Comisión Federal de Electricidad

Mexico's electric sector: recent developments and upcoming challenges

MAY 2010

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Introduction

- **CFE was created in 1937 by Presidential decree, as a decentralized agency of the Federal Government**
- **CFE is responsible for planning, developing and operating the electric system for all of Mexico except Mexico City which was managed by Luz y Fuerza**
- **CFE is the largest Mexican company in terms of assets and capital and ranks among the largest utilities in North America**

CFE Company Overview

- **Installed capacity: 51,390 MW (National 57,299MW)**
- **Transmission network: 61,552 miles (161 – 400 kV)**
- **Distribution network: 385,191 miles**
- **Fiber optic network: 16,155 miles**
- **Users: 26.6 million (plus 6.5 from LYF)**
- **Annual revenue: $20 B USD**
- **Employees: 80,000**

Figures Dec. 2009

Recent developments

- **Private Producers: success story**
- **Gas Strategy**
- **Wind Program**
- **New Responsibilities**

Private Power Producers

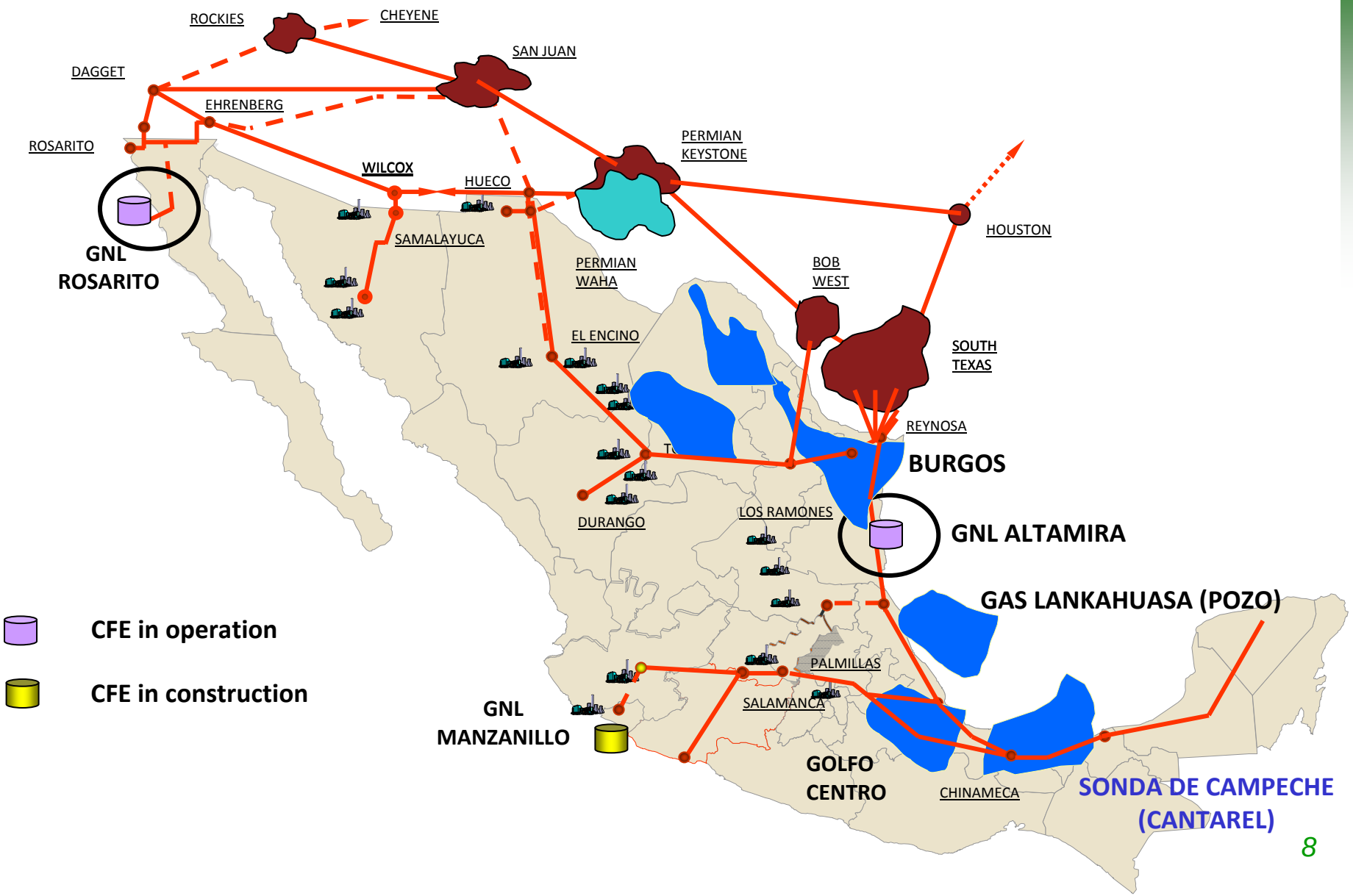
- **A successful mix of public and private investment**
  - 21 operating projects
  - 11,600 MW of installed capacity
  - Over $6 B USD invested
  - Companies involved:
    - Intergen
    - AES
    - Mitsubishi
    - Unión Fenosa (Gas Natural)
    - Iberdrola
    - Trans Alta
    - Mitsui
    - EDF

Private Power Producers

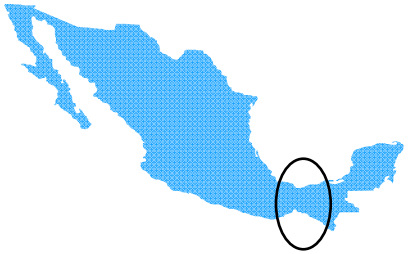
POWER FACILITY	CAPACITY MW	OPERATION DATE
Merida III	484	2000
Hermosillo	250	2001
Saltillo	248	2001
Tuxpan II	495	2001
Río Bravo II	495	2002
Bajío (El Sáuz)	565	2002
Monterrey III	449	2002
Altamira II	495	2002
Tuxpan III y IV	983	2003
Campeche	252	2003
Mexicali	489	2003
Chihuahua III	259	2003
Naco Nogales	258	2003
Altamira III y IV	1,036	2003

POWER FACILITY	CAPACITY MW	OPERATION DATE
Río Bravo III	495	2004
La Laguna II	498	2005
Río Bravo IV	500	2005
Altamira V	1,153	2006
Tuxpan V	509	2006
Valladolid III	540	2006
Tamazunchale	1,168	2007
Under Construction		
Norte I	450	2010
Oaxaca I	101	2010
La Venta III	101	2011
Oaxaca II, III, IV	300	2012
Norte II	545	2013

Gas Strategy



Wind Program



Projects connected to the CFE network

	Capacidad (MW)
In operation	
Bii Nee Stipa Energía Eólica	26.35
Eléctrica del Valle de México	67.50
Parques Ecológicos de México	80.0
Eurus	250.0
La Venta II CFE	83.3
In construction	
La Venta III CFE	101.4
Oaxaca I CFE	101.4
In design	
Eoliatec del Istmo	22.00

Projects associated with the Open Season

(Sept. 2010)

	Capacidad (MW)
Desarrollos Eólicos Mexicanos de Oaxaca	227.5
Eoliatec del Istmo	142.2
Eoliatec del Pacífico	160.5
Fuerza Eólica del Istmo	80.0
Gamesa Energía	288.0
Fuerza y Energía Bii Hioxo	227.5
Vientos del Istmo	180.0
Energía Alterna Istmeña	216.0
Oaxaca II, III y IV CFE	304.2

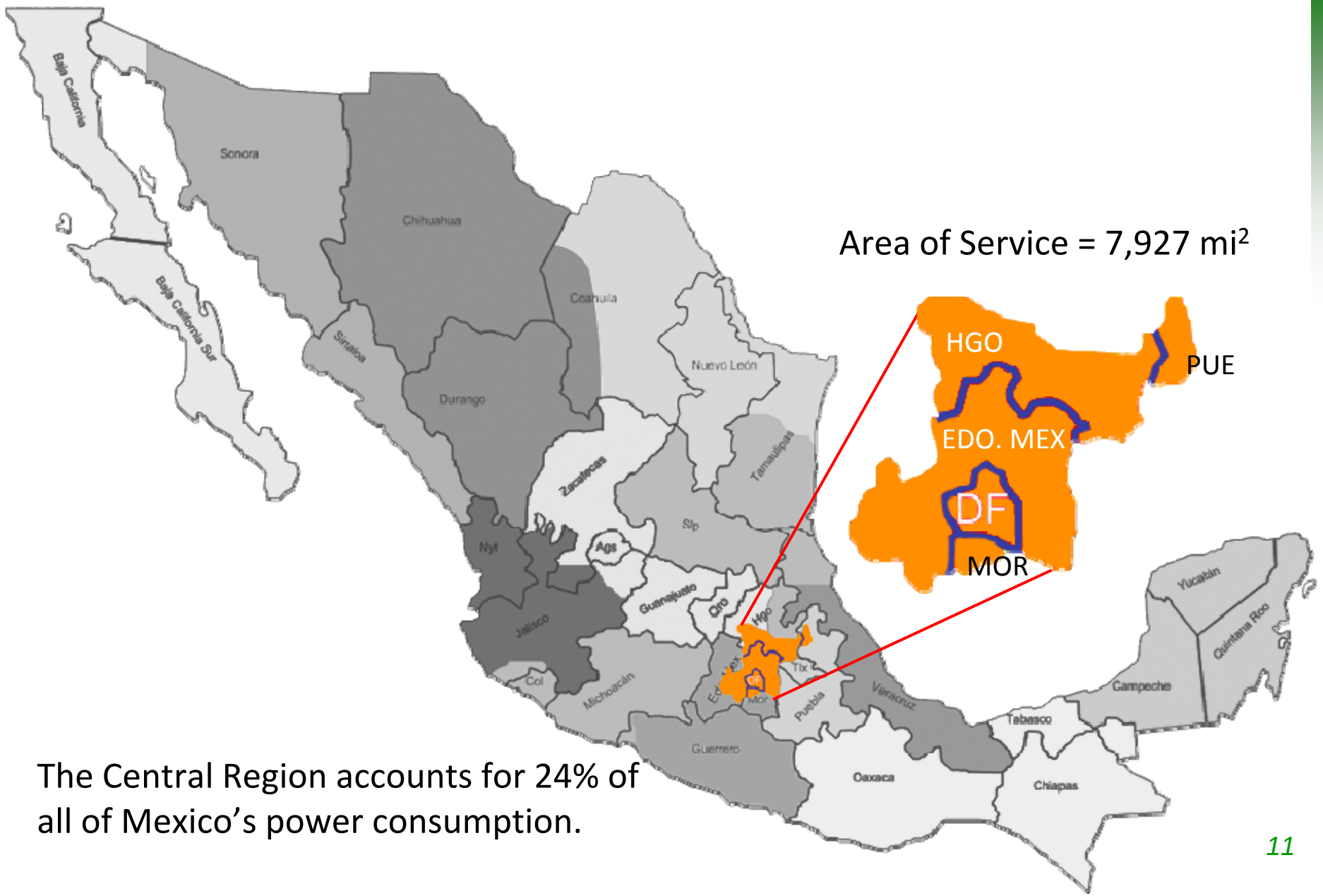
Total: 2,558 MW

Note: There are small projects in experimental phase at La Rumorosa (B.C.) and Guerrero Negro (B.C.S)

New Responsibilities

- For decades, Mexico's power production and distribution was managed by two public companies: Comisión Federal de Electricidad (CFE) and Luz y Fuerza del Centro (LFC).
- LFC's infrastructure included: 28 power plants with 62 units (hydroelectric, thermal and distributed generation) with a installed capacity of 1,301 MW. A transformation capacity of 30,951 MVAs with 249 substations. 3,379 Km-c in 256 transmission lines to service an area of 7,927 mi^2, which accounts for 24% of the total demand in Mexico.
- On October 11th, 2009 the Federal Government decided liquidate LFC. CFE has been responsible for the service of the 6.5 million users of the central area, including power generation, transmission and customer service.

New Responsibilities



The Central Region accounts for 24% of all of Mexico's power consumption.

New Responsibilities

- Power supply and service has not been interrupted, and the 6.5 million users who were previously served by the now demised LFC have not been affected.
- In addition, the sale of energy continues normally; new clients (industrial and residential) are connected to the network in record time; and an ambitious plan to modernize the electric infrastructure of the Central Region is in progress.
- CFE has not only been able to guarantee delivery of electricity to the central region, but also introduce significant improvements in productivity, turning the operation profitable; hence eliminating the huge subsidies required for the operation, and has initiated a slow but noticeable improvement in service.

Future Challenges

Planning of the Electric System

CFE is responsible for the planning of the National Electric System.

The growth forecast of the demand, is based on econometric models that take into account the historic evolution, population growth expectancy, regional demand growth, economic growth scenarios and power generation technologies.

POISE

- **Through mathematical models that reproduce the national electrical grid, the "Works and Investment Program of the Electric Sector" (POISE) is developed to meet the demand for the following 15 years, which takes into account the various technologies, the availability and prices of fuels.**

- **The guidelines of the "National Climate Change Strategy" to reduce CO2 emissions, establish a 25% target of renewable energy by 2012.**

Long-term Investment Program ("POISE")

- Detailed investment and construction program with yearly reviews for the next 15 years.
- Planning scenario 2010 – 2024:
  - Estimated GDP growth: 1.8 to 3.4%
  - Estimated demand growth: 2.6% to 4.3%
- The Program is financed with public and private investment.

Projects under construction

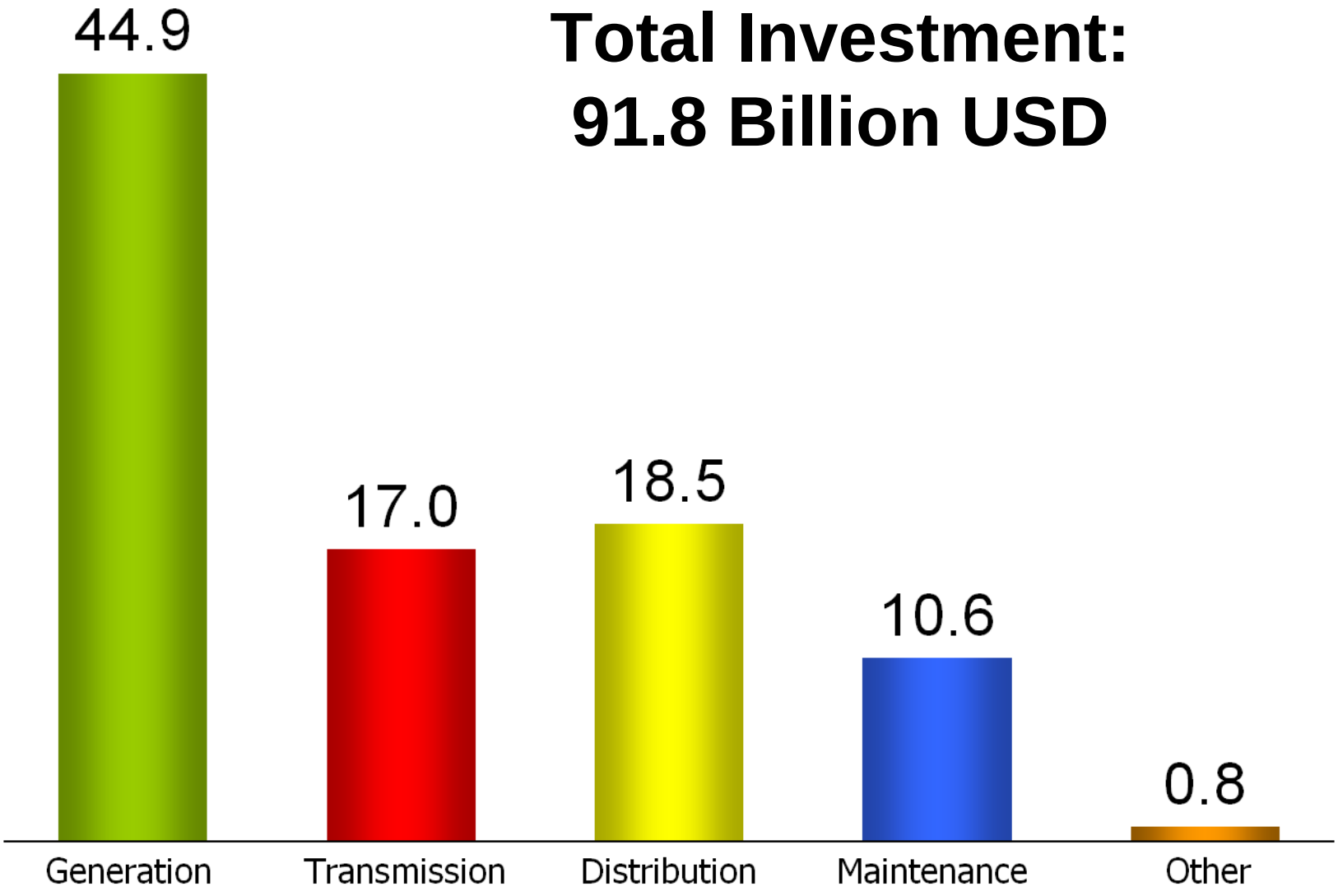
POISE: Capacity Requirements 2010 – 2024

Total: 32,095 MW*

*** Excluding capacity under construction or public tender**

1/ Figures are rounded and therefore total does not appear to add up.

Investment Requirements
2010 – 2024



Total Investment:
91.8 Billion USD

Future Challenges
Today's Decisions

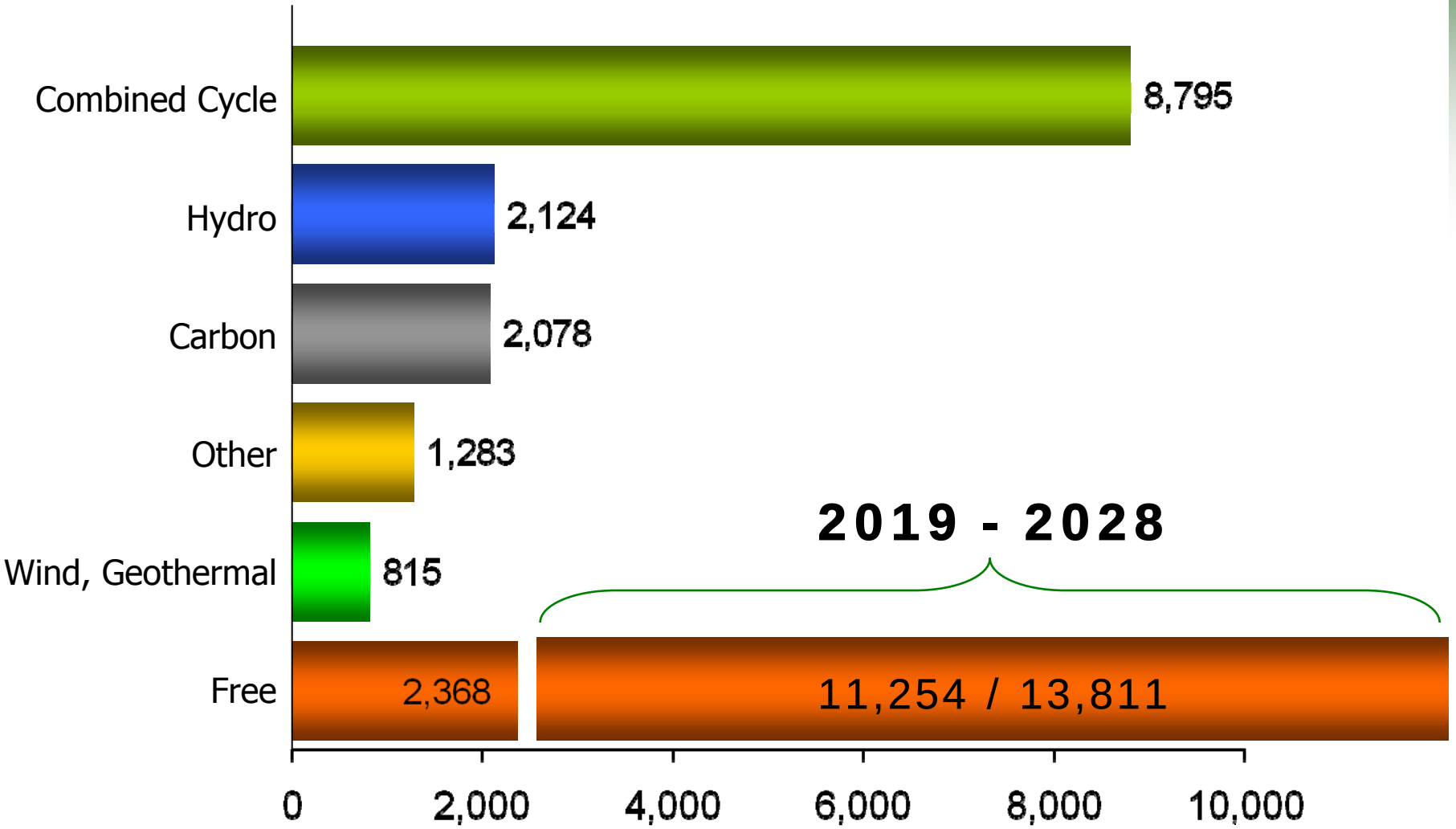
Guaranteed delivery of electricity is required for Mexico's economic development

Transition to a Sustainable and Green energy model

Generation Requirements

2009 - 2018: 17,942 MW of gross new capacity (5,787 MW retired)

2019 - 2028: Between 11,254 and 13,811 MW of net new capacity



Others: Turbogas, internal combustion and generation of LFC

Examples of alternatives: 4 scenarios

1

- POISE fixed projects for 2009-2018 with free expansion starting in 2019.
- Not including nuclear or wind.
- Addition of 14 carbon plants from 2019 – 2028.

2

- POISE fixed projects for 2009-2018.
- Starting in 2019 limit development of carbon plants (4) to 15% and combined cycle to natural gas to 45%.
- Include two nuclear plants in 2027 and 2028; and
- 4,000MW from wind between 2023 and 2028.

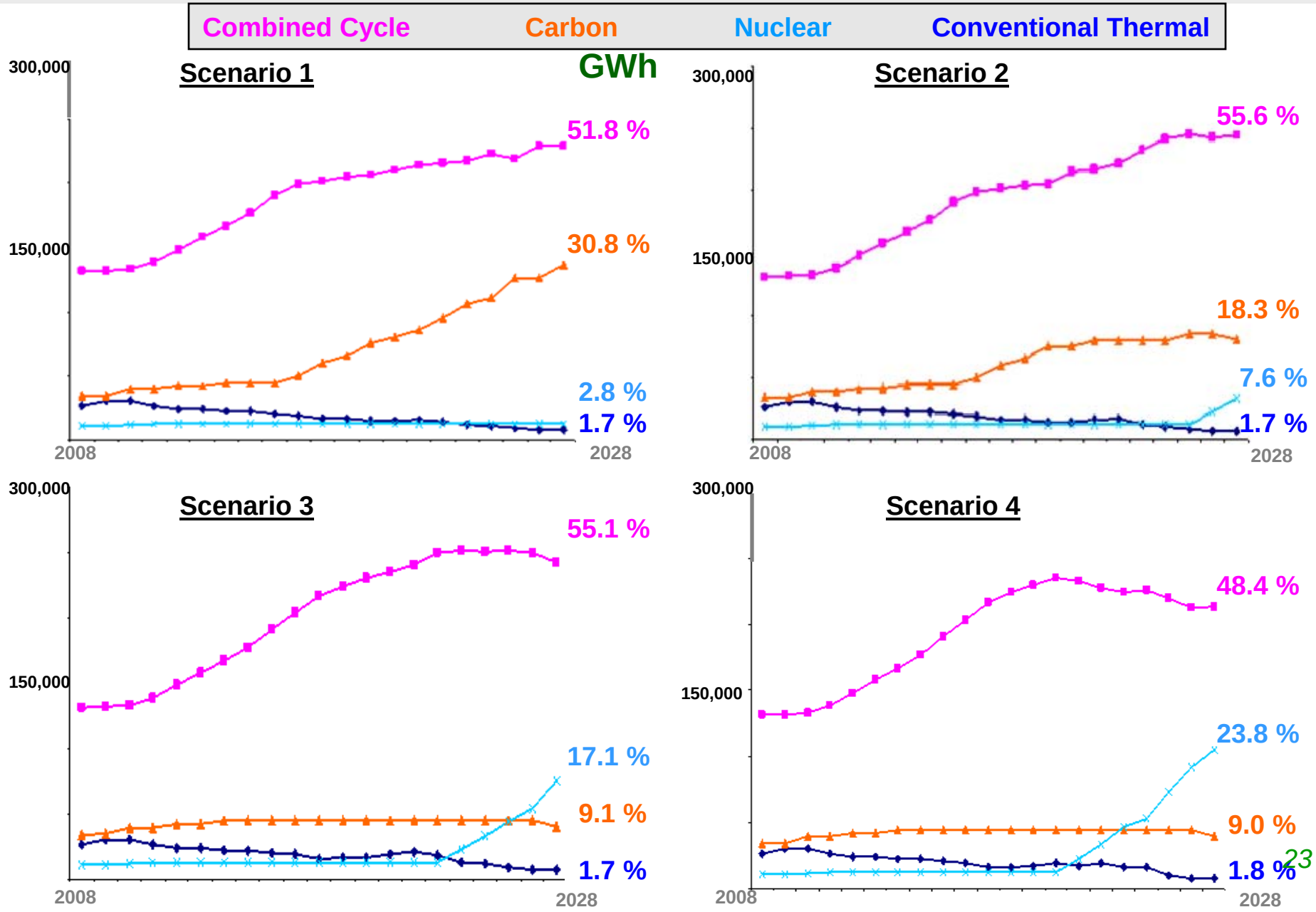
3

- POISE projects for 2009-2018 fixed until 2016.
- No additional carbon and limit combined cycle to 45%.
- 6 nuclear plants between 2024 and 2028 and additional
- 4,500 MW from wind.

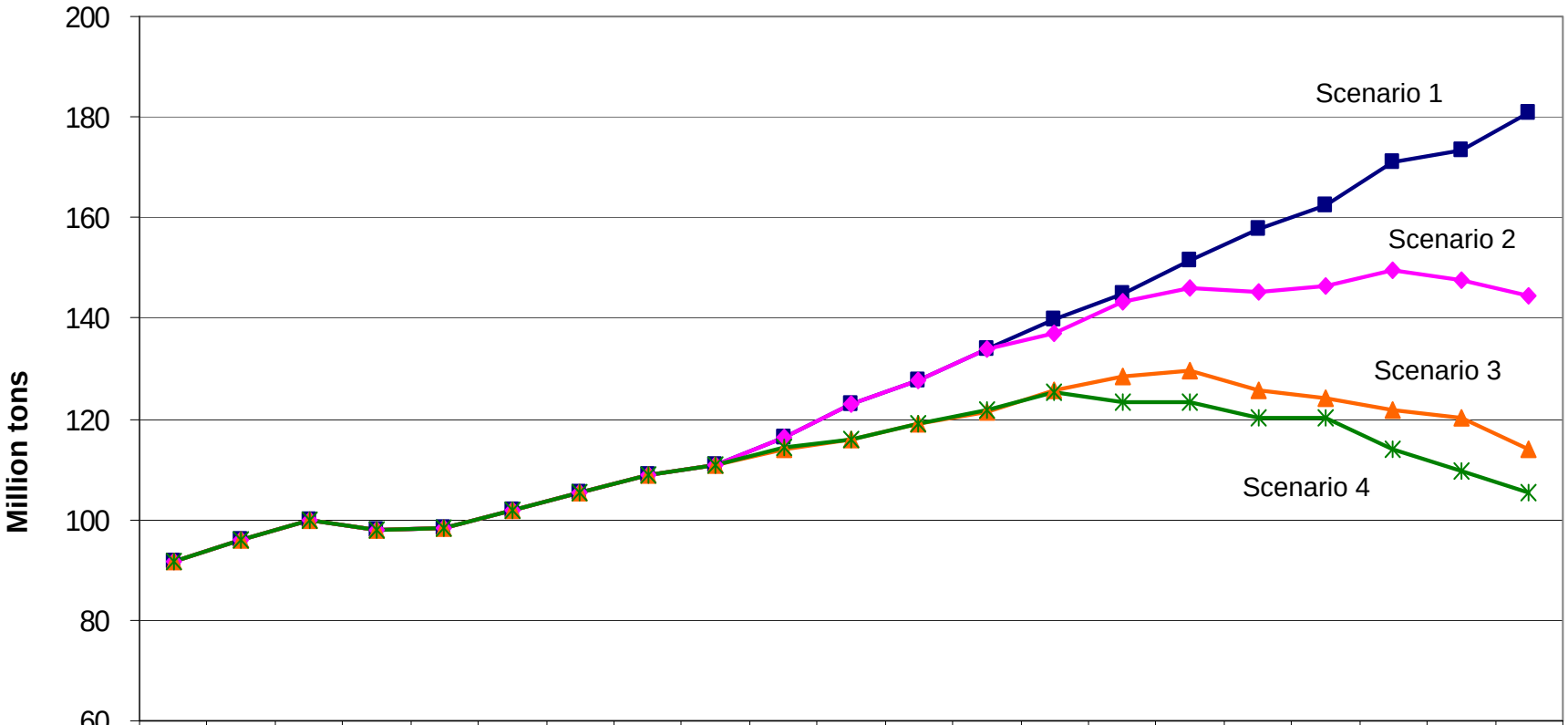
4

- POISE projects for 2009-2018 fixed until 2016.
- No additional carbon and limit of combined cycle to 45%.
- Include 10 nuclear plants from 2022 to 2028 and addition of
- 4,500 MW from wind.

Power generated by technology 2008-2028



CO_2 Emmisions



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Scenario 1	91	96	100	98	98	102	106	109	111	116	123	128	134	140	145	152	158	163	171	173	181
Scenario 2	91	96	100	98	98	102	106	109	111	116	123	127	134	137	143	146	145	146	150	148	144
Scenario 3	91	96	100	98	98	102	106	109	111	114	116	119	121	126	129	129	126	124	122	120	114
Scenario 4	91	96	100	98	98	102	106	109	111	114	116	119	122	125	123	123	120	120	114	110	105

Cost of Preventing Emissions

- Efforts to reduce emissions in Power generation have proven to increase the cost of electricity over conventional power generation options.

- Society must decide how far is his willing to distribute the cost of electricity:
  - Setting a higher price (Consumer bears the cost)
  - From taxes (Taxpayers bear the cost regardless of consumption)

Energy Savings

The cheapest power is the one that is not produced

Possibilities to reduce power consumption:

- Efficiency in Generation, Transmission and distribution: “SMART GRID”
- Consumption:
  - Residential
  - Industrial

CFE

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