



# Pemex' Strategy for Optimizing Electrical Energy Use

“México - Día de Energía”

Presentación de las oportunidades de negocio e inversión para empresas alemanas  
en el sector energético de México:

Energías Renovables, Energía Eléctrica, Oil & Gas

June 22<sup>nd</sup> 2009



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- Since the beginning of its operation, Pemex has been one of the largest electricity consumers in the country. To date, Pemex is able to generate 2,143 MW of electric power. This is equivalent to almost 4% of the national electric power system capacity (SEN). Nevertheless, most of the current equipment employed is either at the end of its useful life or operates with low efficiency and high generating costs.
- Cogeneration or Combined Heat and Power (CHP) facilities, which are 50% more efficient than the existing facilities for power and steam generation (boilers and turbo generators), represent in the medium and long terms a technical and economical option to replace inefficient or at the end of their lifetime equipments.
- As a result of the “Reforma de Cogeneración” (Cogeneration Amendment), published in January 2006, Pemex has been able to develop new cogeneration projects either by itself or in collaboration with CFE.
- We present the basic elements of the Pemex strategy for optimizing electrical energy use, based on a improved handling of the current electric power generation facilities and the construction of large-scale cogeneration projects.

- In accordance with the National Development Plan and the Energy Sector Program 2007-2012, Pemex established its electricity optimization strategy aimed to achieve the electric power self-supply, to improve energy efficiency and reliability and to reduce operation costs.
- The strategy consisting of the following two steps:
  1. Short term (2009-2012):
    - Transmission of Pemex self generated electric power through the national grid network (“porteo”) for consumption in other work places, reducing power purchases from *Comisión Federal de Electricidad* (CFE) and/or *Luz y Fuerza del Centro* (LFC), achieving self-sufficiency by 2011-2012.
    - To increase the reliability of the CFE and/or LFC grid supply.
  2. Medium and long terms (2012+):
    - Large-scale cogeneration projects :
      - To replace inefficient equipments, some of which are at the end of their lifetime.
      - To sell the electric power surplus to CFE.
- The cogeneration plant at the Nuevo Pemex Gas Processing Complex will be the first large scale Project.

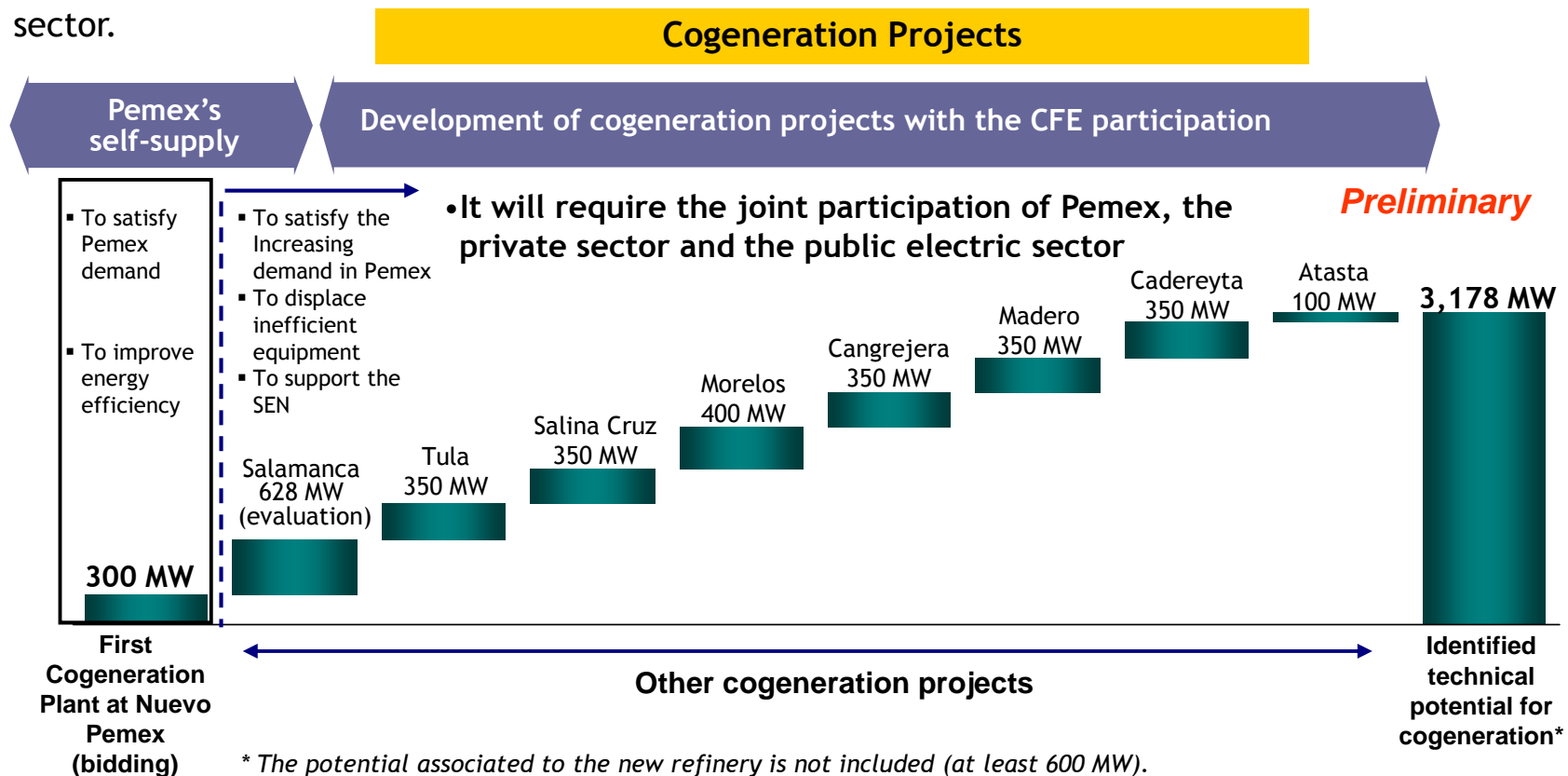
- The strategy seeks to capture the potential for cogeneration with two objectives: Self-supply of Electric power by 2012 and to trade the electric power surplus to the national electric power system (SEN) after 2012.

### Potential for cogeneration

	Description	Timing
 <p>Pemex' self-supply</p>	<ul style="list-style-type: none"> <li>• <b>Cogeneration centered on own needs:</b> To increase the Pemex global efficiency in power and steam supply, to replace inefficient generating equipment. These should be achieved by the development of large-scale cogeneration projects for self-supply purposes.</li> </ul>	<p>Medium and long Term (2012)</p>
 <p>Support the SEN</p>	<ul style="list-style-type: none"> <li>• <b>Cogeneration centered on distributing electricity to the CFE public service grid:</b> To develop the rest of the potential for cogeneration in Pemex in collaboration with CFE.</li> </ul>	<p>Medium and long Term (2012+)</p>

## II. Cogeneration Projects

- The current identified technical potential for cogeneration is greater than 3,000 MW.
- After an extensive technical and economical analysis, Nuevo Pemex was chosen to be the first cogeneration plant for self-supply purposes (300 MW).
- The development of the remaining potential for cogeneration will be focused on selling electricity to CFE and will require the joint participation of Pemex, the private sector and the public electric sector.



### Description

- Construction of a cogeneration plant with gas turbines and heat recovery steam generator (HRSG), via water and natural gas for steam and power generation with the following characteristics.
- It considers two main parts:
  - Cogeneration plant.
  - Transmission lines to interconnect the plant to the national electric power system.
- The project will supply 55% of the steam requirements and all the power needs of the Complex, as well as providing the surplus power (260 MW) to other PEMEX workplaces.

### Technical basis

Net generation (MW):	300 (+/- 15%)
● Local consumption:	40
● Remote consumption:	260
Steam production (t/h):	550 a 800
Plant Factor (%):	95
Gas consumption (Mcf/d):	80
Start up:	2012

### Operation costs savings

- Replacement of inefficient equipment or which is at the end of its lifetime:
  - 10 gas turbo generators
  - 9 steam turbo generators
  - 5 boilers

### Energy efficiency improvement in Pemex

- Fuel consumption reduction:
  - Natural gas                      67 Mcfd
  - Fuel oil                              1 tbd

### Greenhouse gas reductions

- 940 Mton/year of CO<sub>2</sub> discharges
- 7 MUS\$/ year income from carbon credits

As a part of the National Strategy for Climate Change, this project will represent the biggest Clean Development Mechanism (CDM) in Pemex and will be equivalent to about 10% of all the CO<sub>2</sub> reductions of the current registered CDM projects in Mexico.

### Opportunities for Investors (subcontracting)

- The Service Provider for the gas and water transformation into electricity and steam from a cogeneration plant project, corresponds to a similar Independent Power Producer scheme (IPP).
- As in any IPP, the winner may partner with any company that fulfills with the market standards and holds to the established lineaments, in order to supply the gas turbines, the heater or the necessary technologies for the required services to PEMEX, in a analogous way as CFE carries its works, securing the same opportunities in this type of contract schemes.

### Opportunities for Investors (Project Requirements)

- The project involves materials and equipment for the construction, as well as studies and engineering developments, for example:
  - Turbo gas generators (300 MW total net capacity).
  - Heat recovery equipment for 550,000 kg/h.
  - Auxiliary gas compressor and services.
  - Integration.
  - Engineering, studies and permits.
  - Transmission lines.
  - Electric power substations.
  - Water treatment.

### Main activities

The project start up is expected to be in September 2012, 36 months after the signature of the contract (August 2009).

Activities	2008	2009	2010	2011	2012
First information session with companies (February 2008)	●				
Previous revision of technical basis (August 2008)	●				
Letter of convocation (bidding) (August 2008)	●				
Announcement of the winner bidder (July 2009)		●			
Signature of the contract (August 2009)		●			
Plant development (September 2009 - August 2012)					
Start up (September 2012)					●

## II.B Cogeneration Projects : Salamanca

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CFE and Pemex have started the technical and economical studies to carry out the first joint project of cogeneration that will be installed around the Salamanca Refinery area and whose electrical energy will be mainly intended for the public service supply, and the steam for the Refinery's process.

The official CFE document "Programa de Obras e Inversiones del Sector Eléctrico 2009-2018" (POISE), that establishes the expanding program of the national power system for the next 10 year period, considers this initiative in two Phases, starting operations in 2013 and 2016, respectively. The definition of two Phases obeys to the difference in requirements before and after the reconfiguration of the refinery.

SENER, CFE and PEMEX decided to launch the bid process of the project by the end of 2009. It is expected that the first stage of Phase I will initiate operations in November 2012 (gas turbines in open cycle).

## II.B Cogeneration Projects : Salamanca

CFE and Pemex have decided to develop the project under two Phases: the first one previous to the reconfiguration (2013) and the second one afterwards (2016).

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### PHASE I (314 MW \*)

- It considers the current status of the Refinery and additional energy requirements of the clean fuel project.
- For the Refinery, the benefits are based on a cheaper power and steam supply, and for CFE on a cheaper electrical energy for the public service supply. About 662 t/h of steam will be provided by the plant to the refinery.
- The technology to be used will be a natural gas-combined cycle plant.
- The natural gas supply will be satisfied by either the Manzanillo LNG Plant or the Gas Pipeline National System.

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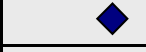




### PHASE II (314 MW)

- It considers the supplementary power and steam requirements of the Refinery Reconfiguration project.
- Possibility of using pet coke.

*\* This capacity is under revision.*

### Main activities

The bid process is expected to be launched in November 2009.

Activities	2009	2010	2011	2012	2013
Project authorizations (February 2009 - January 2010)					
Site selection and technical and economical studies (July 2009)					
Bid process and development					
Letter of convocation (bidding) (November 2009)					
Announcement of the winner bidder (July 2010)					
Signature of the contract (August 2010)					
Start up of gas turbines in open cycle operations (November 2012)					
Start up (April 2013)					

- Petróleos Mexicanos has defined and is implementing its strategy for optimizing the electrical energy use. Thus, the company is carrying electric power generation into the national grid (“porteo”) in order to decrease power purchases to CFE and LFC and developing the first large-scale cogeneration plant at the Nuevo Pemex Gas Processing Complex.
- Once the power self-supply is achieved with the Nuevo Pemex plant, Petróleos Mexicanos will focus on the modernization of old facilities and the development of cogeneration plants to supply electric power to the CFE public service grid (Salamanca and others).
- The planning and development of this kind of projects will need additional well-coordinated and wide-vision studies.
- With these actions, energy efficiency in power and steam generation will be improved in Pemex, cheaper electricity will be available for the CFE public service supply, and the negative effects on the environment will be reduced with the emission reductions associated to cogeneration plants.

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**Annexes**

- Up to February 2009, the Pemex installed capacity of electric power generation is 2,143 MW operating under 53 permits granted by the *Comisión Reguladora de Energía*: 35 of self-supply and 18 of cogeneration.

Subsidiary	Installed capacity (MW)	
	Total	Cogeneration
PR	683	683
PPQ	569	555
PEP	500	138
PGPB	385	202
Corporativo	6	0
<b>Pemex</b>	<b>2,143</b>	<b>1,578</b>