Impact of Reforms in the Energy Sector in the Smart Grid Model of Mexico

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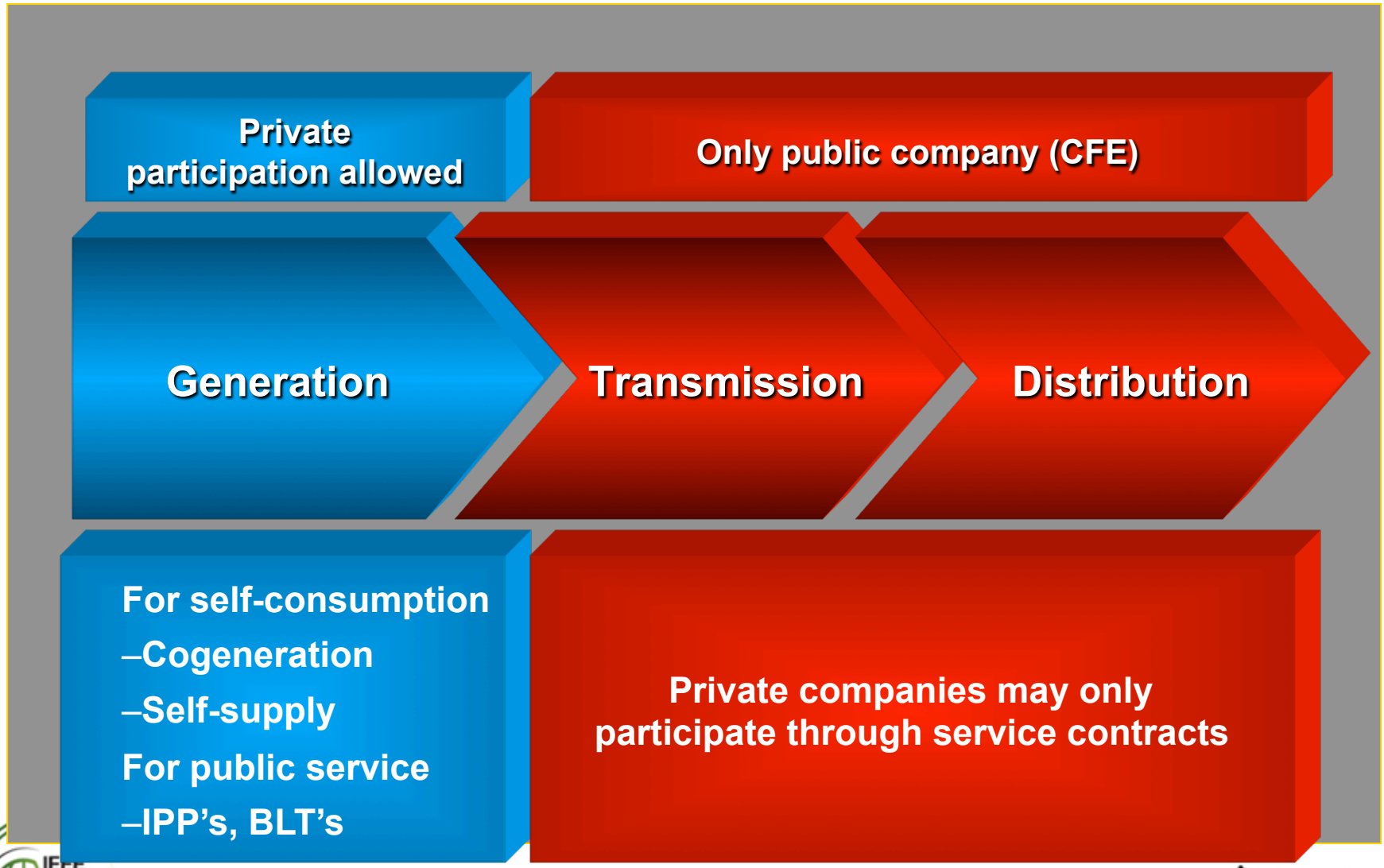
  - The structure of the Mexican Electrical System
  - The Smart Grid Mexican Model (REI)
- Reforms in the Energy Sector
  - Motivations
  - Main features
  - Concerns
- The impact on the Smart Grid Model of Mexico
  - On fundamentals
  - On structure

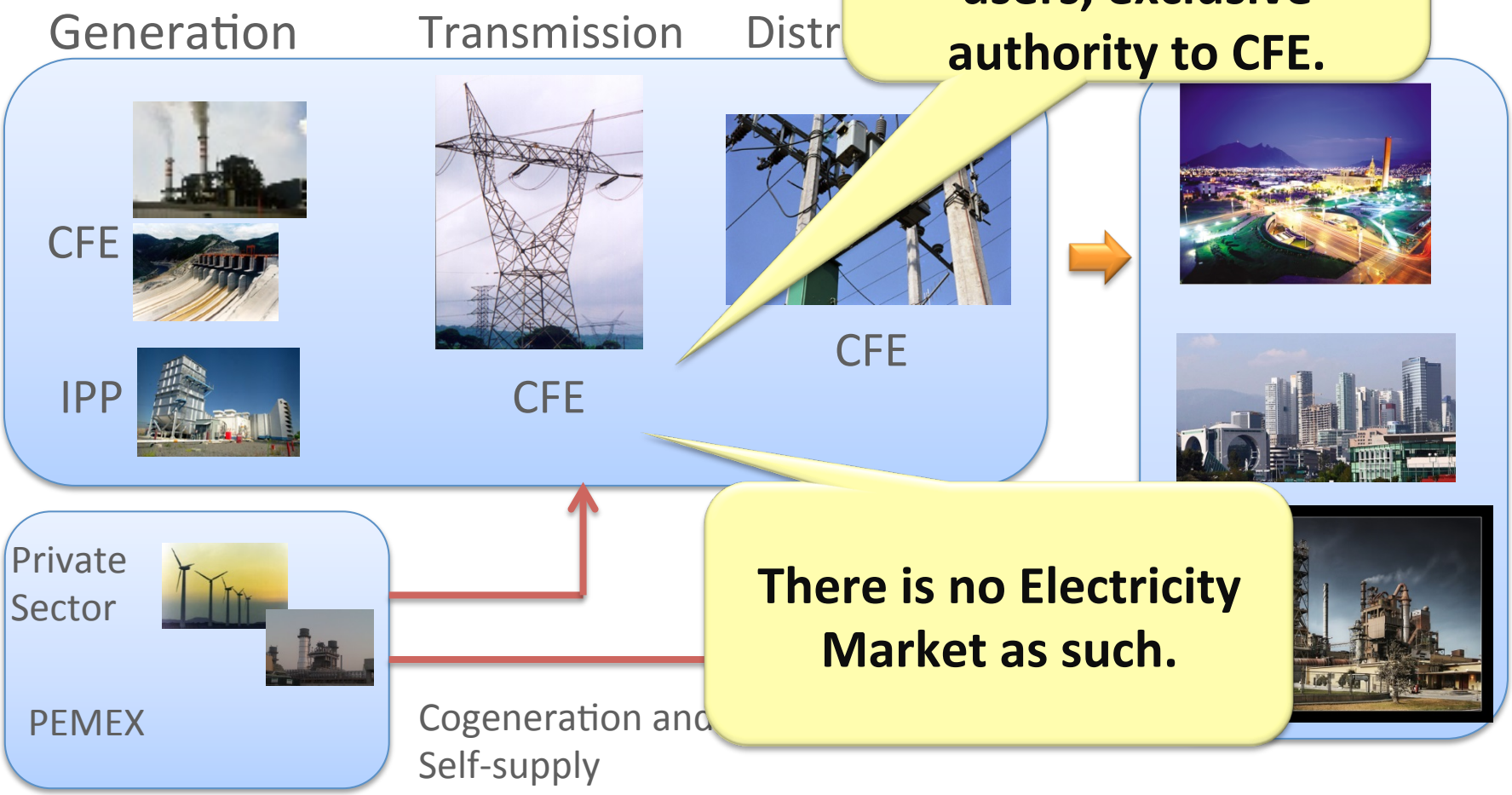
Current Electricity Regulatory framework



Background

- Comisión Federal del Electricidad (CFE) is a government owned Mexican Electric Utility serving most of the electrical services in Mexico (≈ 35.3 million people representing about 97.6 coverage).
- The Mexican Electrical System (MES) administration is accomplished by the National Control Center (Centro Nacional de Control de Energía – CENACE), and there are eight Area Control Centers (ACC) coordinating operation at regional level.
- The MES is composed of:
  - A transmission system based on 400 kV, 230 kV and 115 kV lines
  - Around 52,515 MW of installed capacity in a total of 209 generation plants
  - A coincident peak demand of approximately 36,140 MW
- About 23% of the installed capacity comes from independent power producers.
- 756,000 Km of transmission and distribution lines.
- 88,000 active personnel.
- There exist partial private participation. For self-consumption; Cogeneration, self-supply. For public service; IPPs, IP, I&E
- There is no market as such

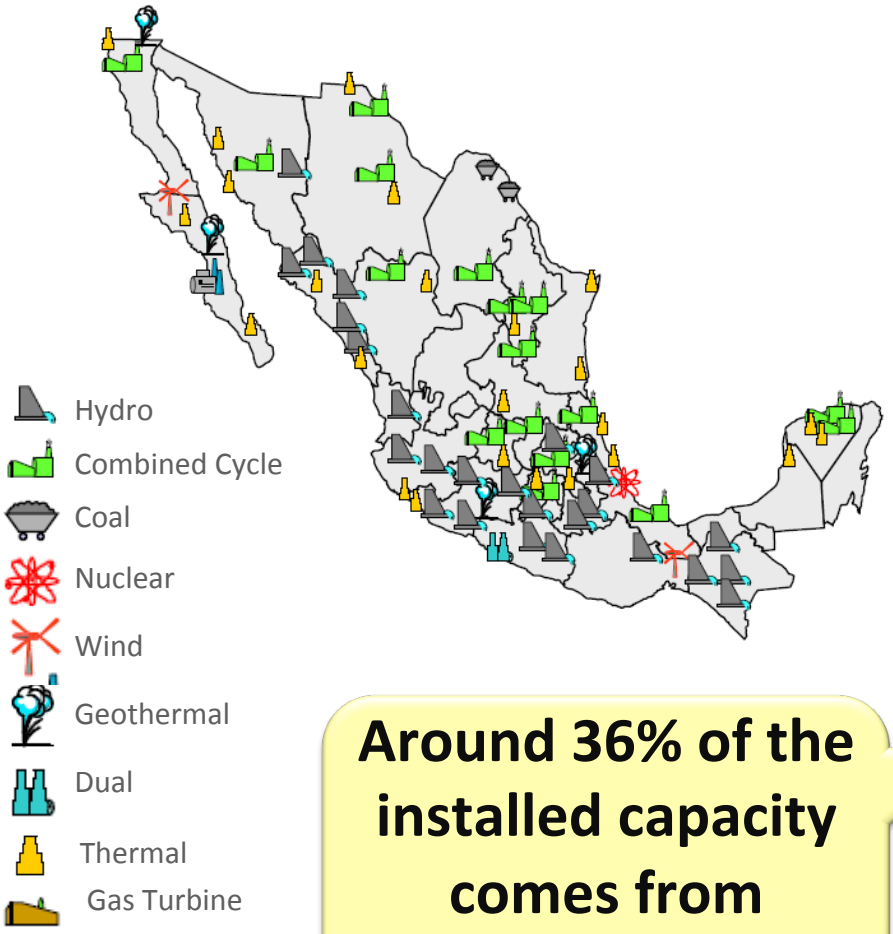
The structure of the Mexican I



Planning, operation and billing to end users, exclusive authority to CFE.

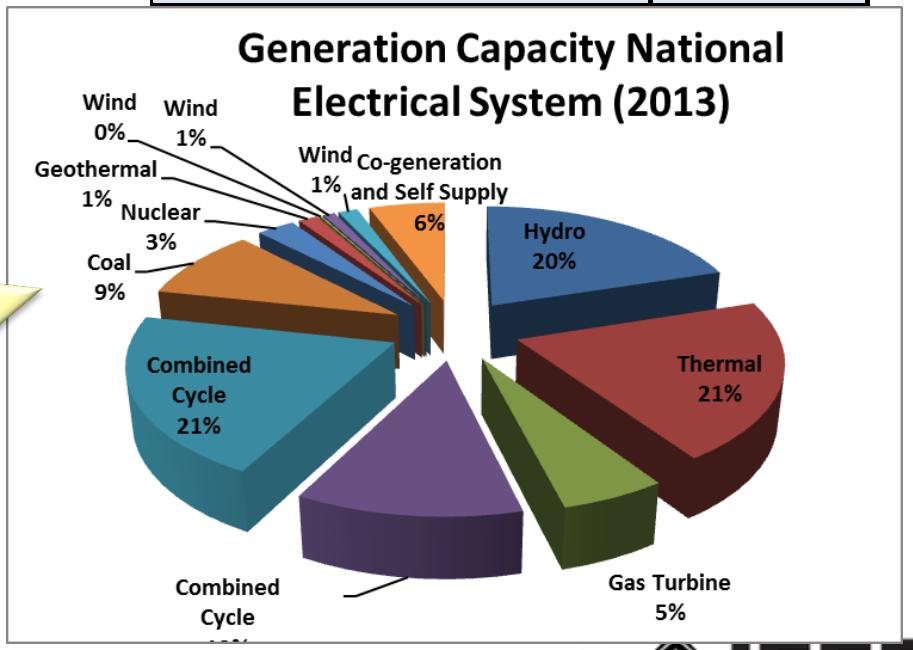
There is no Electricity Market as such.

Actual Generation Infrastructure



Technology	Producer	Capacity (MW)
Hydro	CFE	11,555
Thermal	CFE	11,843
Gas Turbine	CFE	3,139
Combined Cycle	CFE	6,693
	PIP	11,907
Coal	CFE	5,378
Nuclear	CFE	1,610
Geothermal	CFE	823
Wind	CFE	87
	PIP	511
	Self-Supply	836
Co-generation and Self Supply		3,222
TOTAL		57,603

Around 36% of the installed capacity comes from private sector



The Smart Grid Mexican Model (REI)

- Joint effort between Comisión Federal de Electricidad (CFE) and Instituto de Investigaciones Eléctricas to define the Smart Grid Model of the Mexican Electrical System
- Framed in the National Energy Strategy 2012-2026
- Guiding principles of the strategy:
  - Energy security
  - Environmental sustainability
  - Efficient and productive Economy

Targets linked to the guiding principles in relation to a smart grid model

- Decrease the reserve margin of electricity generation capacity at a level of 22%.
- Reducing electricity losses to levels comparable with international standards of 8%.
- Raising the level of electrification of the country to reach the 98.5% of the population
- Increase participation of clean technology within the installed capacity to 35%
- Capturing the potential savings in final energy consumption (electricity and fuel) that arises in the National Programme for the Sustainable Use of Energy 2009-2012

The Smart Grid Mexican Model (REI)

Objective: To evolve into a network more secure, efficient and sustainable, that will:

- meet the energy challenges of the country, transforming the public service of electricity to meet increasingly demanding expectations of customers and
- contribute to economic growth and social development

Perspectives

Costumers: Intelligent Service

Network Operation: Intelligent Operation

Resource Management: Intelligent Management

Sustainability: Renewable Energy and Electric Vehicles

Technolgy: Information and Communications

for each of the perspectives of the roadmap,

Objectives and goasl in the short, medium and long term

Short term: 2015

Medium Term: 2020

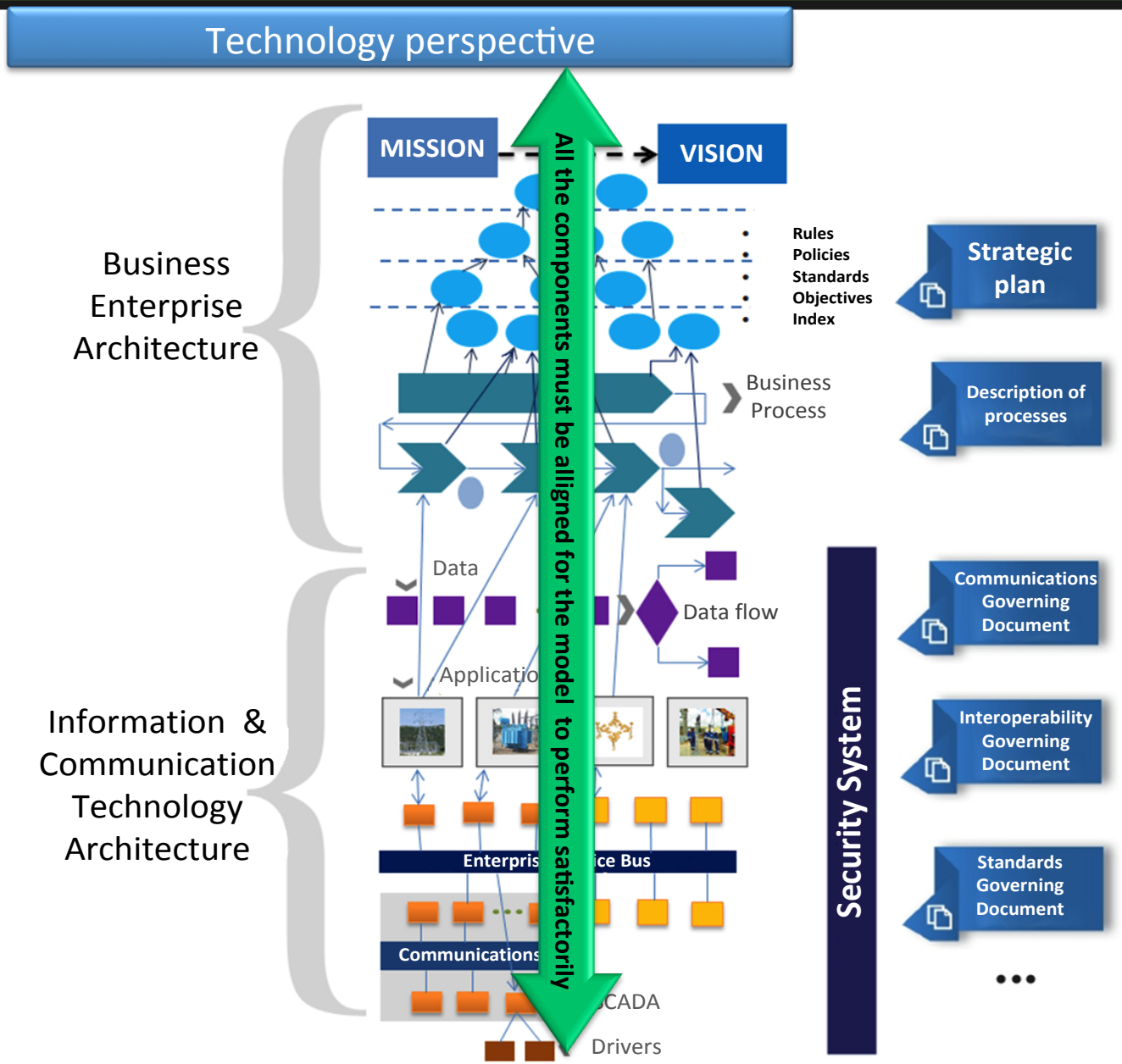
Long Term: 2025

Priority Projects

- Institutional Geographic Information System
- Asset Management System
- Enterprise Architecture Information Technology and Communications
- Lowering power losses in the National Electricity System
- Marketing System Improvements (strengthening)

Background

Objective: Implementing an efficient enterprise architecture information and communications technologies, processes aligned with interoperability and security



Motivations:

- Meet investments requirements to adequately expand the energy infrastructure (oil, gas and electricity)
- Promote private participation to achieve higher efficiency and quality of service in the generation and commercialization of electric energy
- Strengthen the regulatory and institutional framework to encourage the expansion of infrastructure for hydrocarbons products and electricity
- Transform the two public energy companies, CFE and PEMEX, into world class competitive companies
- Achieve the goals of clean generation (35% in 2024, 40% in 2035, 50% in 2050)
- Cheap energy to encourage the economic development of the country

Main features:

- Private participation in the processes of exploration, extraction, processing and transportation of hydrocarbons and their derivatives (oil and gas)
- Private participation in the generation and commercialization of electric energy
- Creating autonomous decentralized agencies of the federal government to monitor and enforce the objectives of the energy reform;
  - ✓ National Hydrocarbons Commission,
  - ✓ Energy Regulatory Commission,
  - ✓ National Center for Natural Gas Control,
  - ✓ National Center for Energy Control
- The National Energy Control Center will be responsible for:
  - ✓ operate the national electricity system,
  - ✓ operating the wholesale electricity market, and
  - ✓ allow open access and non discriminatory to transmission and distribution networks
  - ✓ Planning new transmission and distribution requirements with approval by ERC
- CFE and PEMEX survive as competitive autonomous government enterprises operating financial management

Concerns:

- Achieving widespread acceptance of society without serious social breaks
- Implement a reform that reflects pressures rather than focused on achieving the objectives
- Approval of an amendment, without the required strengthening of the regulatory instruments and enforcement of justice in energy in the time required
- Implement the requirements of technological innovation needed in a timely manner for the expected success

- **The essence of the operation of the power system remains the same. There will be a set of generators and loads connected through transmission networks.**
  - ✓ **The biggest impact for the system operator will be increased external scrutiny of all processes, which have to strictly adhere to the defined market rules.**
- **Rules, policies, standards and objectives of the Smart Grid model must change to reflect energy reforms**
  - ✓ **Disincorporation of the electricity sector services with private participation**
    - **Independent system operation**
    - **Electricity market**
    - **CFE acting as a competitive company ruling out the transmission and distribution networks**

- **Business process must be aligned to the new requirements**
- **Information technologies must be reinforced to meet the new challenges.**
  - ✓ **Information systems should record more information than before and should have the right skills to help the system operator or market to make transparent (explain) all decisions**
- **Short, medium and long term priority projects must be redefined**
- **A modern EMS/MMS/DMS/SCADA system must be designed and deployed**
- **A strong communication system must be available**
  - ✓ **robustness,**
  - ✓ **availability,**
  - ✓ **speed,**
  - ✓ **security**

¡¡¡ Thank you for your attention !!!