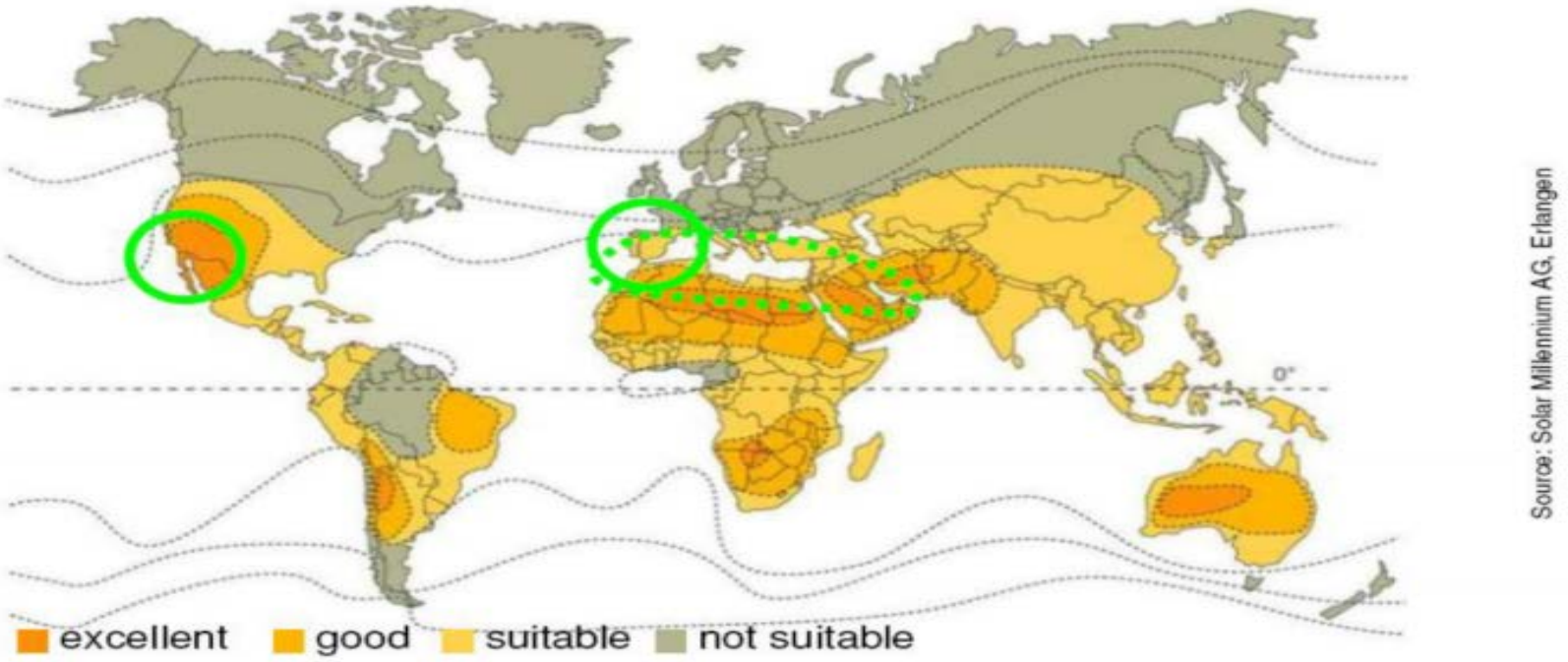
-It's a local resource.

-It can compete with fossil fuels.

-It is a known energy.

SOLAR ENERGY IN TURKEY

Turkey is very lucky to possess a high solar energy potential, in terms of its geographical location.
See below;



WATER HEATING SYSTEM

- Solar energy utilization in Turkey is mainly composed of hot water generation systems which turn solar energy into thermal energy and are mostly used in the west and south regions of the country.
- 18 million m2 flat-plate solar collectors are in use.
- Turkey is one of the biggest Producers of the solar collectors İn the world. Some amount of this production is exported.

TURKEY'S FIRST SOLAR-ENERGY BUS

- Middle East Technical University in Ankara, Turkey have started a project by suggesting the idea of performing a first bus powered by solar energy.
- The purpose of the project is to use the generated energy by storing it in the operation of the electric air conditioner.