MEXICO IN MISSION INNOVATION

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MAY 2016

INTRODUCTION

The world has strived to improve how we generate energy from renewable sources, and various countries are conducting research in different fields of science to address the main global climate challenges. To reach our ambitious global sustainability objectives we must work as a team in the fronts of knowledge and technology-sharing.

Throughout the first decade of the new millennium, these ideas have spread among emerging countries and have caused them to act accordingly. Mexico's response to these challenges was the creation of the Energy R&D Funds in 2008, which by law were set to be the engines that strive to reach a level of research and technology development that allows the country to address the great challenges in the energy sector, including climate change and a greater demand for energy resources.

These Energy R&D Funds are jointly led by the Ministry of Energy (SENER) and the National Council on Science and Technology. The Energy R&D Funds receive federal contributions each year, derived from the Federal Income Budget Law, which stipulates that 0.65% of oil revenues shall be divided among the Energy R&D Funds and the Mexican Institute of Petroleum.

THE ENERGY SUSTAINABILITY FUND (FSE)

Mexico has two Energy R&D Funds, the Hydrocarbon Fund and the **Energy Sustainability Fund (FSE)**. The former, funds activities related to technological development and training on hydrocarbons whilst the latter is the main funding scheme for clean energy technological developments in Mexico. The objective of the FSE is to fund and support scientific research, technology development, innovation, IP registration, talent development, scholarships, research groups, diffusion and technology deployment in the following areas: energy efficiency, renewable energies, clean energies and diversification of the energy matrix.

The FSE allocates its resources through calls for proposals. The FSE has published 26 calls for proposals since its creation in 2008. As a result, the FSE has approved 118 projects, with many more projects currently in the evaluation process.

DOUBLING COMMITMENT

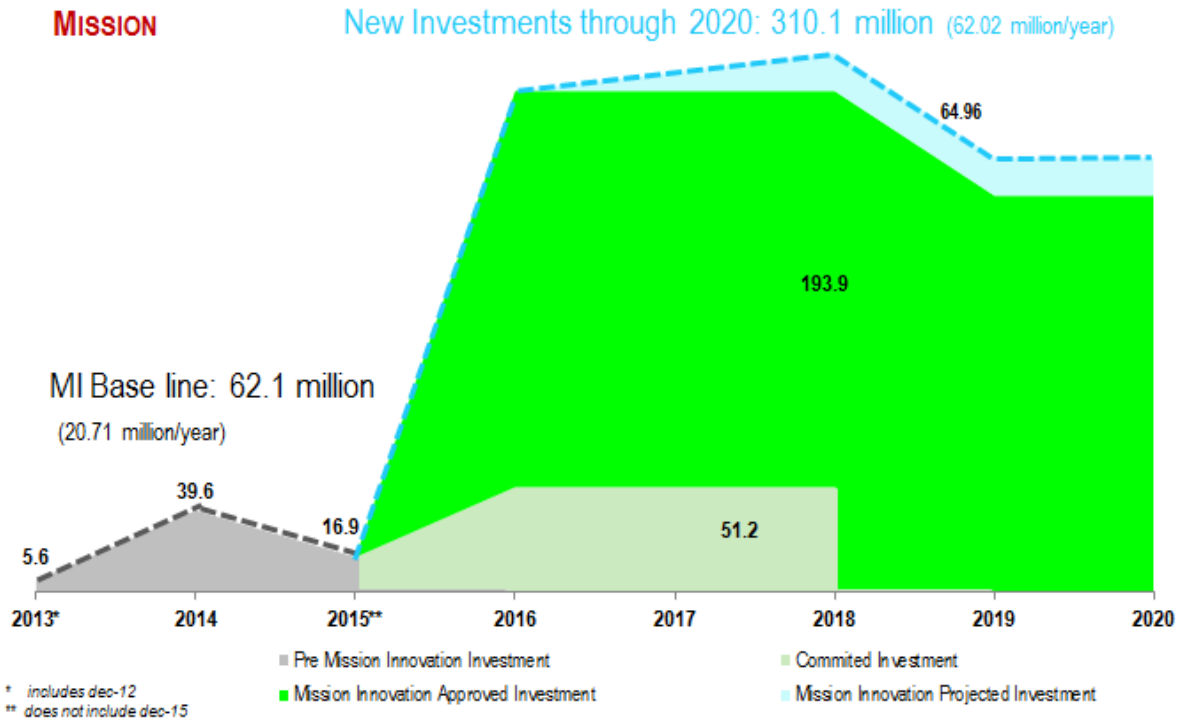
Mexico's integration to Mission Innovation comes with the commitment to double the investment in clean technologies research and development. Mexico hereby reaffirms its commitment adopted in Paris on November 30th, 2015 and plans to **more than double its investment in** clean technologies R&D over the next five years.

HOW WILL WE GET THERE?

Mexico´s baseline with respect to the Mission Innovation commitment is defined by the investments made through the Energy Sustainability Fund (FSE) over the three-year period prior to Mexico's integration to Mission Innovation, from the 1st of December 2012 to the 30th of November 2015.

Over this baseline period, 63 projects were funded by the FSE, for a total of $62.1 million USD[1] (***Pre Mission Innovation Investment***), which represents $20.71 million USD on average per year for the three-year period.

The graph below (Graph 1) shows the clean energy R&D investment level aimed for the next five years (starting from 1st of December 2015), compared to the $62.1 million USD established as our base line. Mexico plans an investment for clean energy R&D of $310.1 million USD by 2020. Therefore, the clean energy R&D investment will be doubled by 2017.



Graph 1: Accumulated investment

[1] All figures in this document are in millions of dollars. Since México's internal operations are cashed in Mexican Pesos, an exchange rate of $17.51 pesos per dollar was used to convert the figures to USD.

WHAT IS BEHIND THE $310.1 MILLION INVESTMENTS?

The $310.1 million investment for the next five years is comprised of Committed Investments (for expenditures of ongoing projects), Approved Mission Innovation investments (for projects approved after joining Mission Innovation) and of Projected investments for the years after the joining date of Mission Innovation.

The FSE has ***Committed Investment*** for ongoing projects that will be invested through 2018; these resources add up to $51.2 million USD, and primarily include the activities of the three major projects of the FSE so far: the first three Mexican Energy Innovation Centers (CEMIEs), which aim to develop market-ready services and technology in geothermal, solar and wind energy.

In addition, the FSE has 47 projects ready to start on 2016, from these, two are particularly noteworthy: the CEMIE for Bioenergy and the CEMIE for Ocean Energy. There is also approved funding for 26 projects that seek to support institutional strengthening for talent development, research collaboration and market-ready technology development. Furthermore, the FSE has resources set aside for projects related to specific areas, such as the new CEMIEs for Carbon Capture, Utilization and Storage (CCUS) and Smart Grids. Funding has also been allocated for collaboration with foreign enterprises on Enhanced and Super-Hot Geothermal Systems and for technology development, allowing for the greater market diffusion of the technology. All these resources were approved after Mexico joined Mission Innovation and are labeled as ***Mission Innovation Approved Investment***, and add up to $193.9 million USD.

Finally, there is a third part counted in under our planned investment, referred to as the ***Mission Innovation Projected Investment***, which represents the future contributions that the FSE receives on a yearly basis, and that will be allocated to confront future challenges that may arise for the energy sector; the projected resources amount to $64.96 million USD.

The total investment for the five years after the date of joining Mission Innovation then is:

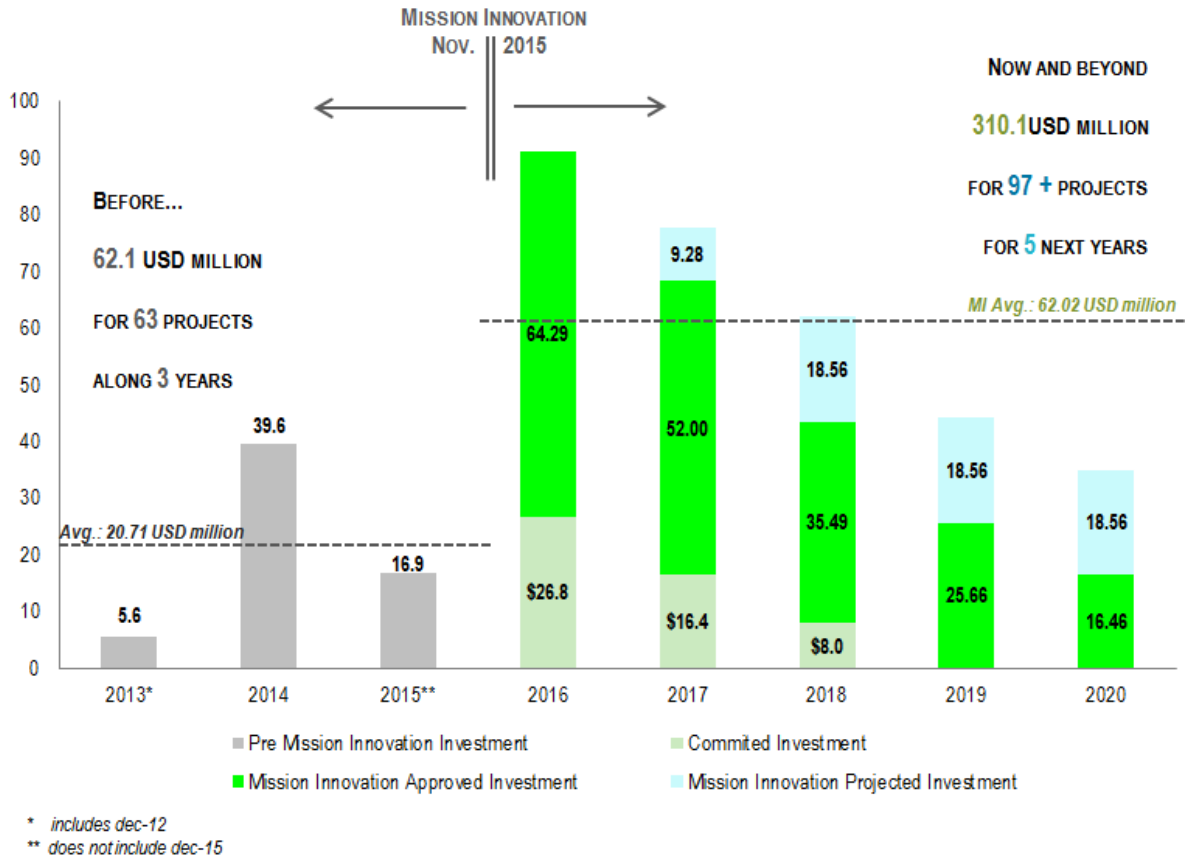
Committed Investment + ***Mission Innovation Approved Investment*** + ***Mission Innovation Projected Investment***

51.2 + ***193.9*** + ***64.96*** ≈ **$310.1 million USD**

The $310.1 million USD investment in clean energy R&D represents an average of $62.02 million USD per year for the five year period after joining MI. Seen on a yearly basis, the projected cashflow for these investments appear as follows:

Year	Pre Mission Innovation Investment	Commited Investment	Mission Innovation Approved Investment	Mission Innovation Projected Investment	TOTAL
2013*	$5.6				$5.6
2014	$39.6				$39.6
2015**	$16.9				$16.9
2016		$26.8	$64.29		$91.1
2017		$16.4	$52.0	$9.28	$77.7
2018		$8.0	$35.49	$18.56	$62.1
2019			$25.66	$18.56	$44.2
2020			$16.46	$18.56	$35.0
TOTAL	**$62.1**	**$51.2**	**$193.9**	**$64.96**	**$372.2**

Table 1: Cashflow by year by category



Graph 2: Investing Cashflow

If seen in accumulative figures (Graph1), we can compare the investments for the next three years against the established baseline, obtaining a 3.49 increase ratio and for the five-year period after joining MI, an increase of 4.99 times against the baseline.

If seen on a yearly average comparison, the average investment for the baseline period is $20.71 million/year, and our planned projected investment average for the three years after joining MI is $76.9 million USD per year, resulting in an increase of 3.71 times. When we consider the five-year period after joining MI against our average baseline, the investment for the next five years averages $62.02 million a year, representing a 2.99 times increase over the baseline average (see Graph 2), increasing nearly threefold.

Energy R&D Centres

The establishment of Mexican Energy Innovation Centres (CEMIES) represent the largest projects that are currently being developed on clean energy R&D in Mexico.

The CEMIES are expected to provide a platform to launch and grow an unprecedented portfolio of low carbon activities, through a guaranteed 4 years funding scheme to deliver low carbon innovation.

- CEMIE Geothermal ($23.6 million)
- CEMIE Wind (6.6 million)
- CEMIE Solar (9.9 million)
- CEMIE Ocean (19.8 million)
- CEMIE Bioenergy (40.1 million)
- CEMIE CCSUS (28.6 million)
- CEMIE Smart Grids (25.7 million)

INTERGOVERNMENTAL COOPERATION

As part of the growing interaction with global entities, which quickly developed into collaboration agreements, memorandums of understanding (MoU) or other similar tools; the FSE has been working with international partners for several years.

The first formal interaction between Mexican and international institutions, under the Fund's framework, was a MoU with the Inter-American Development Bank (IDB) signed in 2011, with the objective of setting a non-exclusive framework that allowed cooperation and joint collaboration between Energy Secretariat and the bank, particularly to identify, asset and track innovative projects related to energy efficiency, renewable energies, clean energies and primary sources diversification. Under this framework the FSE published two joint calls with the IDB, which translated into four projects in 2011 and two more that will begin operations this year.

Last year, the FSE began to expand its collaboration efforts with European counterparts, publishing two calls that include joint financing between the Fund and its European counterparts.

The first call was designed with the British agency Innovate UK, and aims to promote the competitiveness between countries, accelerating the commercialization process of technology development that benefits both, focusing on supporting education institutions and research centers working collaboratively with enterprises of any size working on activities in the Industrial Research, Experimental Development and/or Pre-competitiveness Development phases of the Technology Readiness Level (TRL) scale. This call will provide funding for projects that may begin operations next year.

The second call focuses on cutting edge geothermal research, specifically on Enhanced (EGS) and Super-hot (SHGS) Geothermal Systems. This joint collaboration worth 20 million euros, was developed with the European Commission, through the Horizon 2020 Programme and seeks to support two-headed projects led by one Mexican and one European Institution; the evaluation process for this joint call included the participation of international experts that assessed the viability of both projects, which will engage their research and innovation activities in Mexican geothermal fields. As the previous call, the activities of the winning projects will begin in 2017.

ENGAGEMENT WITH PRIVATE SECTOR

Mexico is changing its former ways of doing things with respect to energy sector; for years the exploration, generation, distribution and sales of energy were controlled by the Mexican State; however, with globalization allowing the sharing and implementation of research and technologies, it has become clear that centralization of energy generation was limiting the advancement of the country's production capabilities, and even more on the research and development front. At the end of 2013, an Energy Reform took place in our country, changing the paradigm and transforming the energy sector from a centralized system to a more distributed and competitive ecosystem. The Energy Reform can be seen as a turning point towards competition in the energy markets and an interest into investing in renewable energy and clean technology.

One of the changes, that derived from the Energy Reform to support private sector engagement in clean energy developments is that the FSE is now able to support projects on research and technology development led by private enterprises as long as these projects are aligned with objectives of the Fund. The calls that will follow in the years to come will be designed to support both public and private actors, allowing the country to accelerate on the development of the energy sector.

One example of private sector collaboration is a recent FSE funded project related to the Bioenergy Mexican Innovation Centre (CEMIE-Bio) that focuses its efforts on Bio-Jet Fuel generation; this project includes the participation of one of the largest aircraft manufacturing companies in the world, Boeing, as well as the participation of both, the largest airline and airport operator in Mexico: Aeromexico and ASA respectively; all of whom provide a larger part of resources than those allocated by the fund. This is an example of an unprecedented collaboration between government, industry and the academic sector in our country that shows that valuable collaborations between institutions and firms could be generated throughout this process.

Mexico acknowledges the important role of the private sector in order to accelerate the commercialization of clean energy technology and therefore welcomes the activities pursued by Mission Innovation countries as well as the Breakthrough Energy Coalition to spur private sector engagement into the research and development of clean energy.