

PASO NORTE PIPELINE ELECTRIC POWER MARKET

NATURAL GAS TRANSMISSION AND ELECTRICAL GENERATION INFRASTRUCTURE



**CHIHUAHUA, CHIHUAHUA
FEBRUARY 2018**



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OPPORTUNITY OVERVIEW

Generate electricity at competitive prices for the new Mexican Wholesale Electric Market taking advantage of competitive and specialized infrastructure and low cost shale natural gas from the U.S.A.

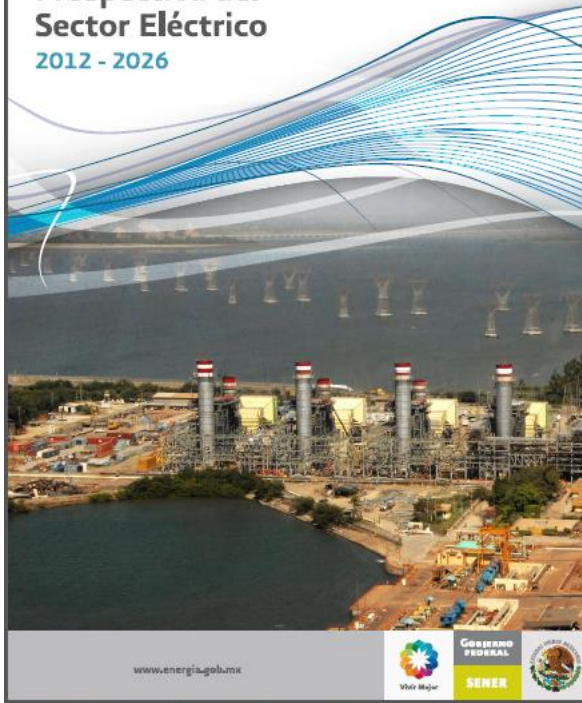




ELECTRIC POWER GENERATION TRENDS IN MEXICO

NEW ENERGY LAWS, ENCOURAGE PRIVATE SECTOR PARTICIPATION IN GENERATING ELECTRICITY

Prospectiva del
Sector Eléctrico
2012 - 2026

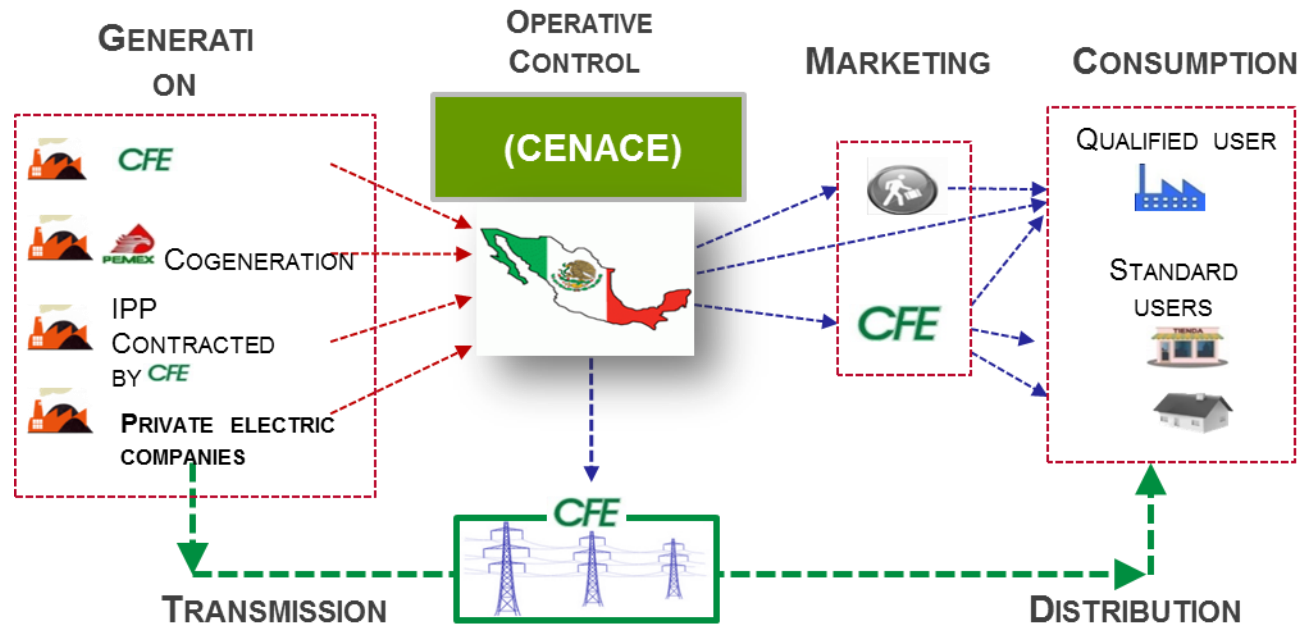


In December 2013 the Mexican Congress approved new energy reform allowing private companies to generate power and sell directly to qualified customers and the CFE.

<http://reformas.gob.mx/en/>



The new Wholesale Electric Market is now in operation



Source: SENER. Prodesin 2015-2029



ELECTRIC POWER PROJECTIONS 2017-2031

Increased demand for electricity in Mexico

Mexico need to develop 40,000 megawatts in the following 15 years

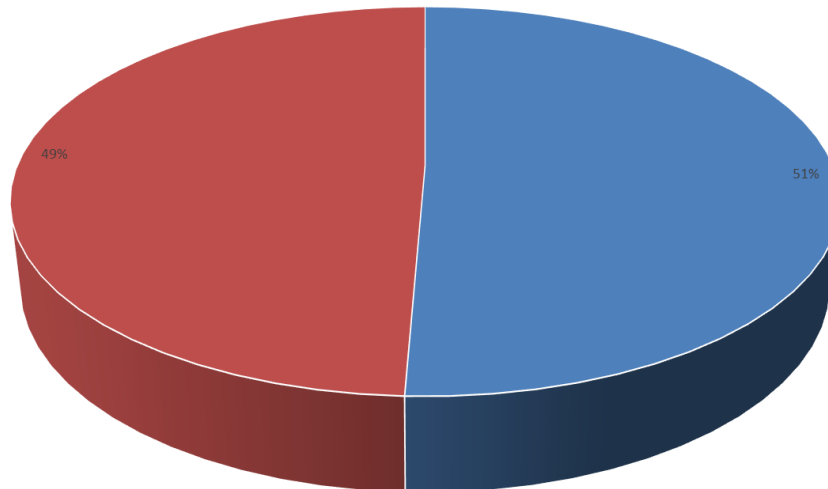


Source: SENER. Prodesin 2017-2031

The Mexican Electric Power Generation capacity must be increased by 39,758 Megawatts form 2017 to 2031

NEW GENERATION CAPACITY IN MEXICO 2017-2031

■ COMBINED CYCLE ■ OTHER



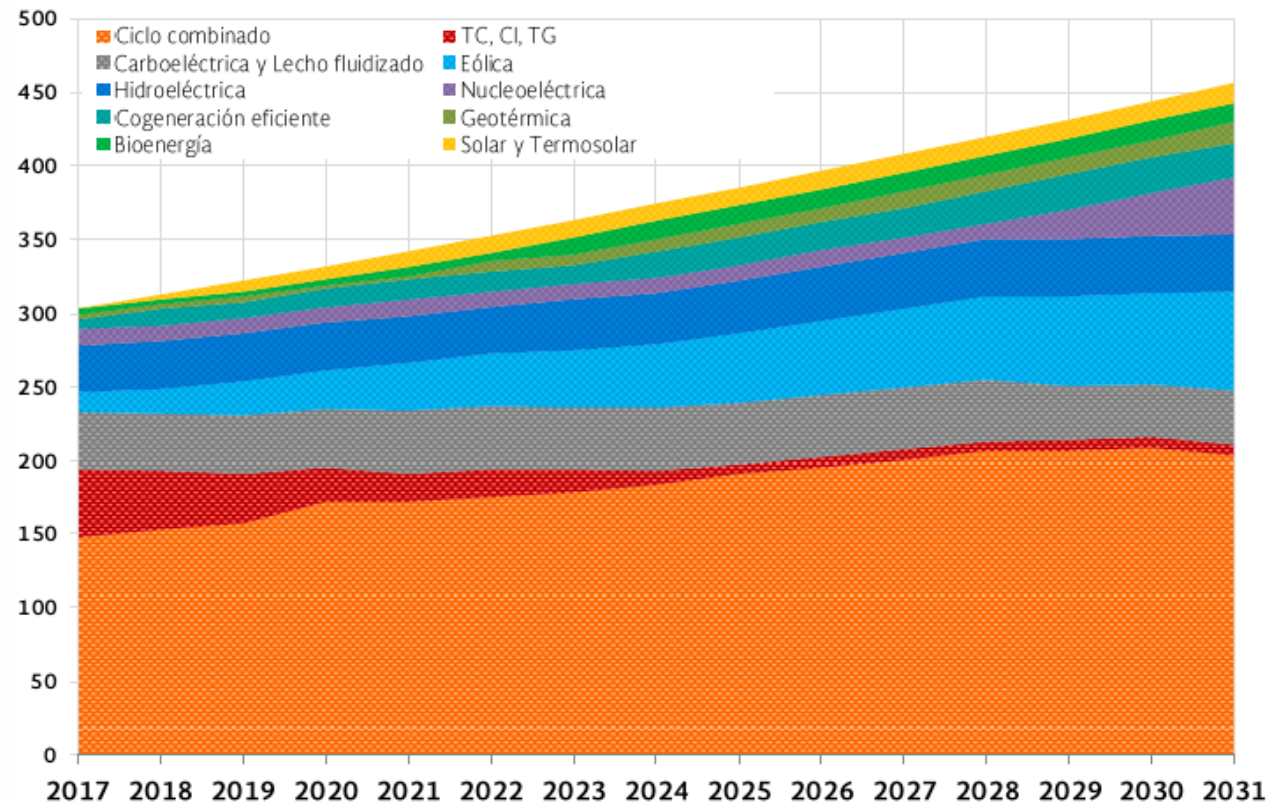
**20,138 Mega watts will be generated by
combined cycle technology**



Combined cycle will be the most important technology in Power Generation in Mexico.

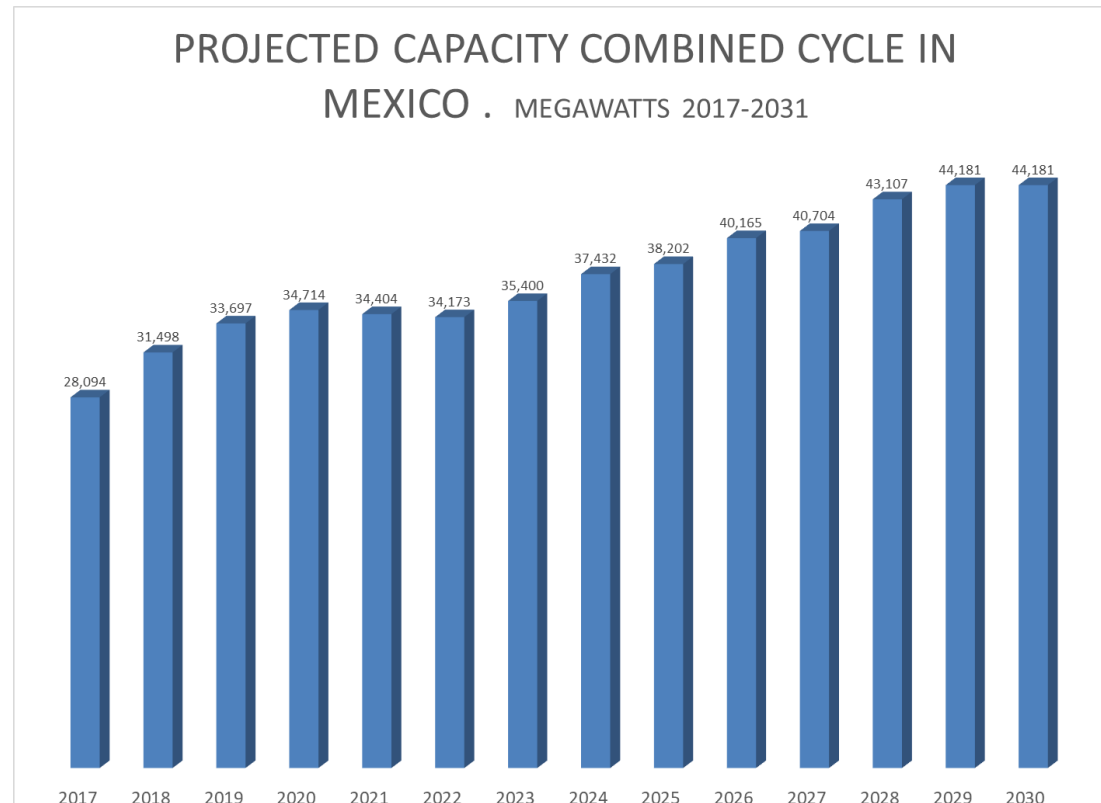


GRÁFICO 4.5.4. EVOLUCIÓN DE LA GENERACIÓN DE ENERGÍA ELÉCTRICA 2017-2031
(Terawatt-hora)



Fuente: Elaborado por la SENER.

Combined cycle power plants will grow from 27,274 Mwatts to 44,181 Mwatts



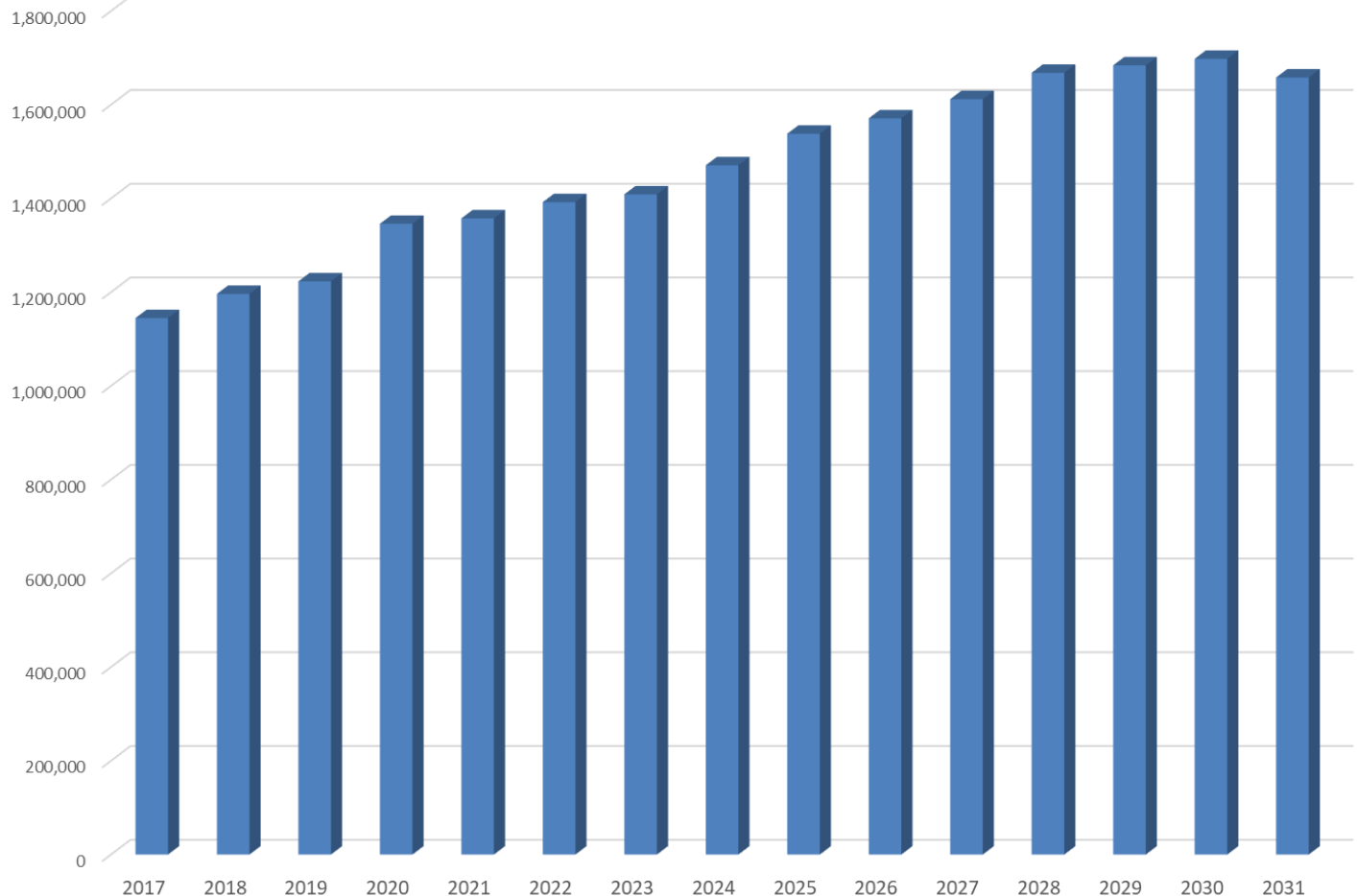
Based on a typical 450 Mw plant, Mexico needs to build 45 new combined cycle power plants

Source: PRODESEN 2017-2031



Natural gas demand for Power Generation will grow 44%

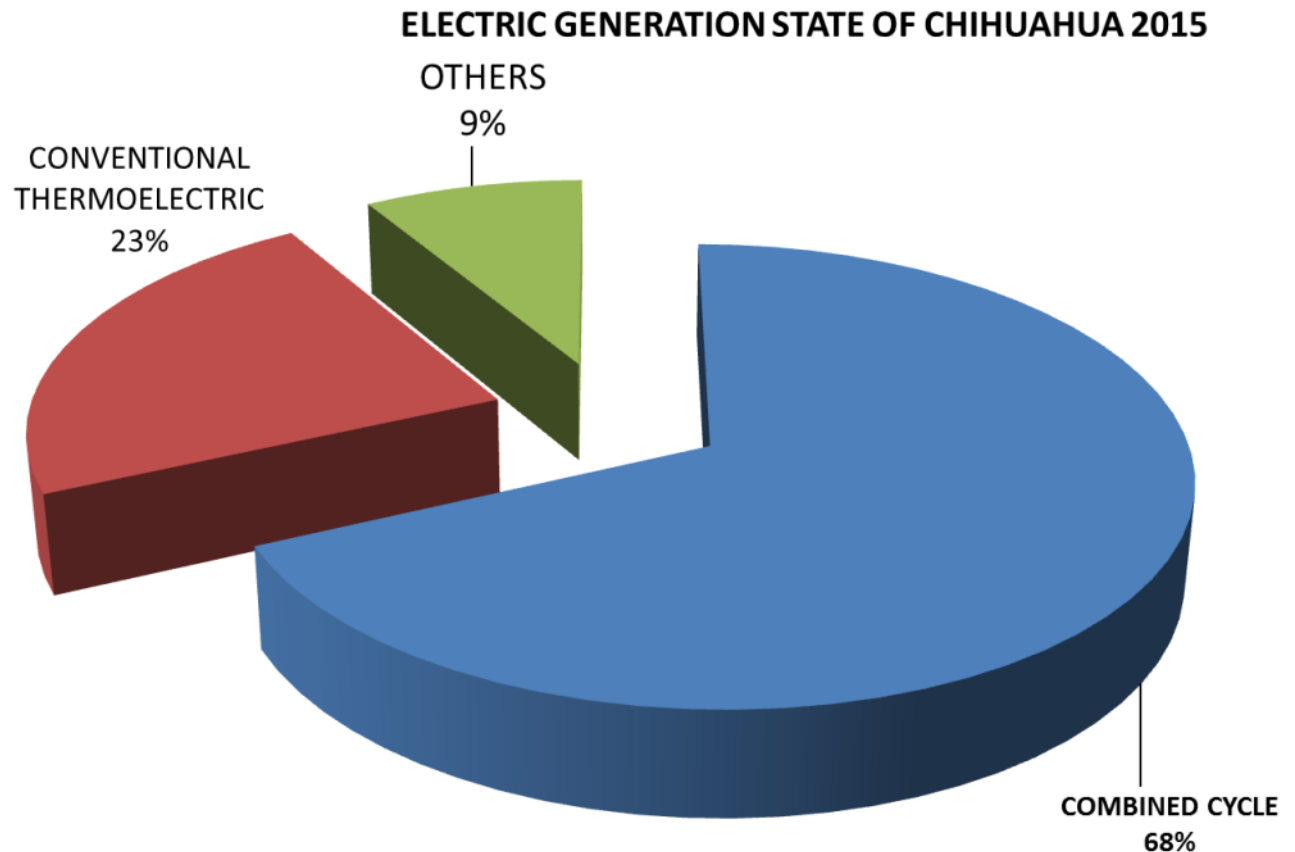
PROJECTED NATURAL GAS CONSUMPTION FOR POWER GENERATION





POWER GENERATION IN CHIHUAHUA

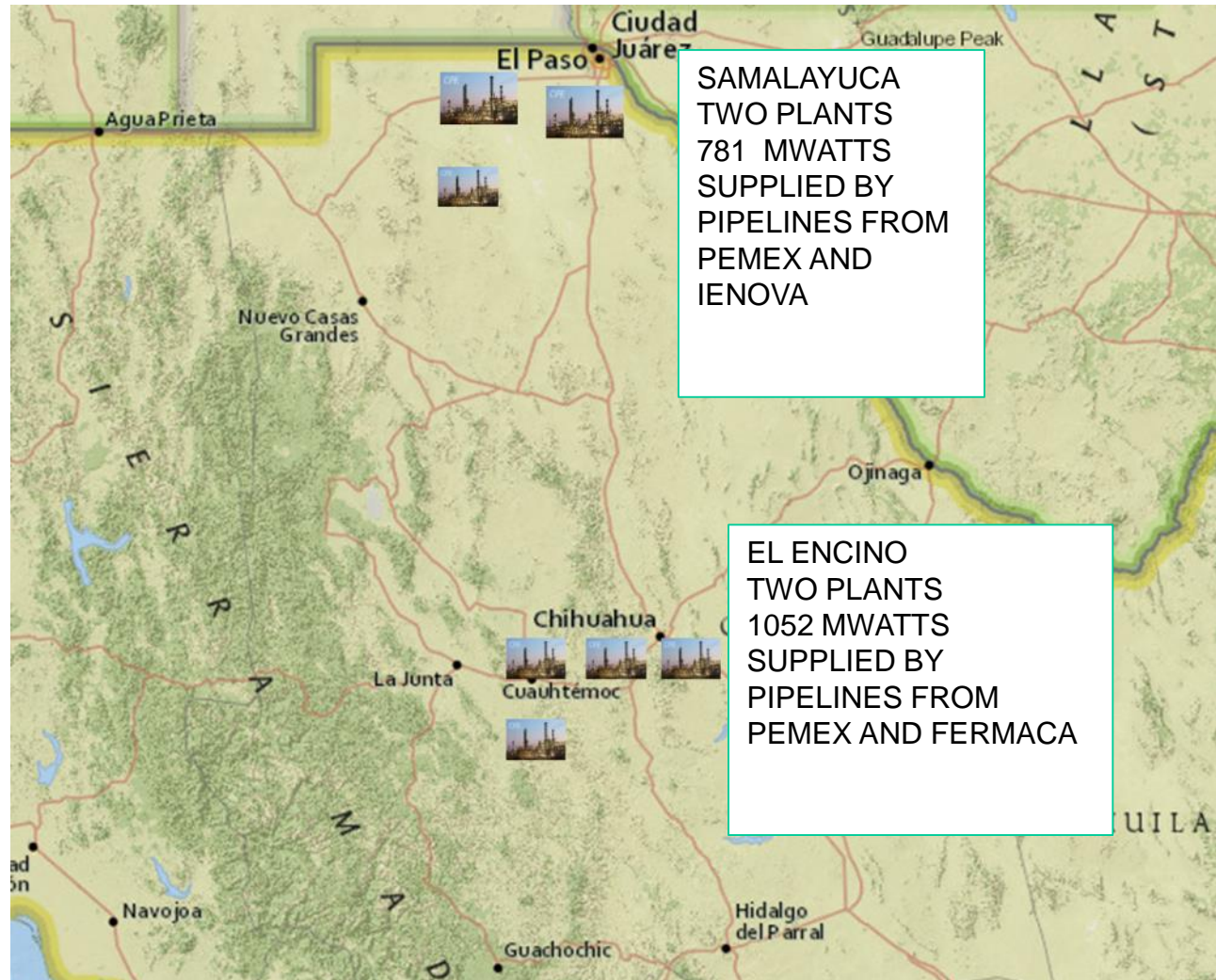
The state of Chihuahua is generating now 2,768 Megawatts



Source: SENER. Prodesin 2015-2029



Power generation in Chihuahua is concentrated in two Power Parks developed by CFE



Source: SENER. Prodesin 2015-2029

The power generation in Chihuahua is projected to grow by 3740 Megawatts from 2015 to 2029

New projected generating capacity by state

MAPA 4.1.1. CAPACIDAD ADICIONAL POR ENTIDAD FEDERATIVA
(Megawatt)



Source: SENER. Prodesin 2015-2029





COMBINED CYCLE ENERGY DEVELOPMENT IN MEXICO

Mexico has a 17,249 MW combined cycle energy capacity, which is produced by private companies under contracts with CFE

Power Generation Summary. COMBINED CICLE

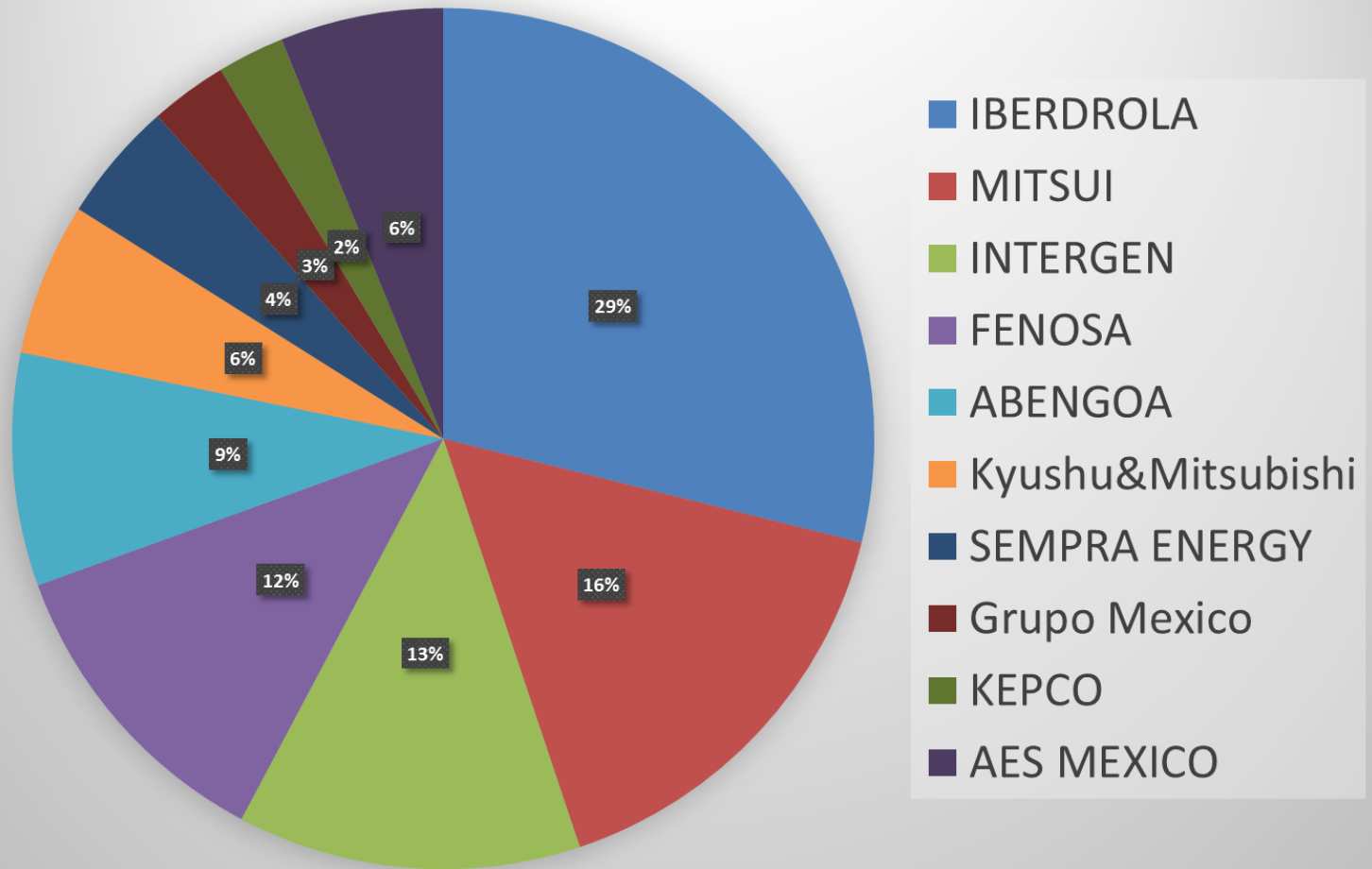
Natural Gas. Combined Cycle Power Plants

| Company | Technology | Number of Power Plants | Capacity MW | Production Share % |
|-------------------|----------------|------------------------|---------------|--------------------|
| IBERDROLA | Combined Cycle | 6 | 4,981 | 29% |
| MITSUI | Combined Cycle | 6 | 2,758 | 16% |
| INTERGEN | Combined Cycle | 4 | 2,223 | 13% |
| FENOSA | Combined Cycle | 5 | 2,020 | 12% |
| ABENGOA | Combined Cycle | 4 | 1,509 | 9% |
| Kyushu&Mitsubishi | Combined Cycle | 2 | 990 | 6% |
| SEMPRA ENERGY | Combined Cycle | 2 | 780 | 5% |
| Grupo Mexico | Combined Cycle | 2 | 500 | 3% |
| KEPCO | Combined Cycle | 1 | 433 | 3% |
| AES MEXICO | Combined Cycle | 3 | 1,055 | 6% |
| Total | | 32 | 17,249 | 100% |

Source:

Iberdrola and Mitsui produce nearly 50% of all the combined cycle energy in Mexico.

PRIVATE POWER GENERATION
COMBINED CYCLE



Source: Direct Research

In 2015 five new combined cycle power plants were bid by CFE with a combined capacity of 4 thousand MW.

Companies that won the 2015 CFE bid for the construction of Thermoelectric plants.

| Company | Thermoelectric plant | State | Date | Millions USD | MW |
|---|----------------------|-------------|---------------|--------------|--------------|
|  | CC Empalme II | Sonora | 8-Oct-15 | 400 | 790 |
|  | CC Norte III | Chihuahua | 9-Jan-15 | 1,500 | 924 |
|  | Empalme I | Sonora | 31-Mar-15 | 477 | 770 |
|  | Valle de México | Edo. México | 19-mayo. 2015 | 425 | 615 |
|  | Noreste | Nuevo León | 22-Sep-15 | 374 | 850 |
| Total | | | | 3,176 | 3,949 |

Source:

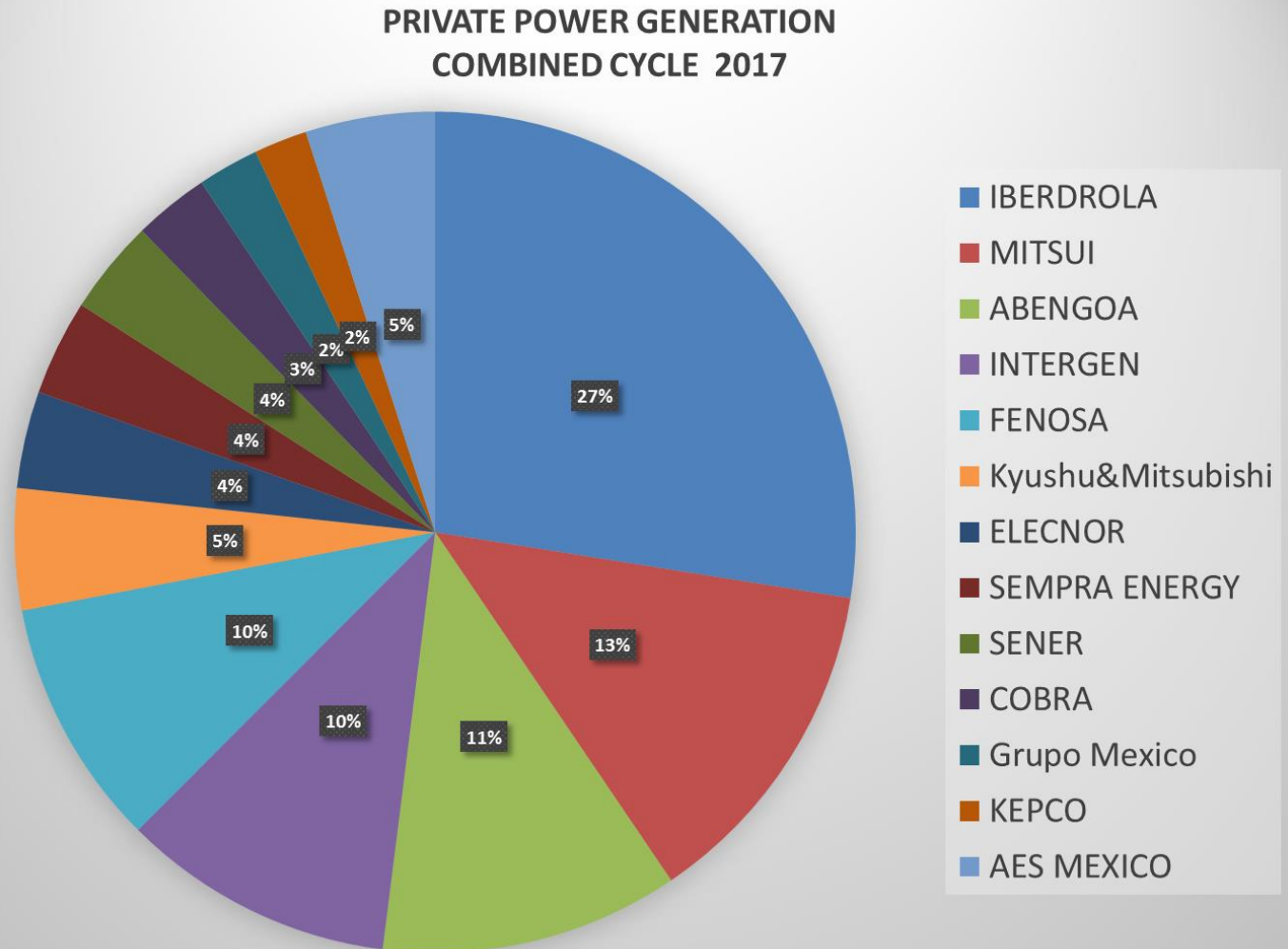


21,000 MW production from private companies is estimated in Mexico, under contracts with CFE

COMBINED CYCLE TOTAL. FUTURE SITUATION

| | | | |
|-------------------|---------------|-------------|-----------|
| IBERDROLA | 5,831 | 28% | 7 |
| MITSUI | 2,758 | 13% | 6 |
| ABENGOA | 2,433 | 11% | 5 |
| INTERGEN | 2,223 | 10% | 4 |
| FENOSA | 2,020 | 10% | 5 |
| Kyushu&Mitsubishi | 990 | 5% | 2 |
| ELECNOR | 790 | 4% | 1 |
| SEMPRA ENERGY | 780 | 4% | 2 |
| SENER | 770 | 4% | 1 |
| COBRA | 615 | 3% | 1 |
| Grupo Mexico | 500 | 2% | 2 |
| KEPCO | 433 | 2% | 1 |
| AES MEXICO | 1,055 | 5% | 3 |
| TOTAL | 21,198 | 100% | 40 |

Iberdrola, Mitsui and Abengoa will produce more than 50% of the combined cycle energy in México.



Source:

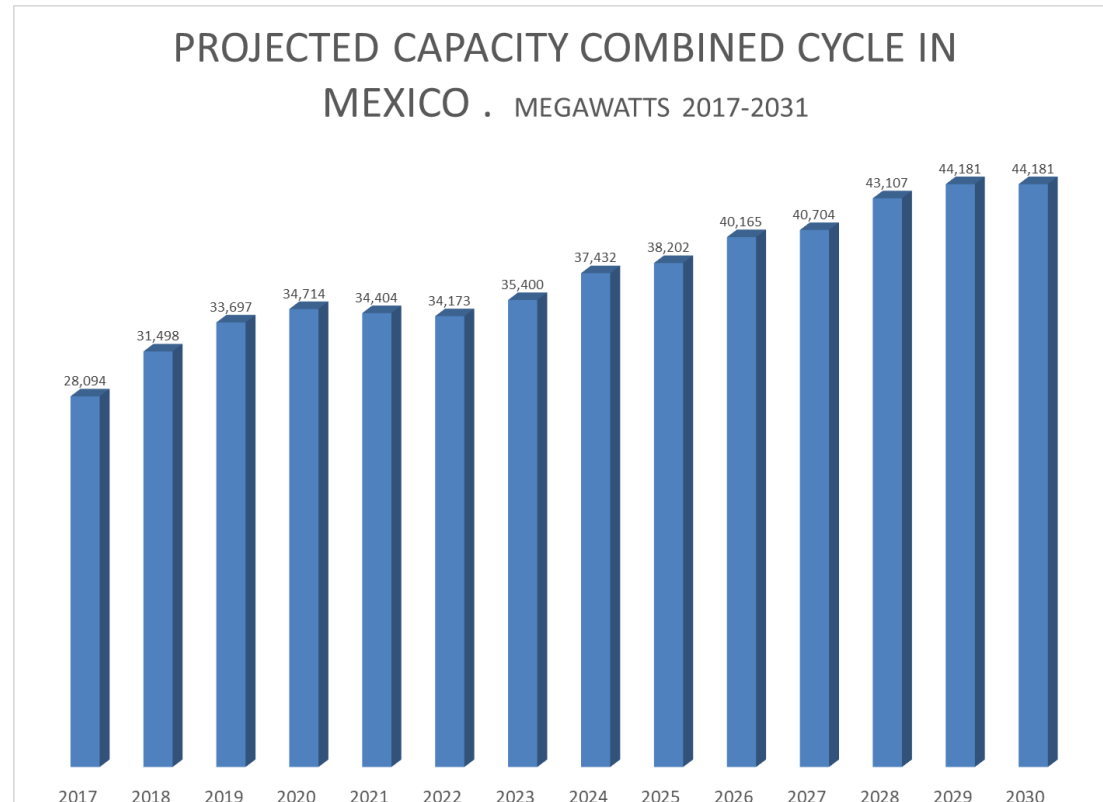


Location of 40 combined cycle energy power plants by 2017.



Source:

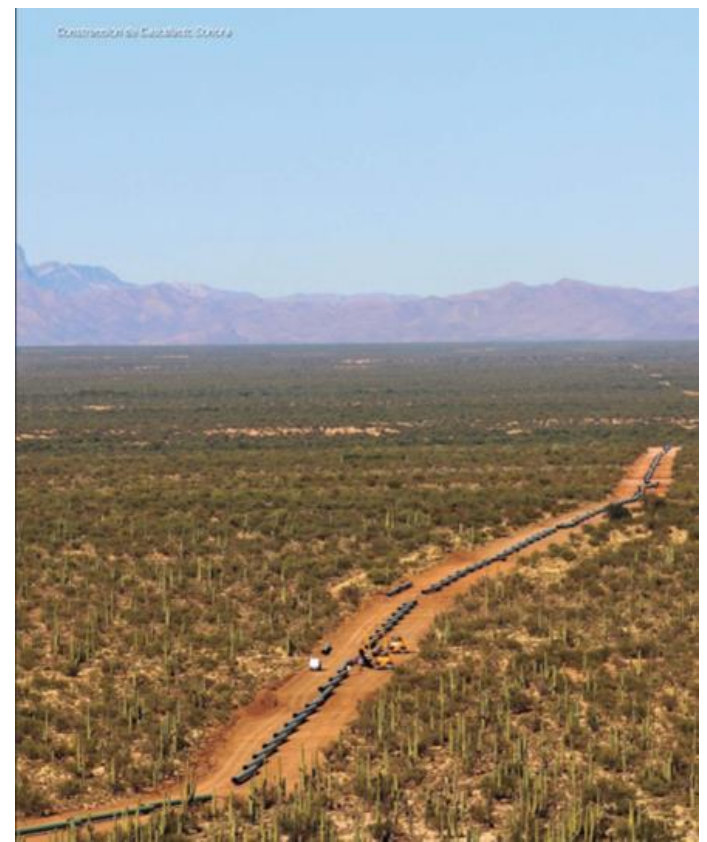
Combined cycle power plants will grow from 27,274 Mwatts to 44,181 Mwatts



Based on a typical 450 Mw plant, Mexico need to build 45 new combined cycle power plants

Source: PRODESEN 2017-2031





COMPETITIVE ENVIRONMENT

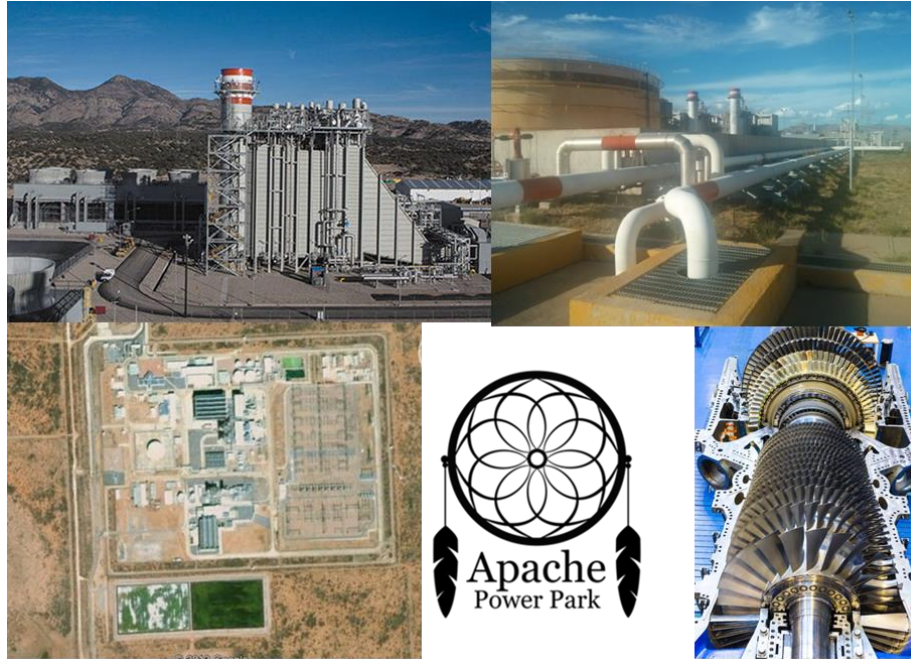
Combined Cycle Power Generation in Mexico will depend on key elements

- LONG TERM SUPPLY OF NATURAL GAS
- COMPETITIVE PRICE OF NATURAL GAS
 - COMPETITIVE PRICE OF TRANSPORTATION OF NATURAL GAS
 - AVAILABILITY OF BASIC INFRASTRUCTURE
- ELECTRIC POWER TRANSMISSION LINES



The Apache Power Park and the Paso Norte Pipeline are planned to provide these advantages.





APACHE POWER PARK

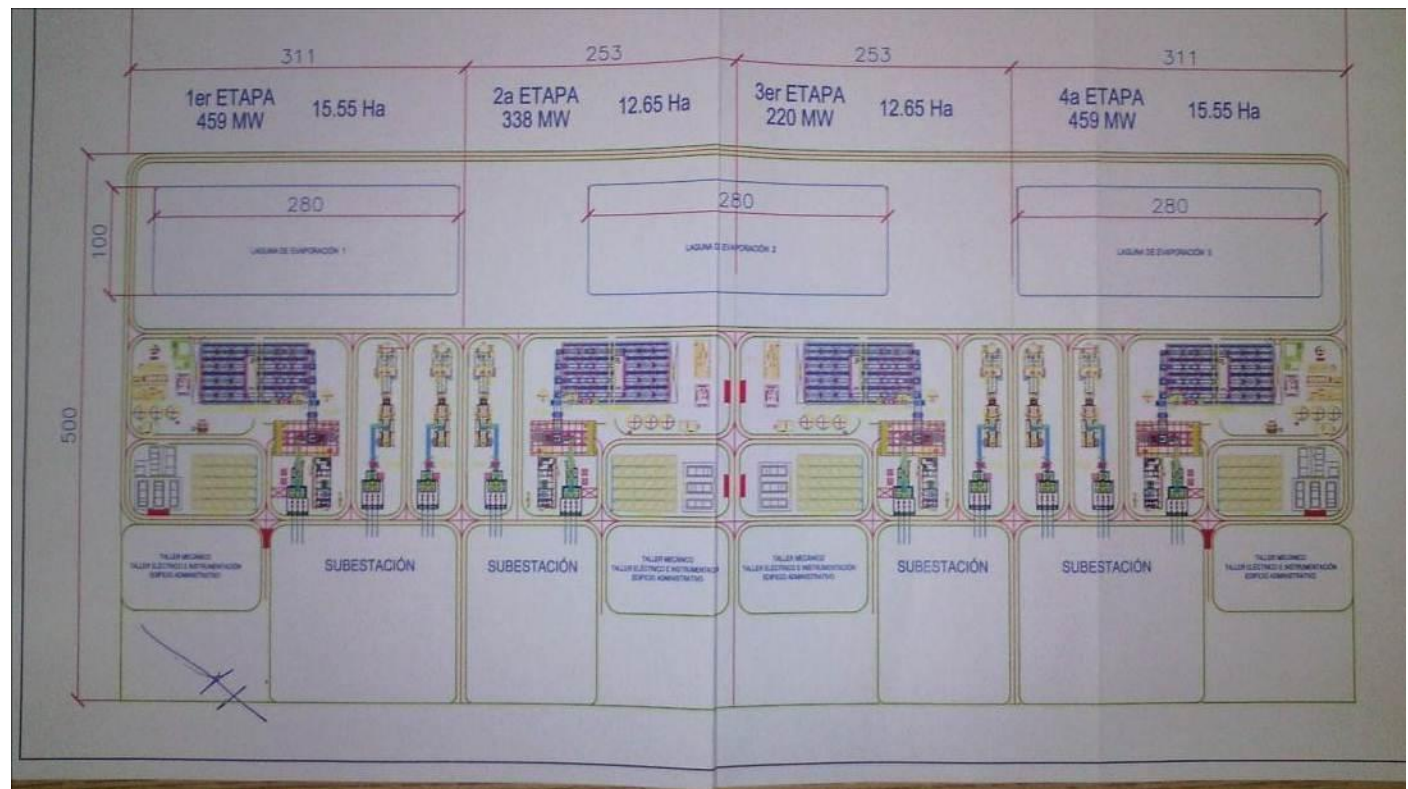
APACHE POWER PARK

- Is a Private industrial site that will be designed with the support of the technical department of CFE that has identified the sites for all new power plants in North and Northwest Mexico
- The park will be oriented to receive different Power Plants from different generators in an planned environment
- The Park will be supplied with natural gas from the Paso Norte Pipeline.
- The park is estimated to generate up to 1,200 Megawatts in 5 years to supply the General and Wholesale Mexican Electric Market



Preliminary design of the Apache Power Park

Four Power Plants with a global capacity of 1,476 Mwatts.



Preliminary design developed by CFE



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