COGENERATION AND SELF-SUPPLY IN MEXICO: OPPORTUNITIES, CONSTRAITS AND PUBLIC POLICY

Odón Demófilo de Buen
Energía, Tecnología y Educación SC

ABSTRACT

The potential for power generation through cogeneration in México has been estimated in more than 10,000 MW. Cogeneration and self-supply are categories considered by the 1992 electricity law. However, only a small fraction of that potential has been exploited, minimizing its many economic and environmental benefits. Barriers for these include the price paid for excess power—defined by law—and the uncertainty of gas prices and supply—determined by the market. Because power sector reform definitions remain uncertain, diminishing investment in infrastructure, improvements in the cost of small generation, the need for distributed generation, the activism of industry and environmental groups and a changing political environment in México are giving higher weight to cogeneration and self-supply as part of the power generation portfolio. This paper explores all of those issues from the perspective of a public policy discussion, and suggests its possible outcomes.

INTRODUCTION

The Mexican economy requires more than an average 2,800 MW of new capacity every year for the next 10 years (1). With more than 43,700 MW of installed capacity at the end of 2003, and an estimated rate of growth of more than 5.0% per year, the state-owned utilities—and the financial backing of the national treasury—have been put great pressure to keep up with this pace (2).

To date, almost all new capacity is being built by the private sector under the terms of the 1992 Public Electricity Service Law, which allows private generators to bid-based on price—for new capacity and sell that capacity and energy to Comisión Federal de Electricidad (CFE, the national utility) under 30 year contracts. These contracts have the backing of the national treasury and, as a result, their growth is putting great pressure on an already constrained and stretched national government budget.

The pressure on the budget—and the financial standing of Mexico as a place for investment opportunities—has led the national government to look for ways to disengage new investments in the power sector from the public sector's budget. As a result, the government proposed a reform of the 1992 Public Electricity Service Law (Ley del Servicio P˙blico de la Energía Elèctrica), which has been under discussions and negotiations since 1998. The terms of the reform—that have been modified several times—have, as its main component, a greater opening of the sector to the private sector, allowing for a spot market and private-bilateral power purchase contracts. Die-hard nationalism, doubts about the results of similar reforms in other parts of the world, strong power-sector unions and a complicated political context after the end of 70 years of a one-party rule in the nation, have put the reform on hold.

Unfortunately, most of the discussion has been focused on the property of the installations in the power sector, ignoring many other aspects of this highly complex industry. One of these aspects, which has gained strength and scope in other places of the world, is the use of the cogeneration opportunities and its positive implications on efficient use of non-renewable resources, greater economic sense, and environmental protection.

Cogeneration is a technological arrangement that allows for greater efficiency in the use of energy and has been around for more than a century. In Mèxico, before the power network reached most parts of its territory, large industrial complexes, such as sugar refineries and paper mills, had cogeneration facilities, but mainly as the only electricity source. The growth of the installed capacity, the extension of the centralized network, the nationalization of the power utilities and a policy of subsidies for electricity, however, resulted in the closure of many of those cogeneration facilities, leaving only a few in operation in the present days.

POTENTIAL IN MEXICO

According to a 1995 study by Mexico's National Commission for Energy Conservation (Conae), the maximum cogeneration potential in Mèxico is above 15,500 MW; this assuming that all of the heat needed in industry comes from heat rejected in the power generation that would take place in these industrial facilities (Table 1). This evaluation was made based on the primary energy requirements for the installations and has only been updated to include the potential in PEMEX oil refining.

Table 1. Cogeneration Potential in Mèxico (CONAE, 2004).

Sector with additional fuel	*Potential (MW)* *Without additional fuel*	
Petrochemical (PEMEX)	1,613	3,026
Chemicals	1,037	1,943
Oil Refining (PEMEX)	786	1,469
Food 755	1,416	
Steel 740	1,388	
Paper	712	1,335
Cement	629	1,179
Other		
Total 8,372	**15,689**	

Source: www.conae.gob.mx/cogeneracion/

A large part of the potential is located in the facilities of Petróleos Mexicanos (PEMEX), the national oil company. Close to 4,500 MW are located in petrochemical plants and oil refineries. The other sectors with the largest potentials are chemicals, food, steel, paper and cement, all of them with more than 1,000 MW potential each.

LEGAL STATUS

Cogeneration and self-supply have legal status in Mèxico since 1992, when a new electricity law was put in place allowing private sector power generators to sell to the state-owned utilities (3). In that law,

which has had some minor changes since first published, there is a definition—in Article 3—of what is not considered public service, and five general categories of generation were defined:

- Self-supply, cogeneration and small production.
- Independent power producers.
- Electricity for export.
- Electricity for import.
- Electricity for emergencies.

For self-supply the law states that associations can be formed if power is to be sold to a third party. This category does not allow sale of power to the grid. For cogeneration, excess power—that has to be justified in terms of the energy needs of the process where it happens—has to be sold to the grid, but is subject to the state-owned utilities' dispatch rules and is based on the short-term marginal cost.

INSTALLED CAPACITY

According to the Energy Regulatory Commission (CRE), as of June 2004, there were 34 cogeneration permits for 2,119 MW (4). Two of these projects—for 484 MW—were inactive, while two others—for 103 MW—were under construction leaving 1,532 MW in operation, at an average of 51 MW per project.

In regard to self supply, as of May 2004, there were 172 permits for a capacity of 4,657 MW, of which 2,100 MW are from plants installed before the 1992 reform, all of which are in operation. Of the rest—2,557 MW—there are 1,544 MW in operation, 816 MW under construction and one for 197 MW that has no activity. Also, of the 1,544 MW under operation, four major plants with more than 100 MW add up to 1,260 MW, leaving only 281 MW in 68 plants, for an average of 4.1 MW per plant, most of which operate with internal combustion engines.

BARRIERS

Conae has been promoting cogeneration since it was created in 1989. Through the sponsorship of many energy audits, the preparation of

the National Cogeneration Potential in 1995, the organization of dozens of regional seminars, and the collaboration in the organization of a yearly international seminar, Conae has tried to convince those who could invest in cogeneration installations to do so.

Also important, Conae integrated in 1996 an expert's group (known as the Subcomisión de PromociÛn de Proyectos de Cogeneración) to identify barriers to cogeneration and ways to overcome them. This group has had the participation of more than 30 private and public organizations and has met more than 30 times. The group has also integrated documents identifying barriers to the full development of the cogeneration potential. In 1998, in work done in direct collaboration with the Energy Secretariat, the following barriers were identified (5):

- Non-compliance of the authorities with, at least, seven articles of the Electricity Law.
- Discretionary use of authority given the lack of public information on generation costs by CFE plants and the dispatch rules.
- Limits to the capacity for sales of excess power without having to go into a bid process.
- The fact that the sale of excess power to the grid is subject to dispatch rules.
- Specific requirements in bids for new capacity, such as location, fuel and union.
- Differentiated procedures to define prices of power in favor of CFE and against cogeneration facilities.
- Lack of certainty in supply and prices of fuels.
- Lack of certainty in contracts with CFE and PEMEX
- High transaction costs.

This document, however, was finalized just days before the Energy Secretariat presented to the general public the first version of a power

sector reform, which proposed very drastic changes in the way the sector operated and in the ownership of the main elements of the system. This proposal included a new law that required changes in the Mexican Constitution to allow for private generators to have power-purchase contracts with private end-users. That meant that the discussion on cogeneration had to be put on hold, as something with greater importance—and much greater scope—to the federal government had to be dealt with.

THE POLITICAL PROCESS

A second document on barriers to cogeneration, prepared in December of 2001, showed that some of the identified barriers had been eliminated but some of the most fundamental remained, such as the fact that the sale of excess power to the grid is subject to dispatch rules (6).

In 2002, in an attempt to bring in new private capacity to the system without having to change the electricity law and/or the Constitution, the Energy Secretariat changed the rule of the electricity law that defines the capacity limits to the sale of excess power, without having to go into a bid process with CFE, from 20 to 40 MW. This change was challenged by members of the Senate opposed to the power sector reform who asked for a review by the Supreme Court of the rule change, on the grounds that the executive branch was overextending its authority into aspects that were legislative. The Supreme Court reviewed the challenge and ruled that the change in the rule of the Law was non-constitutional, so it was not valid and had to go back to the same terms as before.

This ruling, furthermore, contained an opinion that has been a major barrier to any other further changes in the electricity law and its rules. In the opinion of Mexico's Supreme Court, the 1992 law was against the constitution, specifically against Article 27 that defines public service. As the challenge was not on the law—but in a rule of the law—the Supreme Court could not rule to change the law. It was, however, a warning that any—even minor—changes in the law could lead to declare the whole law illegal, thus affecting the status of the private generators, in particular the independent power producers who have several thousand megawatts installed and in operation based on the 1992 law.

POLICY INITIATIVES

With the reform on hold and little room to move in the regulatory arena, an initiative to promote cogeneration in PEMEX has been generated in the Senate and is now waiting approval in Congress. This initiative, via changes in the PEMEX law, facilitates the sale of power from the state-owned oil company to the state-owned power utilities. According to PEMEX, there is a 4,000 MW potential for power generation, with 1,400 MW to be used in self-supply and 2,600 MW to be sold to the grid (7). Most of this potential is in the oil refining plants (2,645 MW).

The problem with this initiative—which seems to have enough political support to become law in the next legislative cycle—is that it only promotes the state-owned generation and leaves behind opportunities that may be much greater in private installations. Also, the fact that this generation is large and centralized, does not have the benefits of distributed generation by private generation in urban centers could provide.

Another initiative, presented in the Senate in April of this year (2004) and proposing to eliminate self-supply as a category in the law, responds to an audit performed by the Congress' auditors early this year. In this audit, the so-called AuditorÌa Superior de la Federación (ASF) analyzed the permit process in CRE and the Energy Secretariat (SENER) and concluded that there were procedural irregularities in some of the cogeneration and self-supply permits. Also, it refers to abuse in the self-supply category as a way to by-pass the electricity law and the Constitution. Furthermore, in an opinion that does not lead to changes of the electricity law—but affects public perception on the status of private power generation—the ASF stated that it considered the 1992 Public Electricity Service Law as non-constitutional.

These two initiatives show the tendency against private power-generation in general and cogeneration in particular. This comes together with a process of personnel changes in SENER—which has had three different secretaries in the last year—leading to a situation that has left the political initiative in Congress and the Senate.

OTHER INITIATIVES

Given the lack of leadership in the political arena in favor of private cogeneration, a group of engineers and entrepreneurs involved in cogen-

eration and self-supply projects has decided to get involved in the political process. This is a group that has been part of Conae's Subcomisión but that has understood that Conae, given the fact that it is part of the executive branch and has to follow the lead of SENER when dealing with Congress, is very limited to lead a process in favor of private cogeneration.

This new group involves consultants, equipment manufacturers, and project developers, so there are particular interests that have to be taken into account. One of the main concerns of the group is what position to take on excess power. To some, it is a secondary issue because what they have as customers are those who want to have self-supply. To others, the issue is how to get CFE to buy excess power at a price that pays the cost of the additional investment for such excess power. Also important to some members of the group are the rules that define natural gas' prices, in particular de fact that the price in México has the South Texas price as a reference.

To be successful, this group will have to find a common ground to focus on to get both the public and the political attention needed to change what is needed.

CONCLUSIONS

The Mexican economy could benefit from cogeneration and power self-supply. Even though it is allowed under Mexican law, regulations are not favorable for most projects and very little of its potential has been exploited. This is mainly because excess power is subject to dispatch, that power purchase prices by the state-owned utilities are not attractive to recover capital investments and that the price of natural gas is too high. Also, the political process resulting from a series of failed attempts to reform the power sector has complicated the situation, and new initiatives go against what was gained with the 1992 Public Electricity Service Law. Furthermore, the frequent changes in SENER have diminished its capacity to lead the changes necessary. It is in this context that the emergence of a group of non-governmental stakeholders is a positive development that could change the dynamics of the political process in favor of private cogeneration and self-supply.

References

(1) SENER, 2004. Prospectiva del Sector Elèctrico 2003-2012
(2) www.cfe.gob.mx
(3) Ley del Servicio P˙blico de la Energía Elèctrica. 1993.
(4) www.cre.gob.mx
(5) CONAE, 1998. Propuesta de Medidas para el Fomento de la Cogeneración. Subcomisión para la Promoción de Proyectos de Cogeneración.
(6) CONAE, 2004. Propuesta de Medidas para el Fomento de la Cogeneración. Subcomisión para Promover Proyectos de Cogeneración. Conae. December.
(7) PEMEX, 2004. Evaluación del proyecto de cogeneración en PEMEX. Dirección Corporativa de Planeación Estratègica. PEMEX. Power point presentation. February.

ABOUT THE AUTHOR

Odón de Buen Rodríguez has a Bachelor's degree in mechanical-electrical engineering from Mexico's National University and a Master of Science degree in energy and resources from the University of California at Berkeley. Mr. De Buen has 20 years of professional experience working for public and private organizations in Mexico, the United States and Canada in the areas of research, design and implementation of energy efficiency and renewable-energy projects and programs. He was in charge of Mexico's National Commission for Energy Conservation for 7-1/2 half years. He is now an international consultant and presides over his own firm (Energía, Tecnología y Educación). His e-mail is: demofilo@prodigy.net.mx