

NUCLEAR RISKS

MARIO B., NUCLEAR TESTS IN THE PACIFIC

CAROLA F., CHERNOBYL

GIORGIA L., NUCLEAR ENERGY

LUDOVICA Z., EARTH DAY

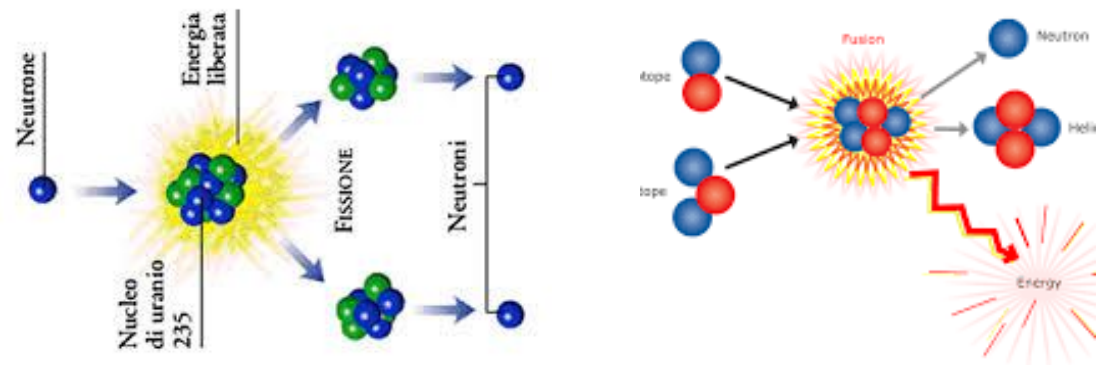
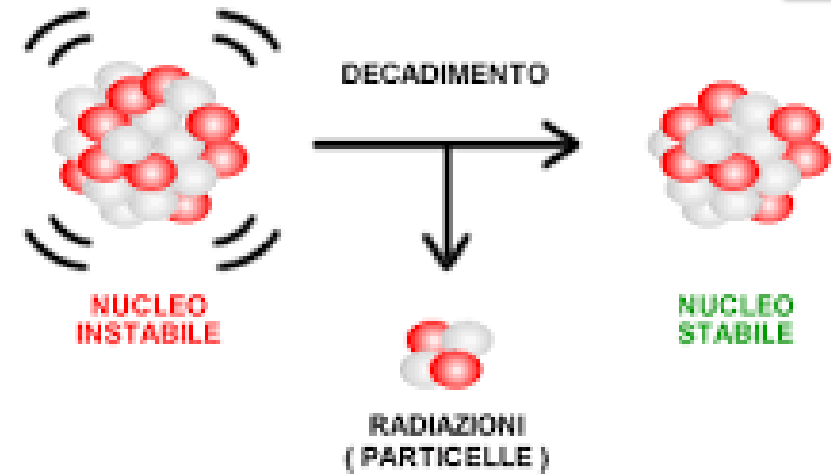
PAOLO M., ATOMIC WEAPON

FLAMINIA C., FUKUSHIMA

NUCLEAR ENERGY

Definition

- ▶ Nuclear energy (also called atomic energy) derives from "nuclear reactions"
- ▶ It is a renewable energy
- ▶ Nuclear power can be obtained from:
 - ▶ - nuclear fission
 - ▶ - nuclear decay
 - ▶ - nuclear fusion reactions



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How can you do it?

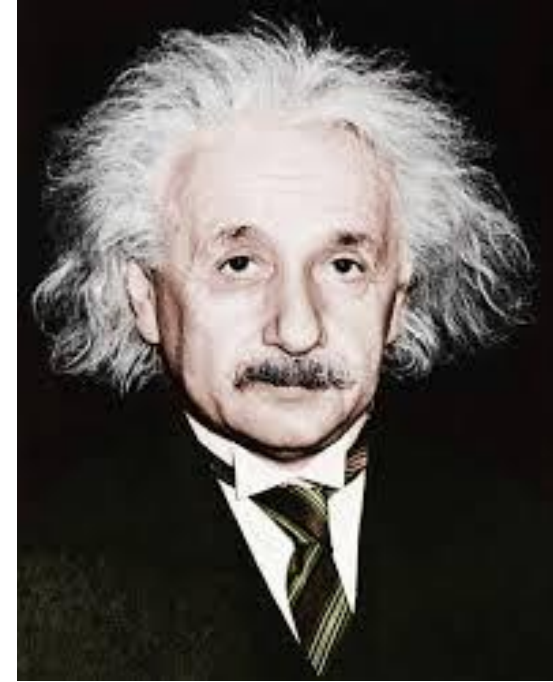


Nuclear power can be obtained from:

- **nuclear fission:** it is a physical-nuclear process in which the atomic nucleus of a heavy chemical element decays into smaller fragments, with the emission of a large amount of energy and radioactivity
- **nuclear decay:** radioactive decay is a set of processes by which some unstable atomic nuclei emit subatomic structures to achieve a state of stability
- **nuclear fusion:** Nuclear fusion is a nuclear reaction through which the nuclei of two or more atoms join together, forming the nucleus of a new chemical element.

History

- ▶ The first person who sensed the possibility of obtaining energy from the nucleus of the atom was the scientist Albert Einstein in 1905.
- ▶ In the United States, there was the creation of the first man-made reactor, the research reactor known as Chicago Pile-1; used for the Manhattan Project during World War II.
- ▶ In the second half of the last century, nuclear power was used for civilian purposes like producing electricity. But during the Cold War, the interest in nuclear energy as a tool for war was returned.



Conclusions

- ▶ Currently, the technical and media debate on nuclear energy largely focuses on nuclear fission, the only nuclear reaction to have a civilian functioning for energy application
- ▶ A major environmental issue is the creation of radioactive wastes



Atomic Weapon

- ▶ **How to create it:** there are two types of nuclear energy, but I will talk only about one of them: *nuclear fission*. The nucleus of a single atom splits in two fractions of atoms. Normally you should use uranium or even plutonium because when one of them splits creates an explosion, which is extremely powerful and big.
- ▶ Another type of bomb also exists, the *hydrogen bomb*. To create a hydrogen bomb, you should use nuclear fusion which fuses two atoms (normally hydrogen or his isotypes). The hydrogen bomb is similar but more powerful and more efficient than normal ones.

Bomb's effects

- ▶ The heat of a bomb is extremely high (usually some millions of Celsius degrees) so to vaporize human tissues. Another problem is that the bomb absorbs all the oxygen near to it and so the air can be toxic. The atomic bomb also releases radiations in the air, causing cancer to the skin and to the organs.
- ▶ If someone is not in the area of total destruction can be "safe" but he/she will fatally suffer of burns and cancer, also becoming blind, bleeding from mouth and having his/her organs mutilated.

Atomic Tests

- ▶ In America there were 1000 nuclear tests, in Russia 700, in France and in other countries 200, for a total of 2121 tests in the whole world.
- ▶ The bombs dropped above Hiroshima and Nagasaki were nicknamed Little Boy and Fat Man. Little Boy had the power of 15000 tons of TNT but Fat Man was incredibly stronger than Little Boy.
- ▶ Americans dropped bombs for tests in the Pacific Ocean and Russians did tests in Siberia.

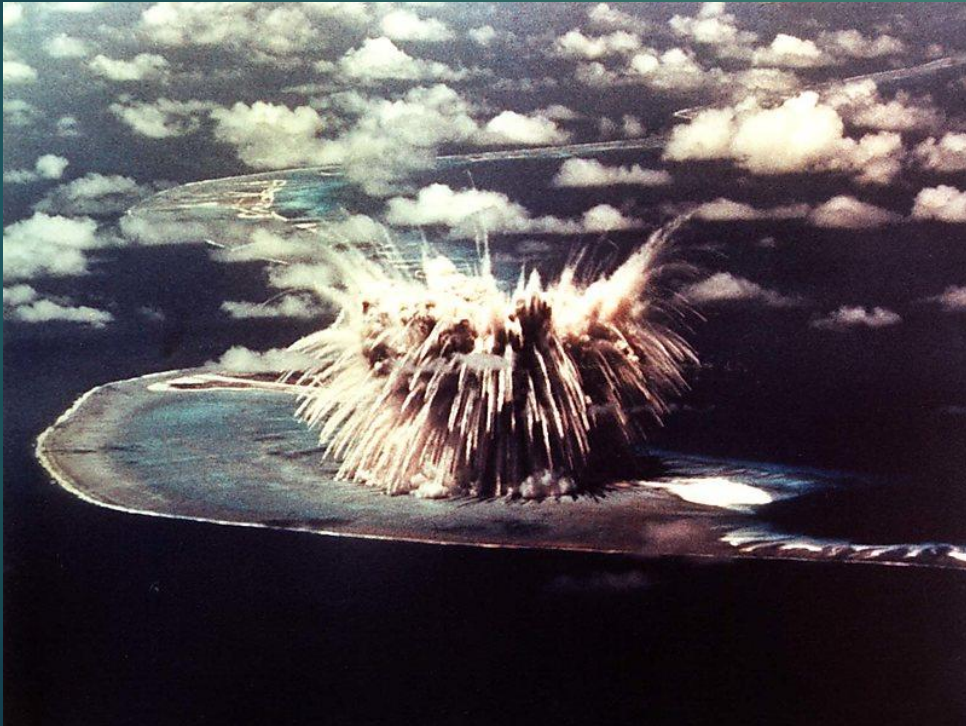


NUCLEAR TESTS IN THE PACIFIC OCEAN 1945-2000

HISTORIC CONTEST – ENIWETOK ATOLL – MORUROA ATOLL

HISTORIC CONTEST

The nuclear bombing of Hiroshima and Nagasaki signed the beginning of the Atomic Age. The **cold war** was a continue threat of nuclear bombings between **USA** and the **USSR**



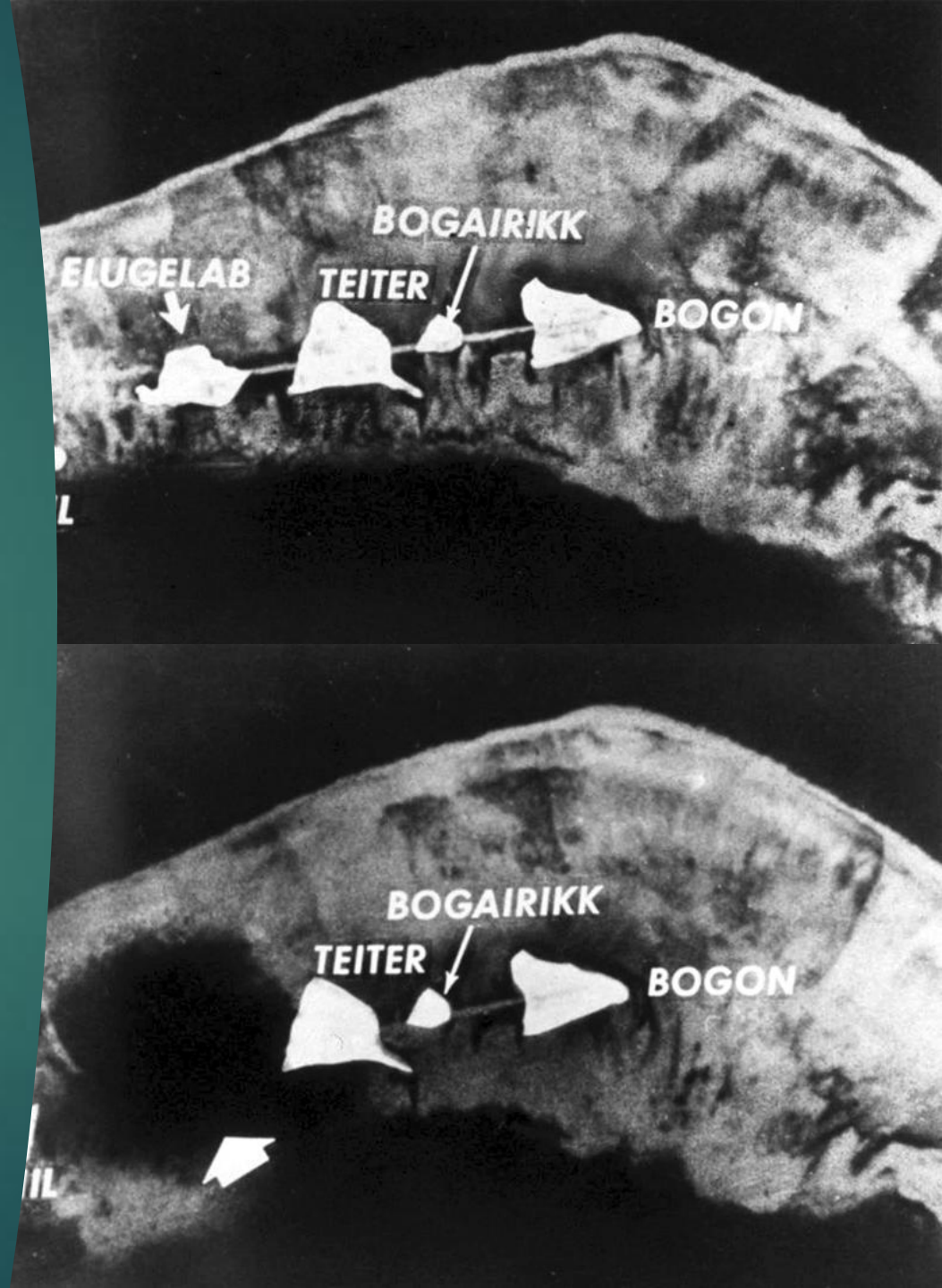
Nuclear tests were done in desert areas and in small atolls of Pacific Ocean. Two famous tests conducted in these atolls were the Eniwetok test and the Moruroa experiment.



THE ENIWETOK TEST— 1ST NOVEMBER 1952

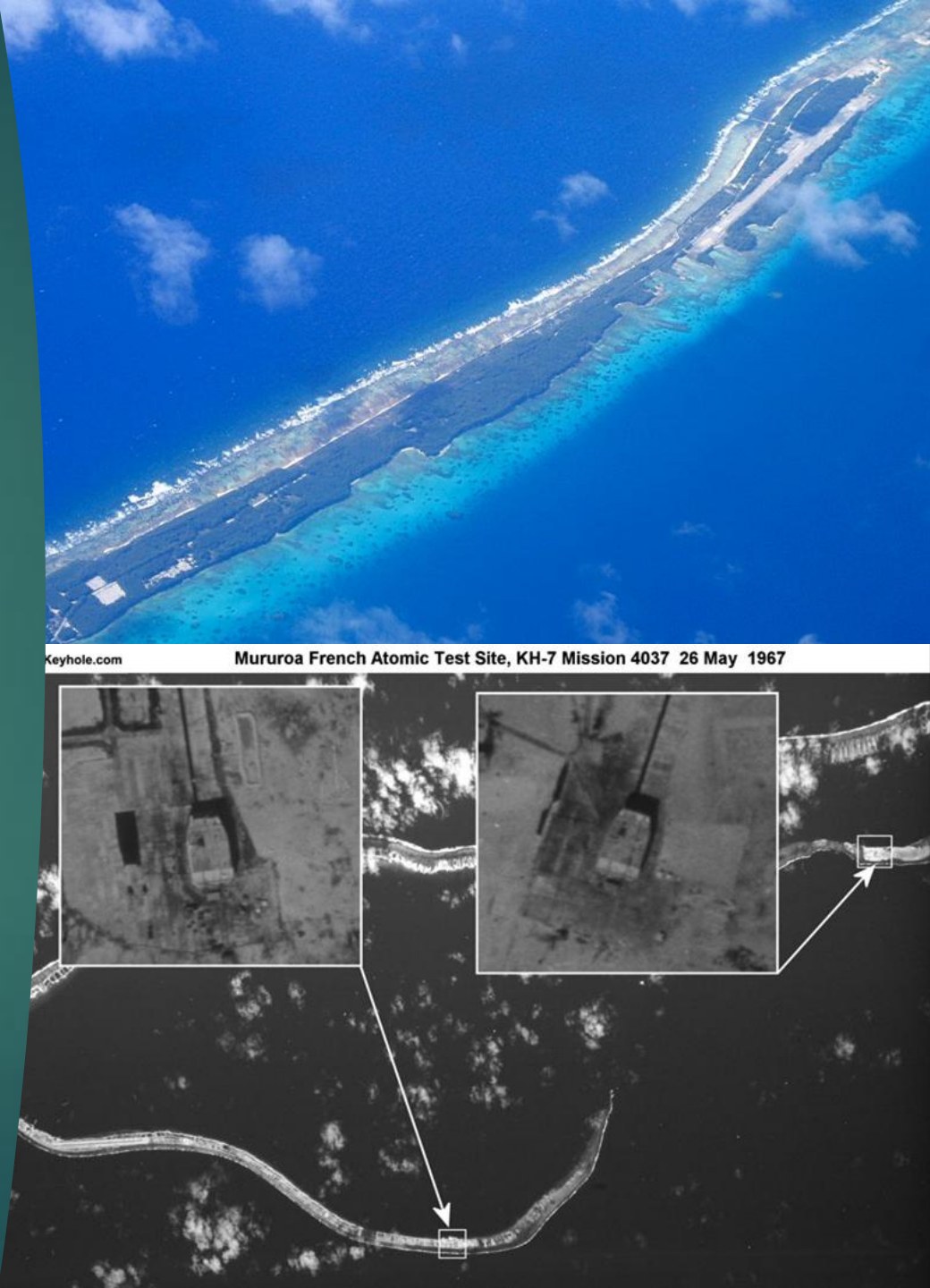
▶ On November 1st, 1952, the United States detonated the world's first hydrogen bomb on a large atoll called Eniwetok in the Marshall Islands in the South Pacific as a part of Operation Ivy. The creation and detonation of the first hydrogen bomb on the Eniwetok atoll allowed the United States to temporarily step ahead of the Soviets during the arms race. Overall there were 43 nuclear tests conducted at Eniwetok from 1948 to 1958. H-bombs, which get their power from fusion, are about 1000 times more powerful than atomic bombs, which derive their force from fission.

▶ **Consequences:** the bomb was dropped on the island of Elugelab, a part of the atoll. The explosion was so violent that the entire island was wiped out. Today all the radiations caused by the test are contained in a huge cemented dome.



THE MORUROA TEST – 1966-1996

- ▶ Mururoa atoll was officially established as a nuclear test site by France on September 21, 1962 and became the site of extensive nuclear testing between 1966 and 1996. The first nuclear test was conducted on July 2, 1966, when a plutonium fission bomb was exploded in the lagoon. Some experts said in a 21st-century study that the explosion sucked all the water from the lagoon, "raining dead fish and mollusks down on the atoll", and that it spread contamination across the Pacific as far as Peru and New Zealand. President Charles de Gaulle himself was present at Moruroa on 10 September 1966 when a test was conducted, using a device suspended from a balloon.
- ▶ **Consequences:** all the radiations released caused an increasement of cancer among the population and still today we have the 34% of cancer cases.



CHERNOBYL



The 26th of April 1985 at 1;23 in the morning, during a test defined as a security test, but arranged in full violation of all protocols and all elementary bases of common sense, the 4th reactor of the Chernobyl nuclear center exploded.

It's been one of the most dangerous nuclear accidents in history and even if 33 years have passed some details of this explosion remain dark.



Surely, we know that there was a strong explosion in the 4th reactor of the central, that caused the uncovering of it and a vast fire. Following the disaster a cloud broke out that was rich of radioactive particles 500 times more deadly than those produced by the bombs of Hiroshima and Nagasaki.

The winds spread the particles in the atmosphere and soon entire regions were contaminated such as Ucraina, Belarus and Russia. The flows also reaches big part of The occidental Europe that was contaminated as well.

In the next days and hours more than 330.000 people were evacuated in fast and fury: citizens were told to bring with them few personal effects and that they would have been transferred in precautionary measure, telling them they could have come back in their homes as soon as possible.

In reality, no one went back in those zones, the area around the centre in fact, is completely uninhabitable because of the high level of radioactivity within 19 kilometres, and even far away from the contamination the radioactivity stays high and life is very difficult. Officially there were about 65 deaths caused by the explosion, but we talk about 4.000 cases of cancer at the thyroid between Bielorussia, Ukraine and Russia for the explosion and radioactive substances. The hardest hit were children and teenagers under 14 years old, because they absorbed big quantities of radiations by milk.

And now how is the situation in Chernobyl?
Immediately after the accident a “sarcophagus” in concrete was built in record time to cover up the remains of the exploded central and the contaminated waste.

The 29th of November 2016 the old sarcophagus was replaced with a new structure preventing that a new cloud composed by 5 tons of radioactive dust would free itself in the European atmosphere.





FUKUSHIMA

How

- The Fukushima nuclear disaster was a nuclear accident at the Fukushima Daiichi Nuclear Power Plant in Ōkuma. It was the most critical nuclear accident since the 1986 Chernobyl disaster.
- The accident started because of the Tōhoku earthquake and tsunami on Friday, 11 March 2011.
- In the days after the accident the radioactive waste released to the atmosphere forced the government to announce an evacuation zone around the plant with a 20-kilometer radius.



Environmental impact

Five years later the situation in these areas is still very serious:

- Radiocative elements have been absorbed by plants and animals.
- The melting of snow, floods and rain have transported radiocative substances into the Pacific Ocean.
- According to some analysis in the new leaves and in the pollen are present high concentrations of radioelements.
- In the flora there are mutations in the growth of trees caused by the increase of radioactivity levels.
- 57 species of birds have disappeared and there have been found hereditary mutations in butterflies.
- The DNA of the worms in these areas is highly damaged and there is also a reduction of fertility of the territory.
- The river ecosystem was contaminated with radioactive substances and dangerously high levels of cesium (is a chemical substance) were found in the fishes.

Impact on population

- ▶ The disaster caused only one cancer death attributed to radiation
- ▶ There have been 16 people with physical injuries due to the hydrogen explosion and 2 workers have been taken to the hospital with possible radiation burns
- ▶ 184,000 residents evacuated from the communities surrounding the central station
- ▶ There have been 16,000 deaths due to the tsunami, 2,572 people missing and 127,000 destroyed buildings.
- ▶ Five years after the disaster Tokyo began to bring people back to their cities. An example could be Okuma, a town about 12 km from the nuclear power station, and once home to over 11 thousand people. Only 367 people have returned to their neighborhoods but of these only 48 are willing to stay there.



THE EARTH DAY



- WHAT IS IT?
- WHERE DOES IT COME FROM?
- WHAT DO WE CELEBRATE?



50 YEARS
EARTH
DAY 2020

50 YEARS EARTH DAY 2020



1970



2015








2016

1. No poverty
2. No hunger
3. Good health and well-being
4. Quality education
5. Gender equality
6. Clean water and sanitation
7. Affordable and clean energy
8. Decent Work
9. Industry, Innovation and Infrastructure
10. Reduced Inequalities
11. Sustainable Cities and Communities
12. Responsible Consumption and Production
13. Climate Action
14. Life Below Water
15. Life on Land
16. Peace, Justice and Strong Institutions
17. Partnerships for the Goals

2030



THE FIVE P

-  **People:** eliminate hunger and poverty in all their customs and guarantee dignity and equality;
-  **Prosperity:** guarantee prosperous life and full of harmony and nature;
-  **Peace:** promote peaceful, rights and inclusive societies;
-  **Partnership:** carry out the Agenda by solids partnerships;
-  **Planet:** protect naturals resources and planets climate for future generations.

THE GLOBAL AGENDA and THE SDG

1. No poverty:



2. No hunger:



3. Good health and well-being:



4. Quality education:



5. Gender equality:



6. Clean water and sanitation:



7. Affordable and clean energy:



THE GLOBAL AGENDA and THE SDG

8. Decent Work and Economic Growth:



9. Industry, Innovation and Infrastructure:



10. Reduced Inequalities:



11. Sustainable Cities and Communities:



12. Responsible Consumption and Production:



13. Climate Action:



14. Life Below Water:



15. Life on Land:



16. Peace, Justice and Strong Institutions:



17. Partnerships for the Goals:

