SENER
SECRETARÍA DE ENERGÍA

MEXICO
NUCLEAR POWER POLICY OVERVIEW

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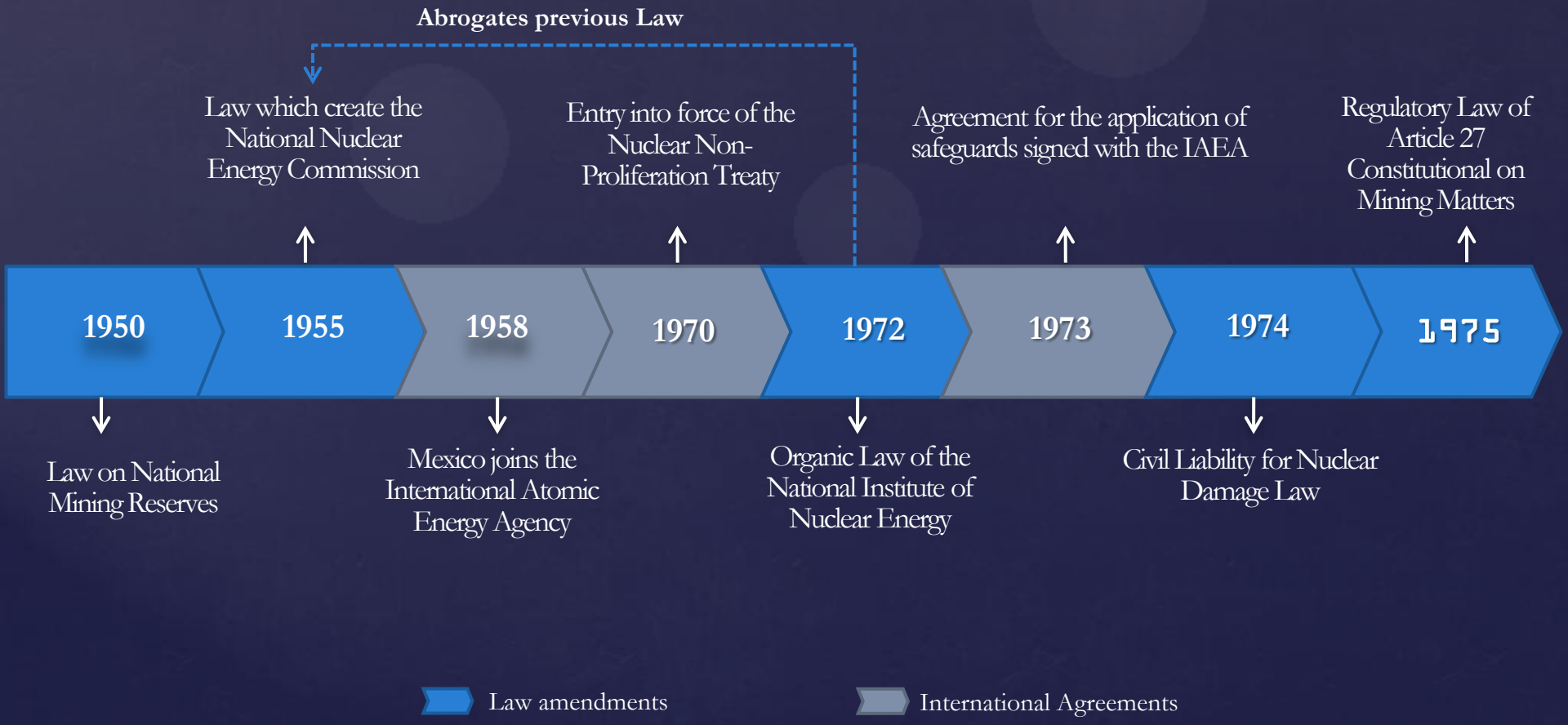
CURRENT STATE OF THE SECTOR

Current legal and administrative arrangements

Evolution of the current regulatory framework

Mexico took the first step in nuclear energy more than 60 years ago, with the issuance of the Law on National Mining Reserves, which declares as national reserves the deposits of uranium, thorium and other substances that can produce nuclear energy.



Evolution of the current regulatory framework

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Regulatory Law of Article 27 Constitutional in Nuclear Matter **(in force)**.

Extinguish:

- ✗ URAMEX
- ✗ National Atomic Energy Commission

1979 → **1985**

Regulatory Law of Article 27 Constitutional in Nuclear Matter.

Creates:

- ✓ National Institute of Nuclear Research
- ✓ National Commission for Nuclear Safety and Safeguards
- ✓ Mexican Uranium
- ✓ National Atomic Energy Commission

Abrogates previous Law

Since 1985, the legal framework of the nuclear subsector has remained unchanged for more than 25 years.*

Law amendments

* This law was amended twice in 1998 and 2013, only as regards the names of the agencies.

Current normative legal framework

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The current Law on Nuclear Matters regulates:

INININ

1. The regime of exploration, exploitation and benefit of radioactive minerals;

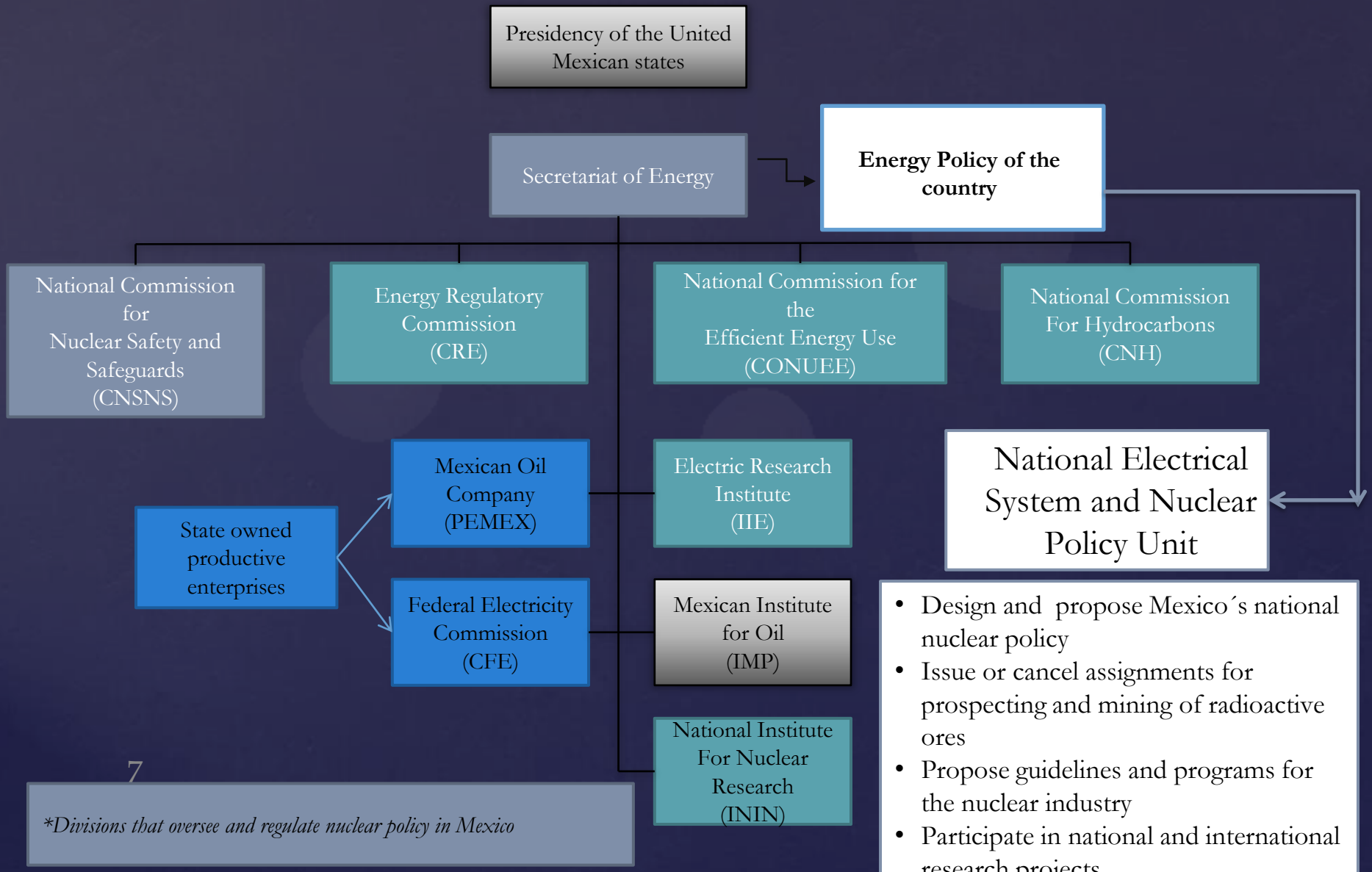
2. Nuclear Industry;

3. Nuclear and radiological safety, physical security, and safeguards;

4. The structure and faculties of the National Institute of Nuclear Research, and

5. The structure and attributions of the National Commission for Nuclear Safety and Safeguards.

Federal Government Energy Sector



**Divisions that oversee and regulate nuclear policy in Mexico*

CURRENT STATE OF THE SECTOR

Current power and research output

Current Nuclear Power in Mexico

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Laguna Verde NPP

- Location: Veracruz State
- Operator: Federal Electricity Commission (CFE)
- Regulator : National Commission for Nuclear Safety and Safeguards (CNSNS)
- Two reactors: General Electric Boiling Water Reactor-5
- Laguna Verde Unit 1 went into commercial operation in July 1990
- Unit 2 went into commercial operation in April 1995
- Net Capacity: 810 MW each one

EPU (Extended Power Uprate) Project

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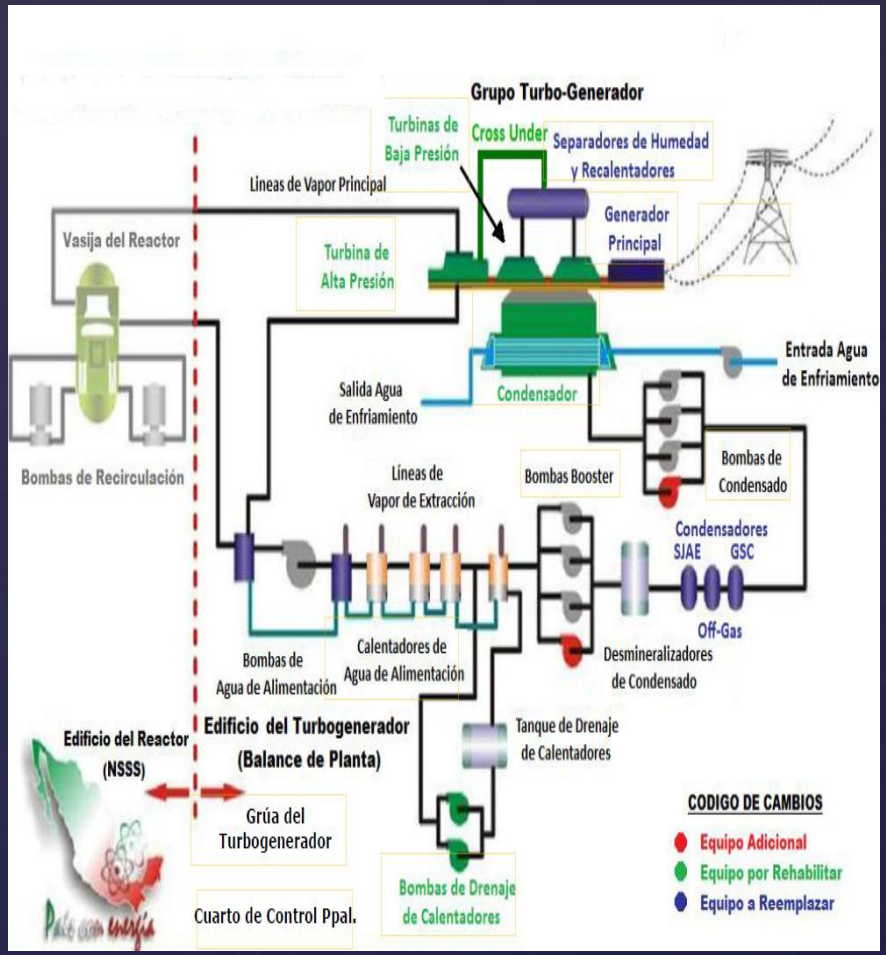
In 2008, Mexico joined its USA peers in uprating power

It consisted of the replacement and upgrade of equipment

Power increase in both reactors from 704 to 810 (MW)

The plant planned capacity is up to 1620 MW

Current (2016) power of both reactors is 1608 Mw



Due to the power uprate, the Annual Growth Rate of Nuclear Installed capacity from 2015 to 2016 was of 6.5%

Nuclear Power in Mexico

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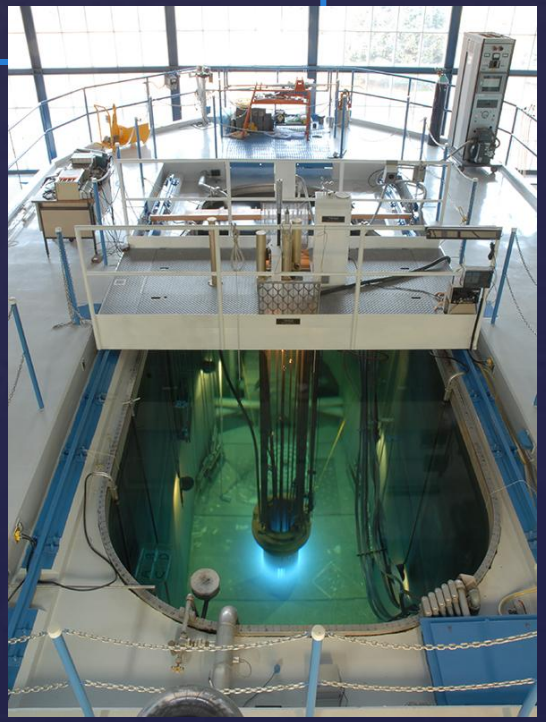
Research Reactor

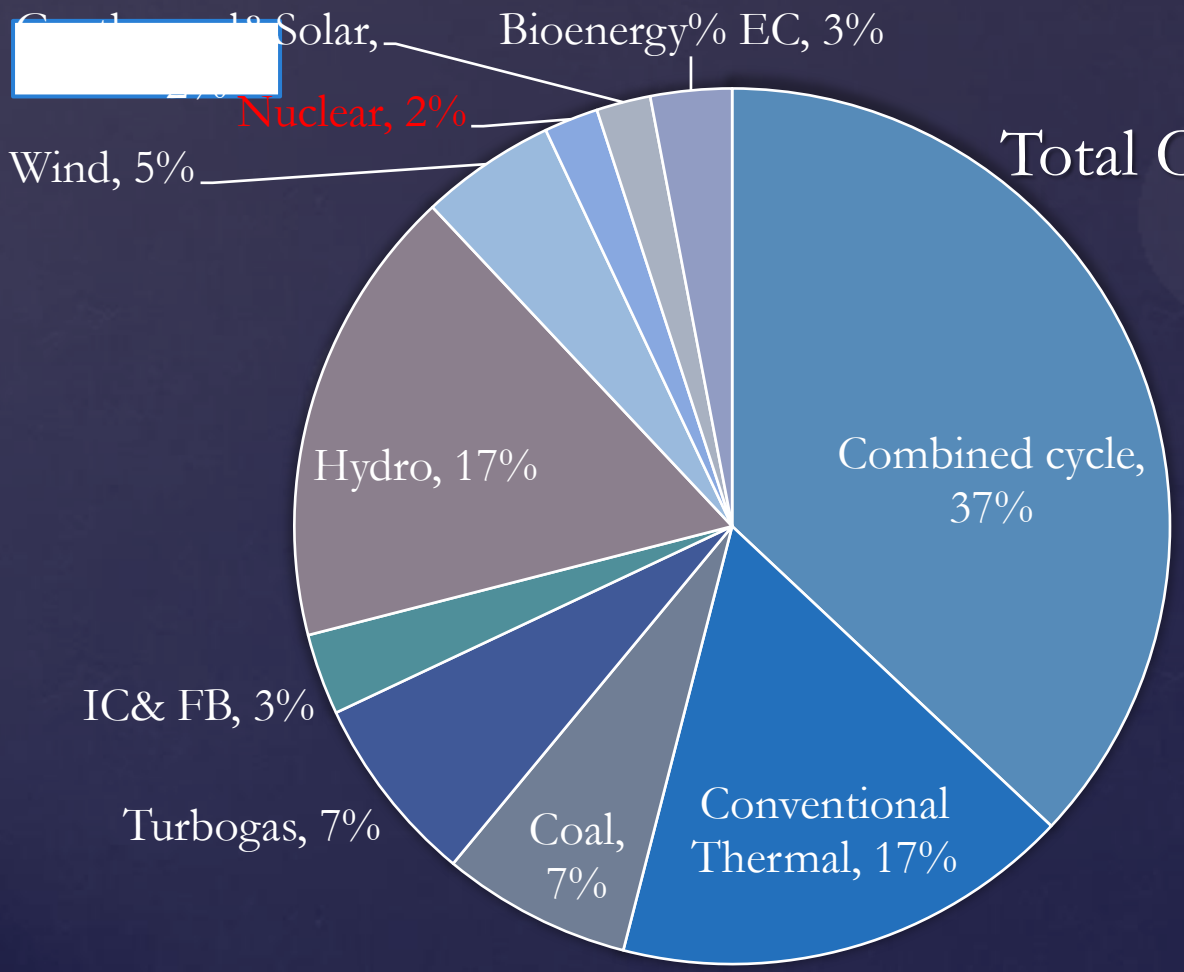
- ✓ Location: Mexico State
- ✓ Operator: National Institute for Nuclear Research
- ✓ Regulator : National Commission for Nuclear Safety and Safeguards (CNSNS)
- ✓ One reactor: TRIGA Mark III
- ✓ Net Capacity: 1 MW (power pulse up to 1500 MW)
- ✓ Training, research and isotope production

instituto nacional de investigaciones nucleares

RADIOLÓGICA NUCLEAR SALVAGUARDIAS
CNSNS
Comisión Nacional de Seguridad Nuclear y Salvaguardias



Power Installed Capacity, 2016

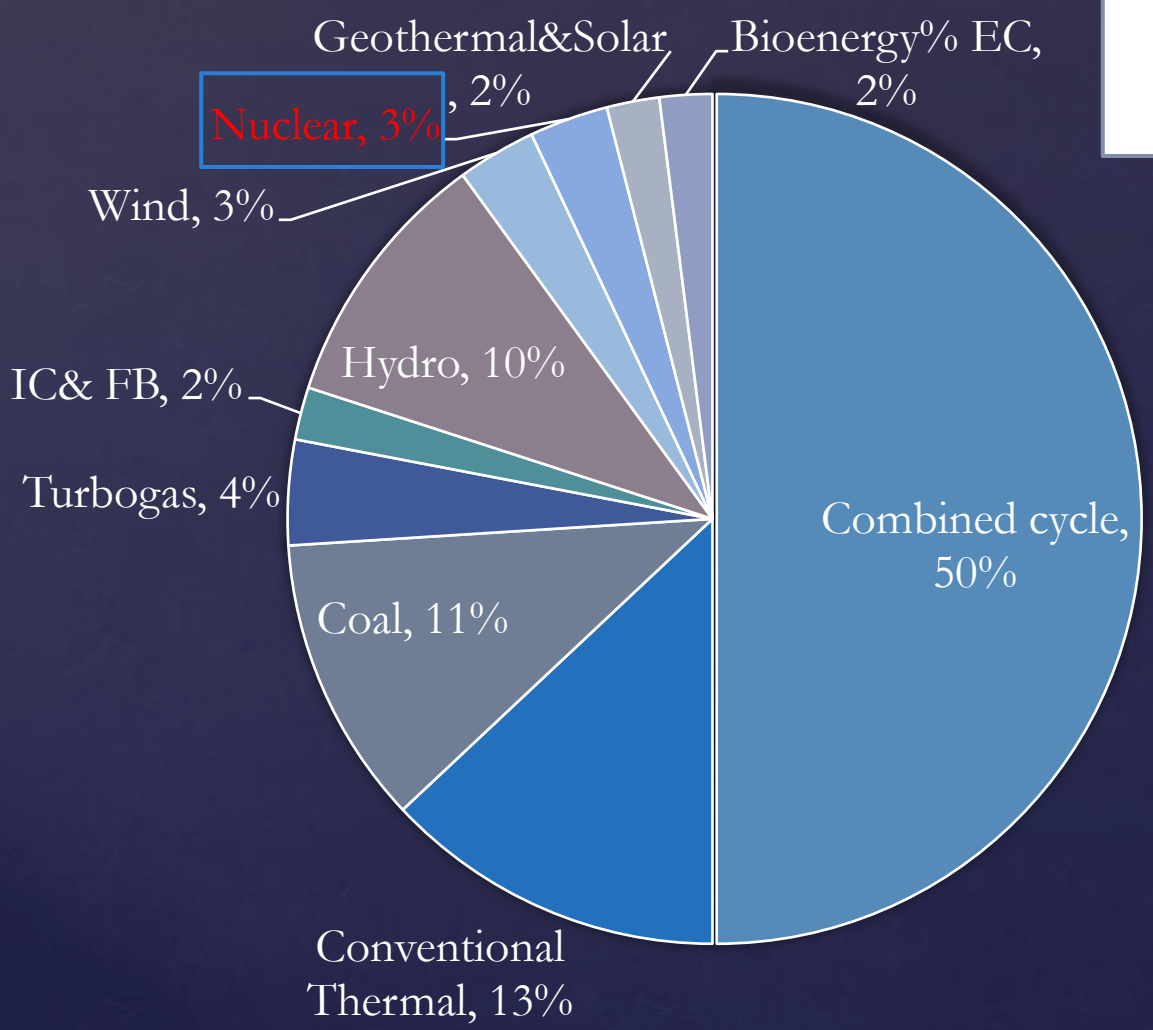


Total Capacity:73,510 (MW)

8.1% from 2015

Source: *PRODESEN 2017-2031*

Power Generation, 2016



Total Generation: 319,364 (GWh

16% of Clean Energy Generated

3.2% from 2015

Source: *PRODESEN 2017-2031*

POLICY DEVELOPED 2012-2017

LIE, LTE and Clean Energy Reduction

Clean Energy and Emission Reduction

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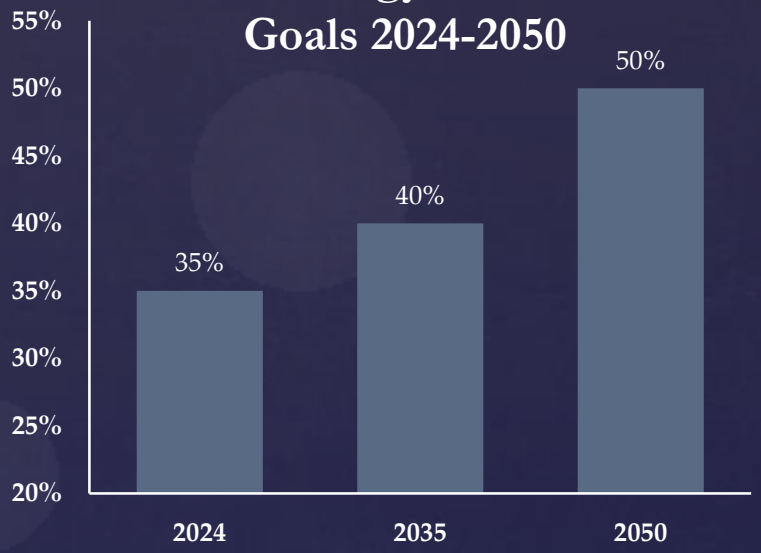
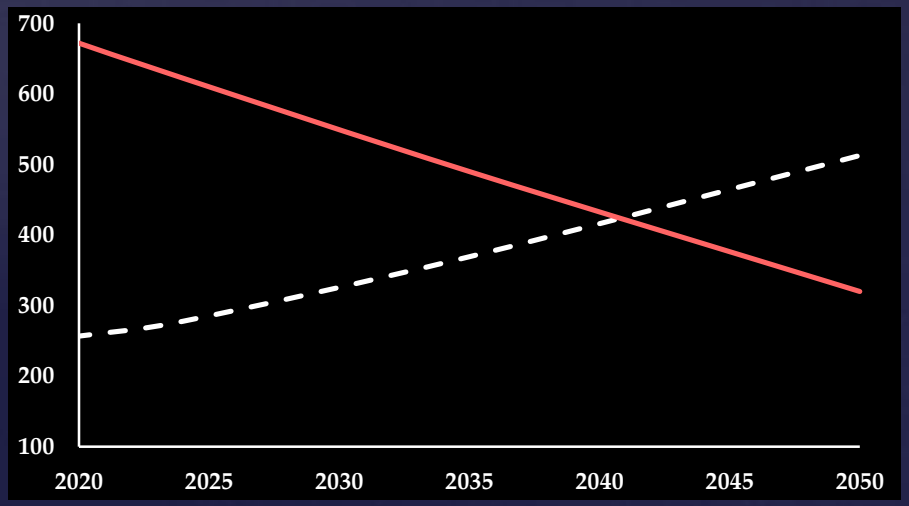
•In 2008, Congress approved the Law for the Use of Renewable Energies, in 2012 the Climate Change Law and in 2015, the Energy Transition Law (LTE).

•These aim at promoting diversification of the energy sources.

Clean Energy Generation Goals 2024-2050



Emission Reductions Goals (MtCO2e)



The National Strategy for Climate Change (NSCC) sets a maximum of:

- 672 millions of tons of CO2 equivalent (MtCO2e) for 2020.
- 320 millions of MtCO2e for 2050.

Energy Clean Goals, LTE

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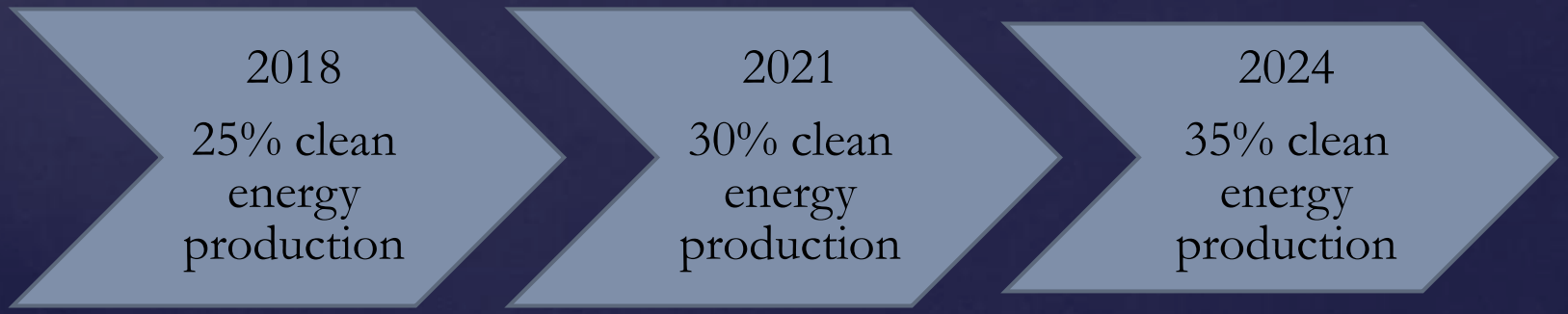
Mexico is taking actions against global warming by reducing pollution emissions from fossil fuels.

The Energy Transition Law (LTE December 2015), sets out the obligations of clean energy and the reducing pollution emissions from electricity industry, while maintaining the competitiveness of productive sectors in the medium term.

The specific goals of the LTE are:

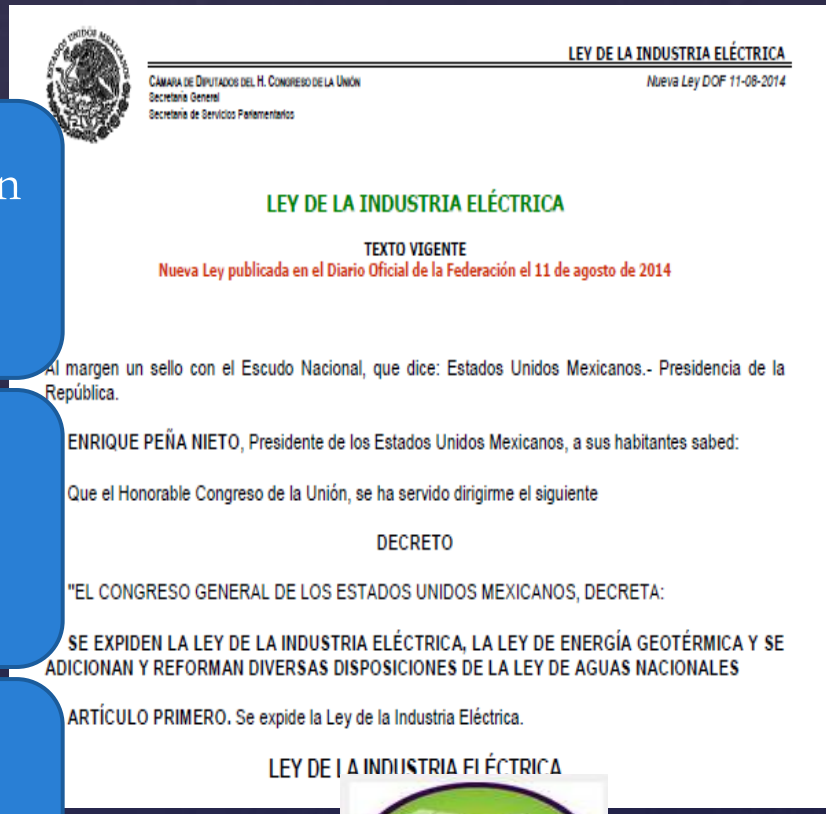


Nuclear power is legally clean energy

The Electricity Industry Law (LIE) published in August 2014, aims to promote the sustainable development of the electricity industry

LIE rests Strategic Planning under the Secretariat of Energy, and makes the National Electricity System Development Program PRODESEN the instrument to do so

Both LIE and LTE defined nuclear energy as clean energy.



LEY DE LA INDUSTRIA ELÉCTRICA

CÁMARA DE DIPUTADOS DEL H. CONGRESO DE LA UNIÓN
Secretaría General
Secretaría de Servicios Parlamentarios

Nueva Ley DOF 11-08-2014

LEY DE LA INDUSTRIA ELÉCTRICA

TEXTO VIGENTE
Nueva Ley publicada en el Diario Oficial de la Federación el 11 de agosto de 2014

Al margen un sello con el Escudo Nacional, que dice: Estados Unidos Mexicanos.- Presidencia de la República.

ENRIQUE PEÑA NIETO, Presidente de los Estados Unidos Mexicanos, a sus habitantes sabed:

Que el Honorable Congreso de la Unión, se ha servido dirigirme el siguiente

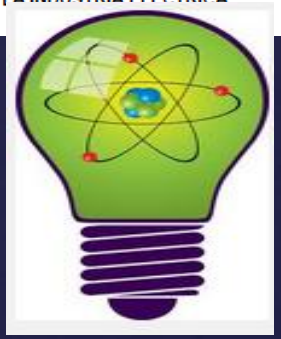
DECRETO

"EL CONGRESO GENERAL DE LOS ESTADOS UNIDOS MEXICANOS, DECRETA:

SE EXPIDEN LA LEY DE LA INDUSTRIA ELÉCTRICA, LA LEY DE ENERGÍA GEOTÉRMICA Y SE ADICIONAN Y REFORMAN DIVERSAS DISPOSICIONES DE LA LEY DE AGUAS NACIONALES

ARTÍCULO PRIMERO. Se expide la Ley de la Industria Eléctrica.

LEY DE LA INDUSTRIA ELÉCTRICA

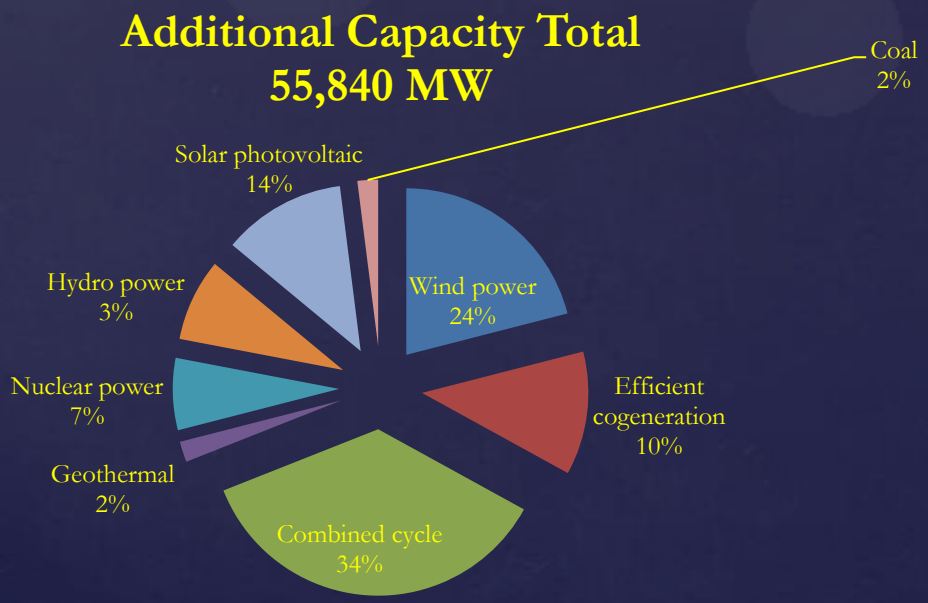


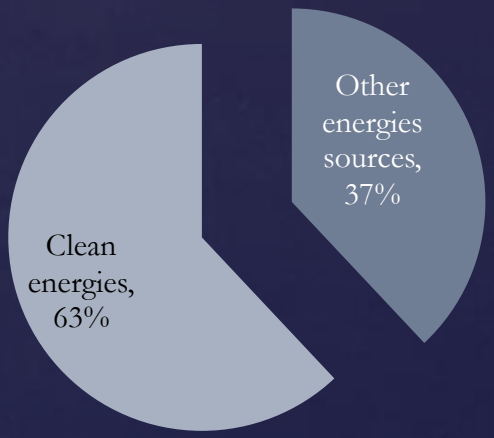
POLICY DEVELOPED 2012-2017

PRODESEN & Studies for Nuclear Developement

Nuclear Power Prospective Developement

- The (PRODESEN) is the annual energy planning document that sets the infrastructure for the new power generation capacity.
- This document shows the optimal energetic mix for supply the demand, at minimum cost, considering the goals in clean energy, efficiency and security of the national electrical system (SEN).
- The PRODESEN 2017-2031 indicates that three new reactors should be in operation by 2031, this will represent **7% of all aditional capacity and 8% of all power generated.**





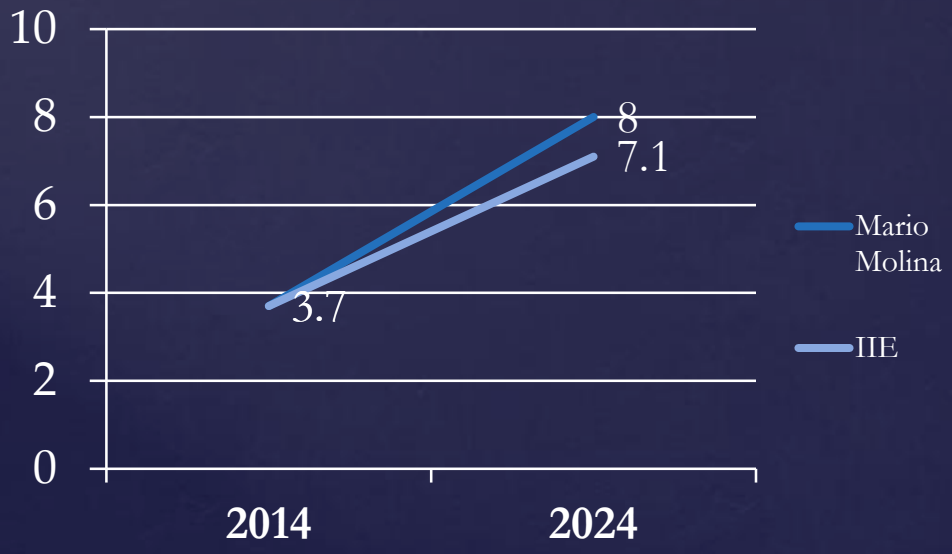
Source: PRODESEN 2017-2031

Nuclear Power Prospective Developement

In addition to the above, in 2013 the National Institute for Electricity and Clean Energies (INEEL) and the Mario Molina Center conducted studies to determine the optimal energy mix that would meet the goals of clean energy in the years 2035 and 2050.

In both cases, results point that nuclear power is necessary in the national electrical system with more than three reactors.

Needed capacity to meet CE goals



Centro Mario Molina and Instituto de Investigaciones Eléctricas (IIE):

Reaching those goals implies to increase nuclear power generation in:

8%

Looking Technologies

Mexico is evaluating technologies of reactors, with focus in:

- ✓ Operational experience
- ✓ Certification by NRC

Besides we are analyzing financial aspects for the new nuclear projects and the technical requirements for the possible sites.

POLICY DEVELOPED 2012-2017

Safe Transportation and Waste Management

Regulation for Transportation

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- ✓ Regulation published in April 2017, to regulate the safe transportation of radioactive materials
- ✓ More than 15000 packages are annually transported in Mexico
- ✓ Some recent incidents of radioactive sources out of regulatory control
  - ✓ **Very high recovery rate**
- ✓ The Regulation incorporates radiation protection measures as well as security measures for radioactive sources

✓It is based on the international best practices and IAEA safety guides

Radioactive Waste Management

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Up to 90% of the of LLW and ILW are generated and managed by Laguna Verde NPP.

- ININ managed the 10% of LLW and ILW from industry, medicine and research
- Temporary storage facility (CADER)

Cooperation project with the EU (2012-2015) for the development of a policy and strategy for the management of spent nuclear fuel

- Included provisions for its safe interim storage and radioactive waste in Mexico.
- Legal provisions for the establishment of a Mexican Entity for the Management of RW to be developed
- SENER will start a working group to develop policy and strategy on waste management

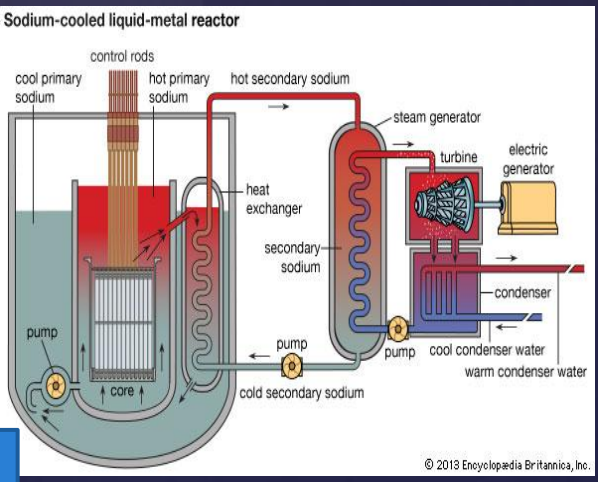
POLICY DEVELOPED 2012-2017

Billateral and Multillateral Cooperation

International Cooperation

- Agreements for Cooperation of the Peaceful Uses of Nuclear Energy
  - Argentina
  - Canada
  - France,
  - Korea
  - Russian Federation

- Close to formalize Agreements with:
  - Japan
  - USA (Agreement 123)



✓Main areas covered:

- ✓ **Safety of nuclear reactor,**
- ✓ **Radiation protection and radioisotopes applications**
- ✓ **Physical protection and non-proliferation**
- ✓ **Capacity building**
- ✓ **Radioactive waste management**

Bilateral Cooperation (USA-EXBS Program)

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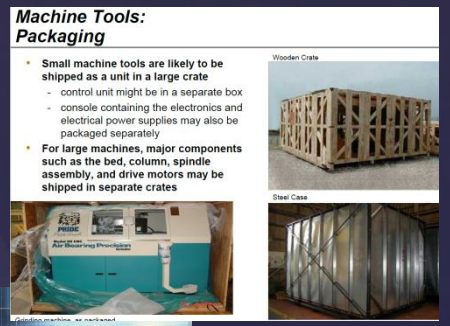
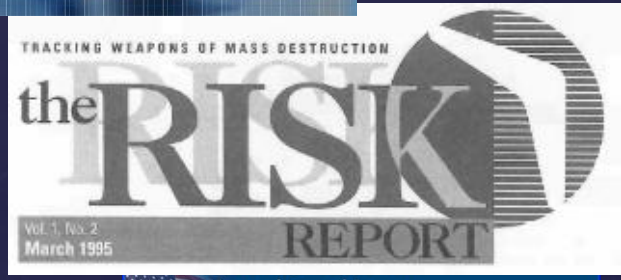
Training:

- Courses to CNSNS licensing officers on:
  - ✓ Non Proliferation
  - ✓ Licensing Process
  - ✓ Risk Analysis
  - ✓ Commodity Identification (CIT)
- Support of Certificated Mexican trainers on Regional courses:
  - ✓ Central America and South America

Analysis Tools:

- Membership on the Risk Report Wisconsin Proyect
- Internal Compliance Program





Multilateral Cooperation

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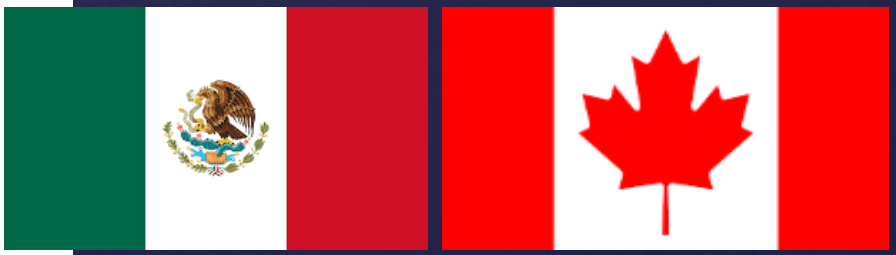
The Canada Government, World Institute Nuclear Security and Secretariat of Energy agreed to collaborate in achieving:

- ✓ ISO 29990 certification of the ININ teste centre
- ✓ Production of learning materials in Spanish to complete existing WINS online modules, and delivery of at least 4 radiological security **training events to Mexican and Central America participants**;
- ✓ Engage with Mexican and regional stakeholders to endorse and promote the training centre

Areas of Cooperation:

- ❑ Development of training materials
- ❑ Establishment of an in-house Pearson test centre
- ❑ Development and implementation of the train the trainers activities
- ❑ Achievement of ISO 29990 certification

WORLD INSTITUTE FOR NUCLEAR SECURITY



Multilateral Cooperation

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Results currently

- ✓ The train the trainer course has been successfully delivered for 8 Mexican participants;
- ✓ The first national training course has been successfully delivered with participation of different Mexican stakeholders:
- ✓ The ININ test centre is fully operational
- ✓ All Mexican trainers get *Certification of Specialization in WINS Academy Radioactive Source Security Management Module*
- ✓ ***A Central American Regional Course will be delivered in August 2017***

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Multilateral Cooperation

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Party of various multilateral instruments under IAEA auspices such as:

- Convention on Early Notification of a Nuclear Accident
- Convention on Nuclear Safety
- Convention on Physical Protection of Nuclear Materials and its 2005 Amendment
- Vienna Convention on Civil Liability for Nuclear Damage

Mexico will shortly adhere the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

Considering updating its civil liability for nuclear damage regime

- Convention on Supplementary Compensation for Nuclear Damage

Member of Export Control Regimes

- Nuclear Suppliers Group
- Wassenarr Arrangement
- Australia Group

FUTURE PERSPECTIVES

Perspective of legal modifications

Current normative framework Limitations

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The limitations of the current framework can be grouped into 4 blocks

- Energy uses: Lack of incentives to the mining exploitation
- Non-energy uses: Lack of certainty in regulation
- Shared uses: Transport and waste management
- International Commitments: Not all commitments assumed by Mexico are reflected



NSG
Nuclear Suppliers Group

Looking for a New Nuclear Law

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A new Nuclear Energy Law should reflect solutions to the limitations of the current regulations, as well as cover the current needs of the country and the international commitments that it has assumed

Incentives to mining exploitation

Legal recognition of non-energy uses

Creation of a strong regulatory framework for imports and exports

Certainty on transport and management of radioactive waste and spent fuel

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Thank you!

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