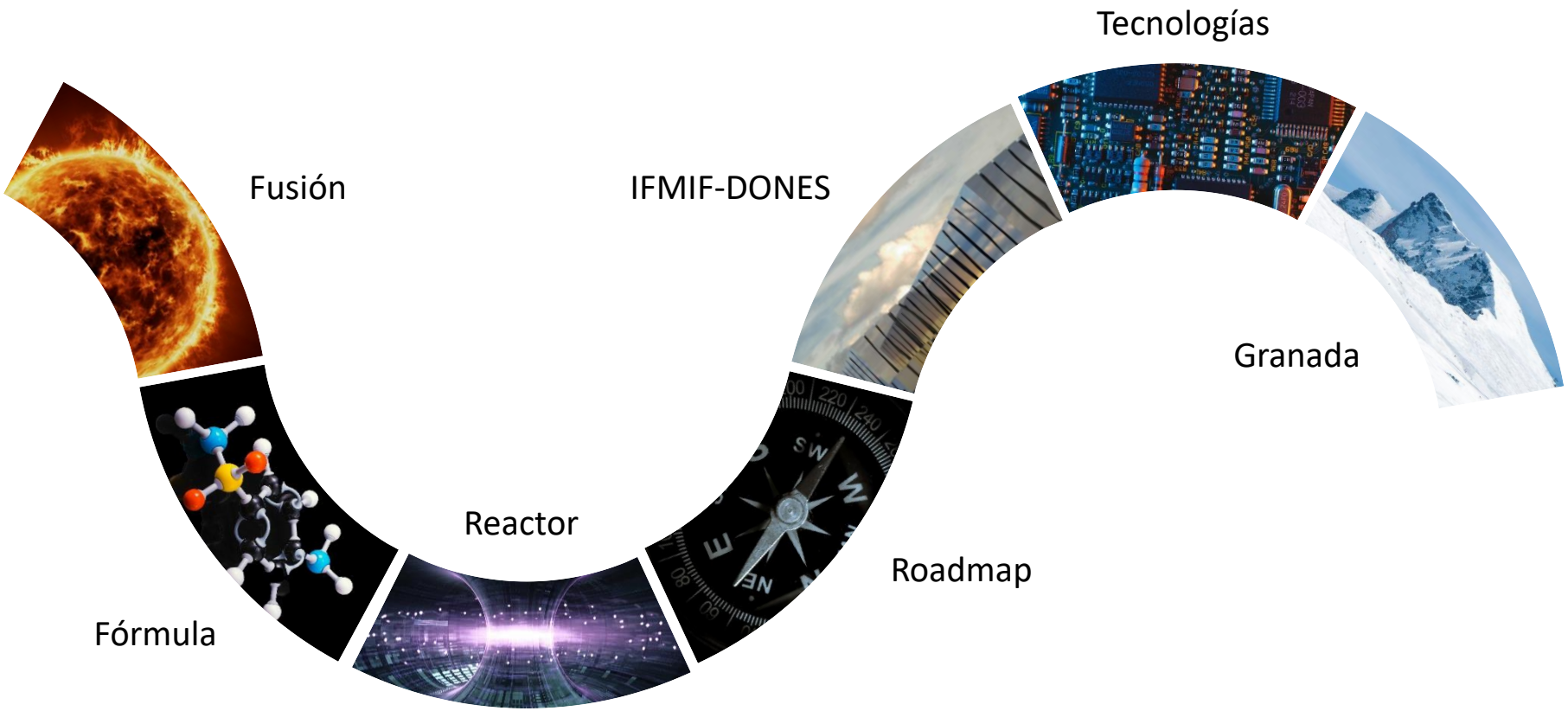
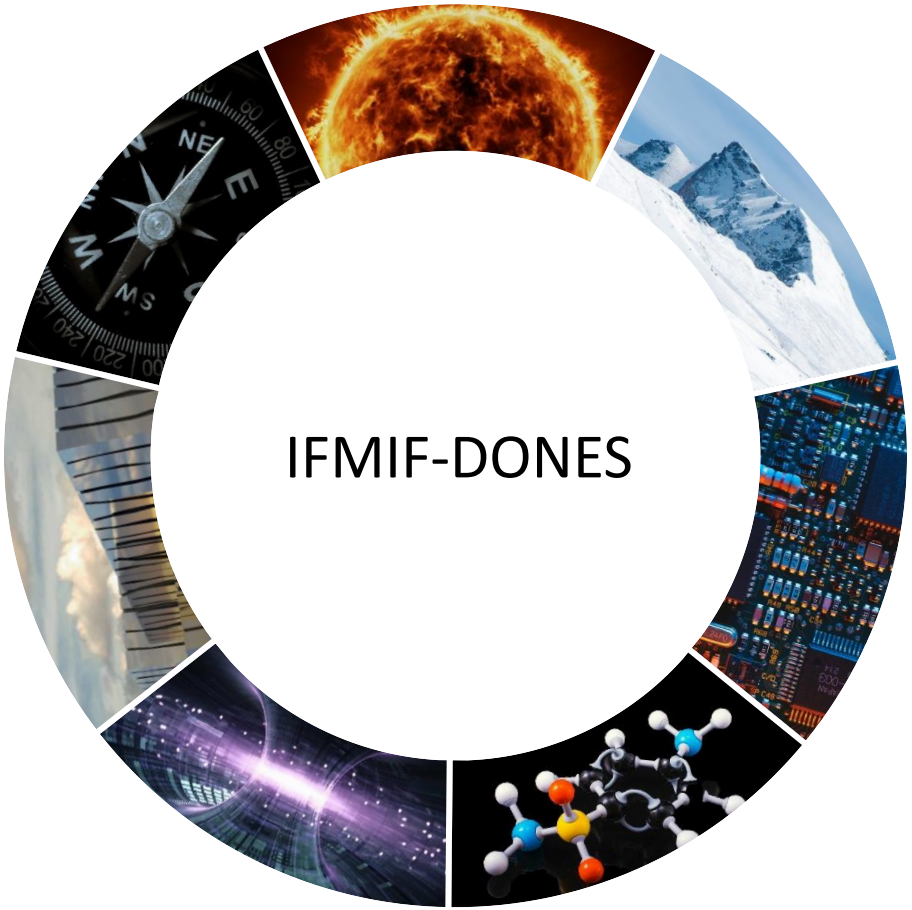
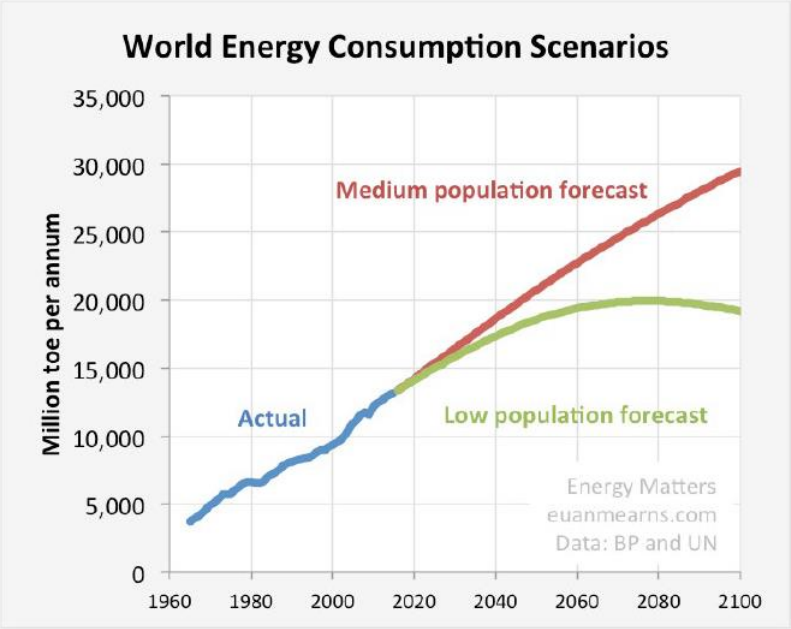

DONES
IFMIF-DONES
ESPAÑA
ISA
Iniciativa Sevilla Abierta
ASIAN
ASOCIACIÓN SUPERIOR
DE INGENIERÍA DE ANDALUCÍA
Fundación
MAS
IFMIF-DONES
The Key to the Future
50 caminos
1975 2025
Andalucía
Ceuta y
Melilla
200
SAGASTA
1825-1903


Fusión
Fórmula
Reactor
IFMIF-DONES
Roadmap
Tecnologías
Granada


IFMIF-DONES

The consumption of electricity (past, present and future)

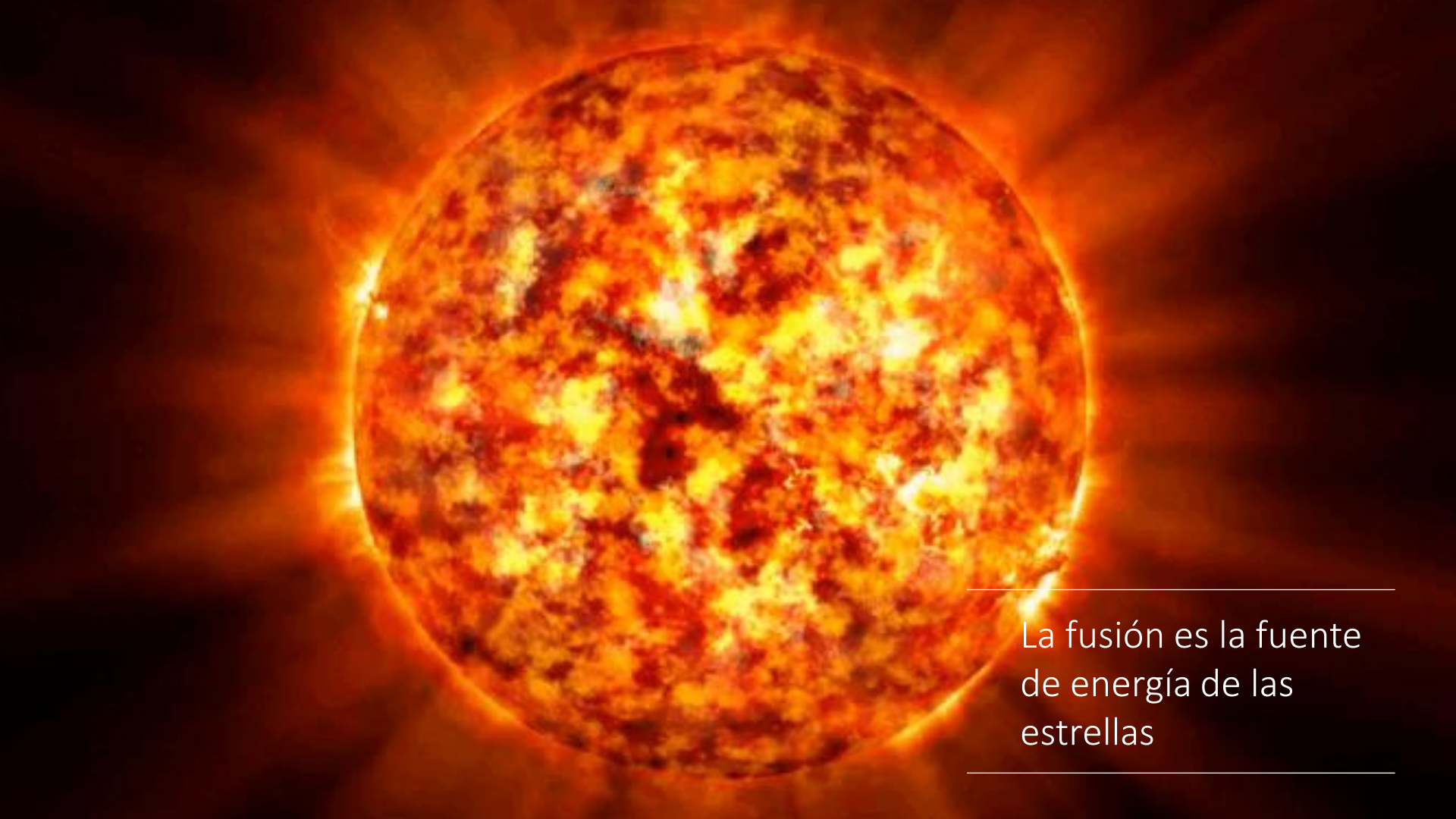


Energy consumption in the world can multiple by 3 around 2100

ENERGY MIX

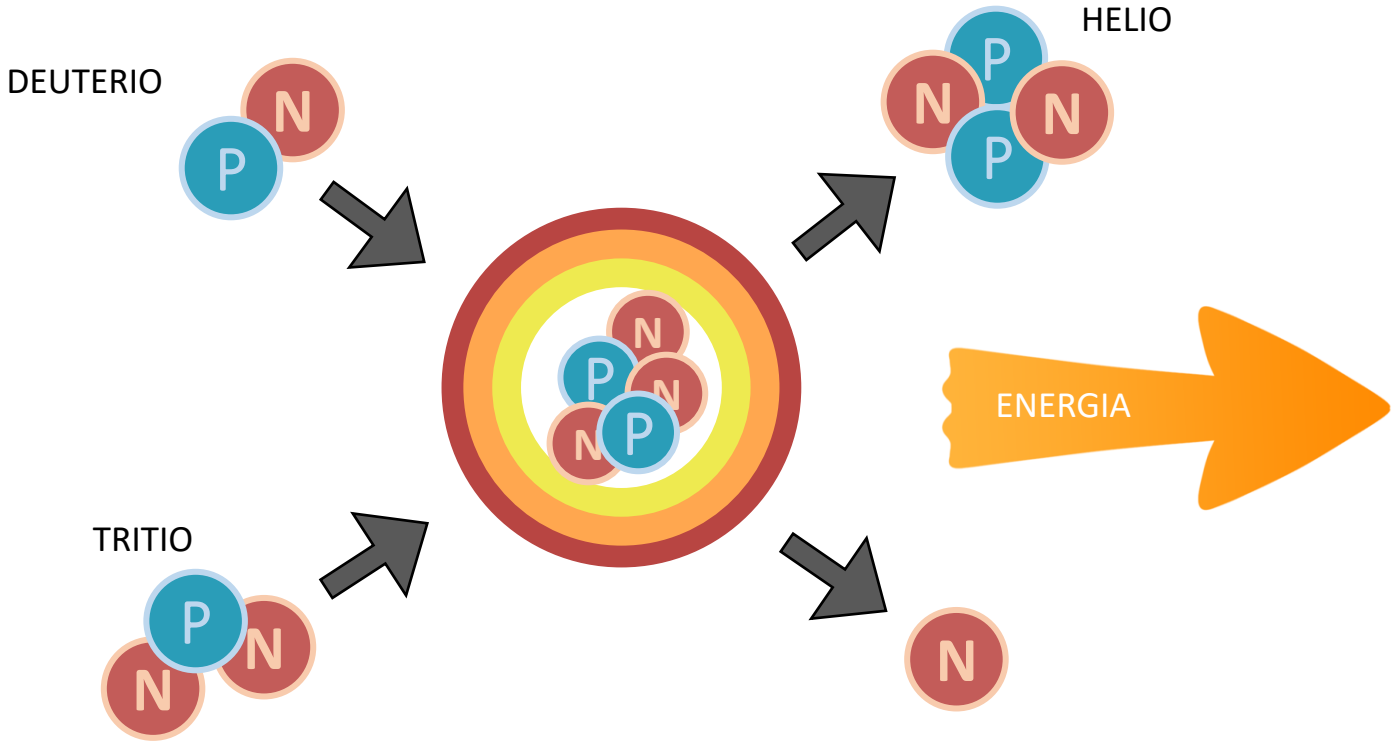
	1980	2020
Oil	47%	34%
Coal	23%	26%
Gas	21%	25%
Nuclear	3%	4%
Hydro	5%	7%
Others	<1%	4%

We must produce much more energy using procedures very different to the present ones!!!



La fusión es la fuente de energía de las estrellas

What is Fusion?



Merits of Fusion Energy

Massive and continuous

"Base load" and "intermediate load "electricity

Not dependent on weather conditions

Resilient to the fuel supply chain

Safe

NO power NO reaction

NO control NO reaction

NO chain reaction at all

Fusion Energy: the energy of stars

Sustainable

NO greenhouse gases

NO high-level radioactive waste

Unlimited fuels in the long term

Open

Fuels distributed worldwide

NO geopolitical implications

Energy depends only on Technology

Why is not here?

It is very difficult to reproduce the Sun's conditions on Earth.

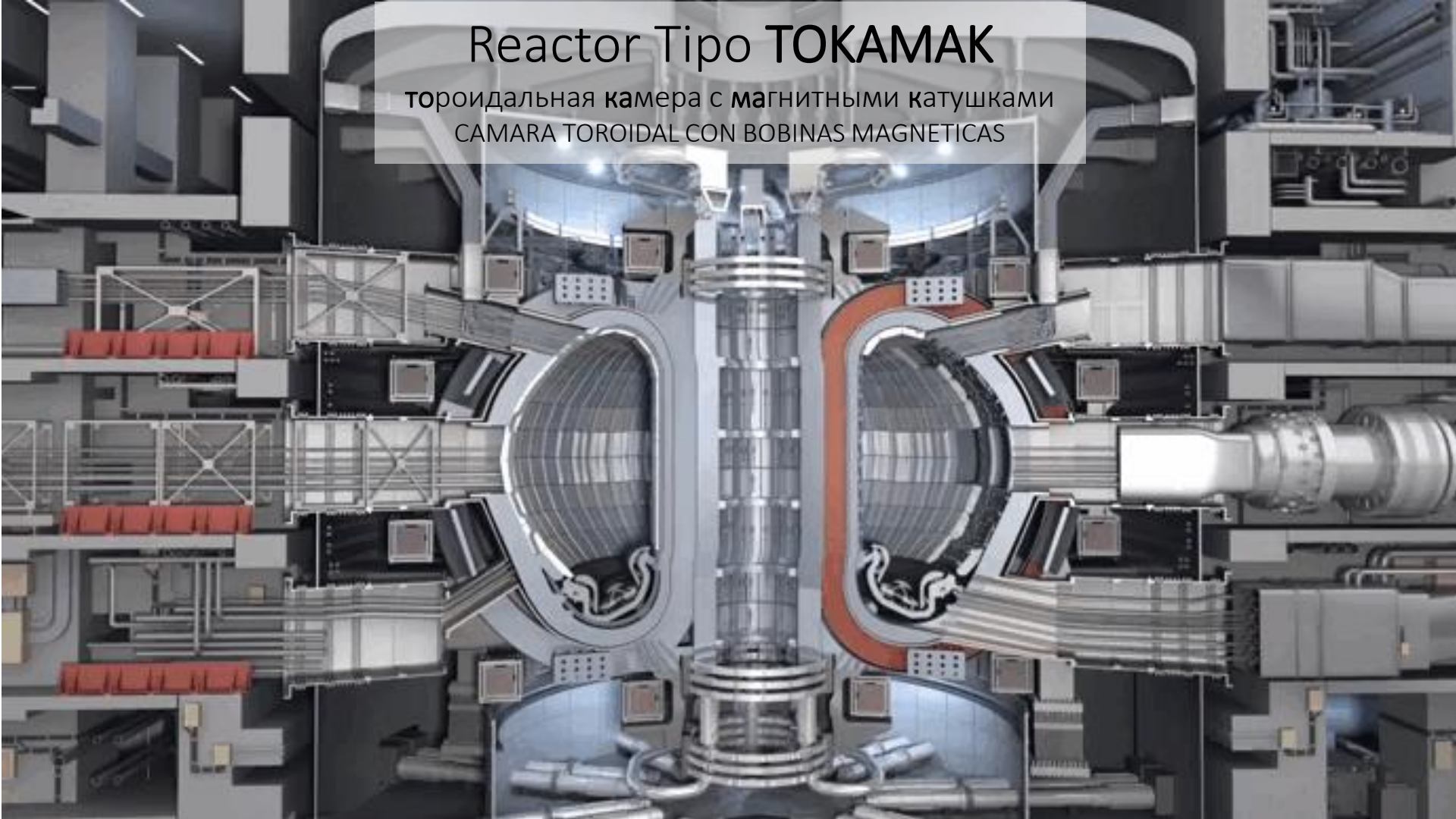
But we are trying

PRESION	TEMPERATURE	
1 atm	15 ºC	Earth
261.534.665.680 atm	15.000.000 ºC	Sun
vacío	150.000.000 ºC	Tokamak

Reactor Tipo **TOKAMAK**

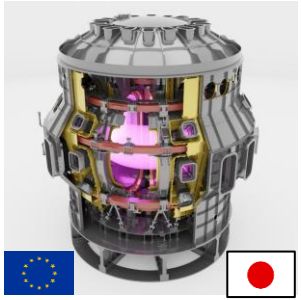
тороидальная **ка**мера с **ма**гнитными **к**атушками

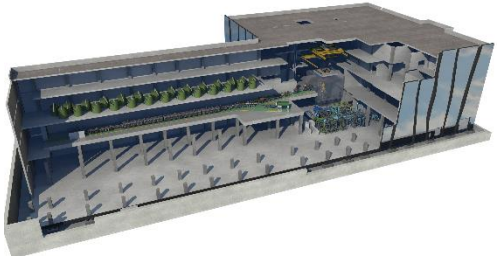
CAMARA TOROIDAL CON BOBINAS MAGNETICAS



Why IFMIF-DONES?

JT-60SA
135 m^3

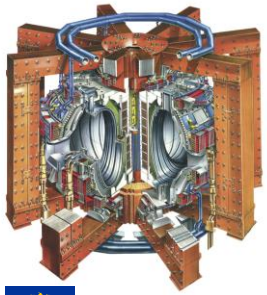




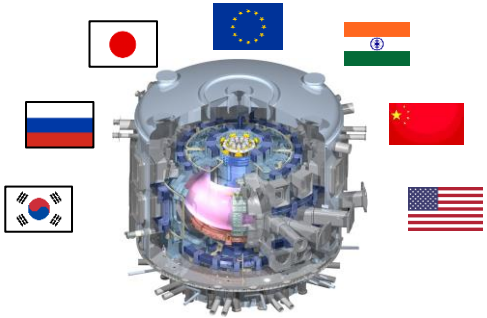
IFMIF-DONES
International **F**usion **M**aterials **I**rradiation **F**acility
DEMO **O**riented **N**eutron **S**ource

It is needed a specific facility for selection and qualification of candidate materials for fusion reactors

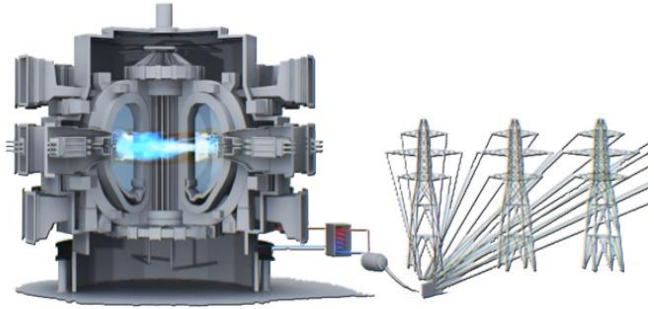
1950 1982 2023 2034 2050



JET
80 m^3



ITER
800 m^3
~500 MW

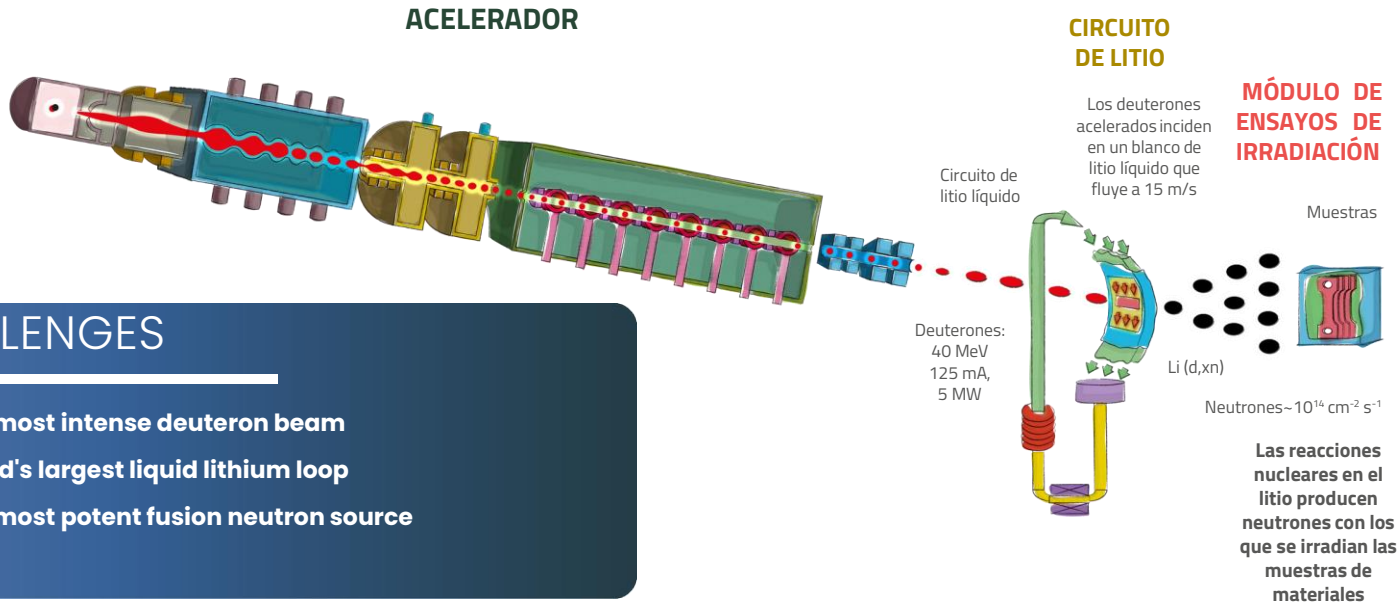


DEMO
~1000 - 3500 m^3
~2000 - 4000 MW

What is IFMIF-DONES?

A fusion-type neutron source is primarily used to qualify the materials used in the DEMO reactor.

- Identified as a high priority in the **EU Fusion Roadmap.**
- Included in the **ESFRI roadmap as a strategic EU facility**.
- Identified as a 'must have' facility in **the EUROfusion Facility Review**.



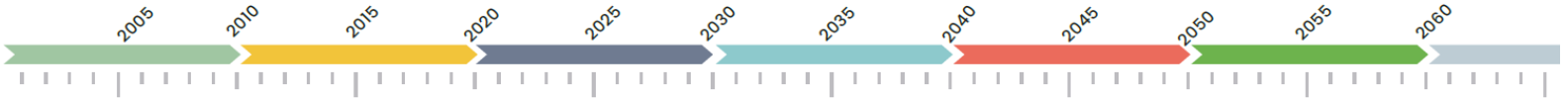
CHALLENGES

- **World's most intense deuteron beam**
- **The world's largest liquid lithium loop**
- **World's most potent fusion neutron source**

DONES Programme Timeline

DONES Programme Phases

The objective of the DONES Programme is not only for building the IFMIF Facility... but also to operate and to exploit it!!



2007-... — Validation Phase (IFMIF/EVEDA)
- Broader Approach collaboration with Japan
- Important validation results for the design of the Accelerator, Test and Lithium Systems

2015-2020 / 2021-2027 — Design and Engineering Phase
- WPENS in EUROfusion (13 countries) ca. 70-100 ppy in research units and industry

2016-2018 — Site Selection Process (FUSION FOR ENERGY)
- Selection of Escúzar site near Granada, Spain

2019-2021 — Preparatory Phase (DONES PreP)
- IFMIF-DONES being recognized as one of the strategic research infrastructures in Europe – ESFRI Roadmap 2018

2023-2034 — Construction, Installation, Testing and Systems Commissioning Phase
- Construction of IFMIF-DONES Facility. Start of Construction Phase 2023. Estimated construction time 10 years

2029-2034 — Plant Integrated Commissioning Phase
- Integrated beam commissioning and power ramp-up

2034-... — Operation Phase / Decommissioning Phase
- IFMIF-DONES is designed for 30 years of lifetime (20 years of full operation)

IFMIF-DONES in numbers

2007-2027

More than 15 countries, more than 50 institutions and more than 200 people are involved in the technical design phase of IFMIF-DONES.

200 million in the validation and conceptual and engineering design of IFMIF-DONES.

DESIGN OF IFMIF-DONES

2023-2034

In-kind contributions from different countries, more than 200 people will work in the international team, and more than 2000 people will participate worldwide.

More than 700 million euros in the construction phase of IFMIF-DONES.

CONSTRUCTION IFMIF-DONES

Since 2034...

A scientific exploitation Programme designed and managed by an International Team involving people and support facilities worldwide.

Over 50 million euros per year for at least 30 years in the exploitation phase of IFMIF-DONES.

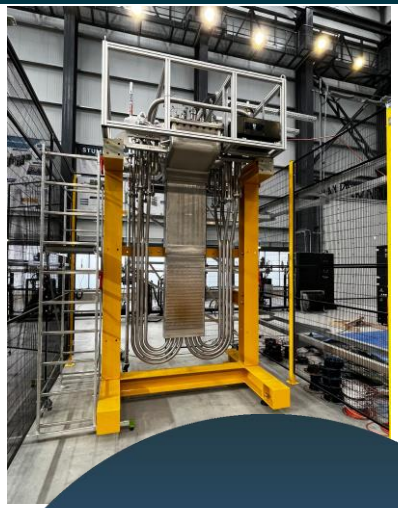
OPERATION IFMIF-DONES

1st DONES-SC on 13 March 2023: Start of the Construction Phase

Where is IFMIF-DONES located?

Escúzar (18 Km from Granada)

Current status



Around
more than
60 **M€**
allocated
in 2024

We are already
more than
50
people
working in
Escúzar


IGR DONES
SANJOSE
IGR DONES

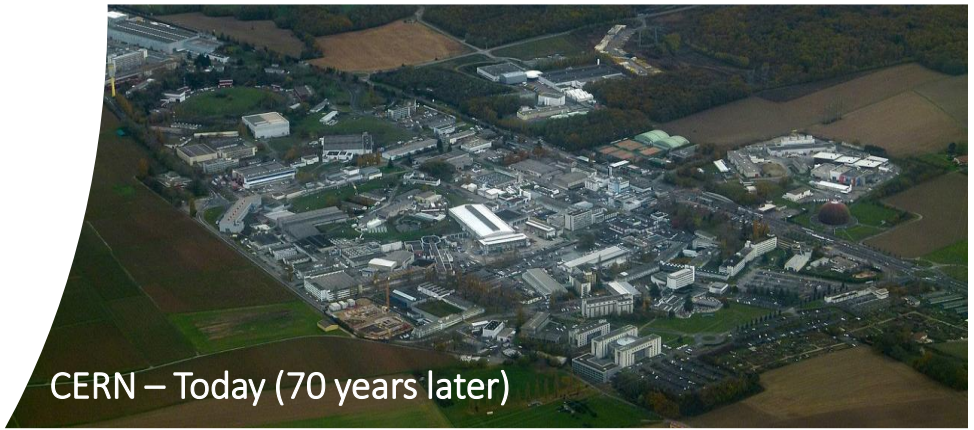
IFMIF-DONES: what will it mean for everyone?

- **First-class international scientific facility** for the next years/decades.
- Creation of **highly qualified jobs**.
- Attracting **international talent.**
- Creation of **new businesses/industries.**

→ **Scientific and Technological Center**


CERN - 1954


IFMIF-DONES - 2022


CERN – Today (70 years later)

R&D to achieve an end. R&D as an end in itself.

DONES will be a unique facility and will become a reference for the future.

In IFMIF-DONES, we will push many technologies beyond the state of the art, reaching new practical technological developments exportable to other sectors.

Industry related to Large Science Facilities

(Big Science Market)

- **(A) Electrical, power electronics, electromechanical and radio-frequency systems**
  - Electricity and power electronics
  - Mechatronics
  - Radiofrequency systems
- **(B) Diagnostics and Sensors, Sensors, Optics and Instruments**
  - Diagnostics and detectors, sensors,
  - Optics and lasers
  - Instrumentation
- **(C) Information and communication technologies**
  - Data management and processing
  - Communication
  - Computer hardware
- **(D) Basic materials technologies and advanced manufacturing techniques**
  - Materials
  - Advanced manufacturing
- **(E) Construction of complex buildings and their safety-related systems**
  - Complex building construction Security systems
- **(F) High precision and significant mechanical components**
  - High precision manufacturing
  - Large mechanical components
- **(G) Automation, control and remote handling systems**
- **(H) Cryogenic, vacuum and leak detection technologies**
  - Cryogenics
  - Vacuum
  - Leak detection technologies
- **(I) Electromagnetics, magnets and superconductivity**
  - Electromagnetism
  - Magnets and superconductivity
- **(J) System Integration**

Complementary applications

- Health sector
- Industry
- Nuclear and particle physics
- Basic physics

IFMIF-DONES is a **unique opportunity** to contribute to a **key problem of humanity** and to participate in **high-tech development**

We are open to new partners and collaborators!!!
Public and Private

DONES

IFMIF-DONES ESPAÑA

MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES

Junta de Andalucía
Consejería de Universidad, Investigación e Innovación

Thank you for your attention…

www.ifmif-dones.es