MÉXICO

The Solar Industry
Roadmap for Mexico

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Mario Monsreal, PROMÉXICO Germany

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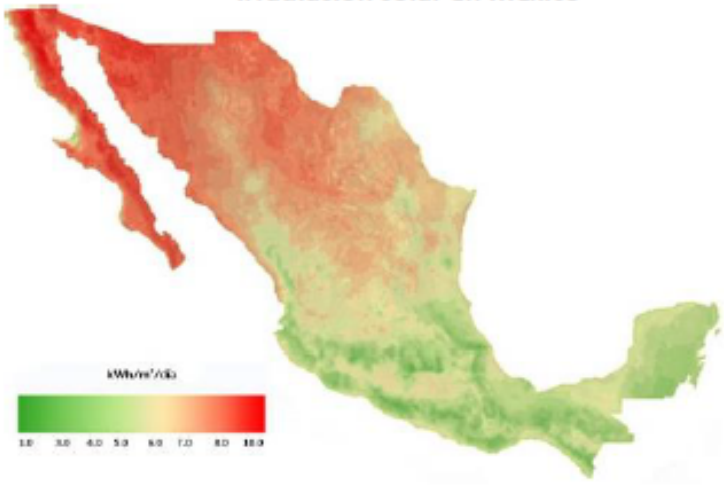
Solar Industry

SOLAR POWER

Given the geographic location of Mexico, it is ranked as the third most attractive country in the world to invest in photovoltaic solar energy projects, only behind China and Singapore.

The average daily solar irradiation during the year is 5.5 kWh / m2, and can present values higher than 8.5 kWh / m2

Irradiación solar en México



If high levels of irradiation were used in Mexico, solar energy could be one of the main sources of supply for the country. The regions of the northeast and north of the country have the highest insolation of the national territory.

According to INER, the solar resource has a generation potential of **6,500,000 GWh.**

Source: Prospectiva de Energías Renovables 2013-2027 / National Inventory of Renewable Energies, SENER. *Month of June

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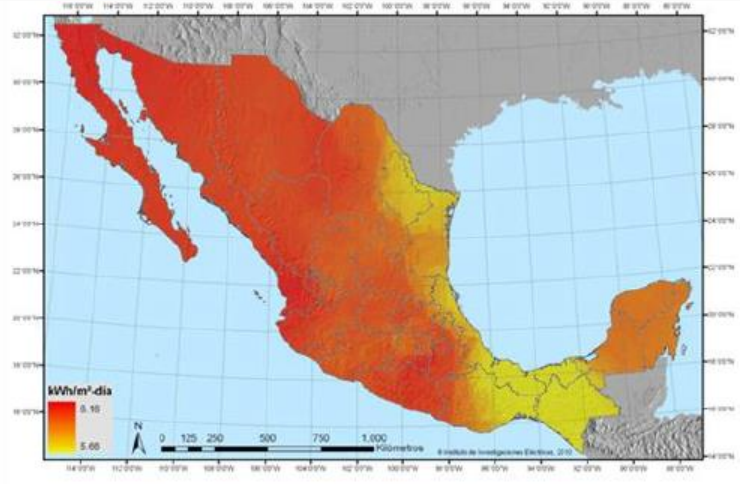
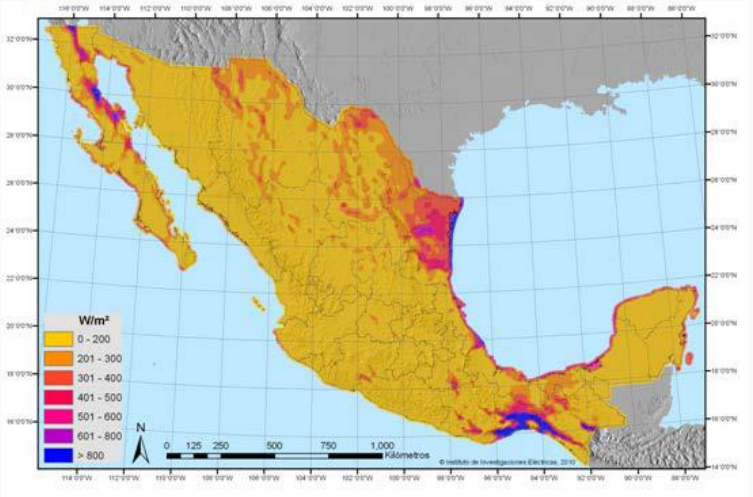
Energy Generation in Mexico

Solar power



Wind power

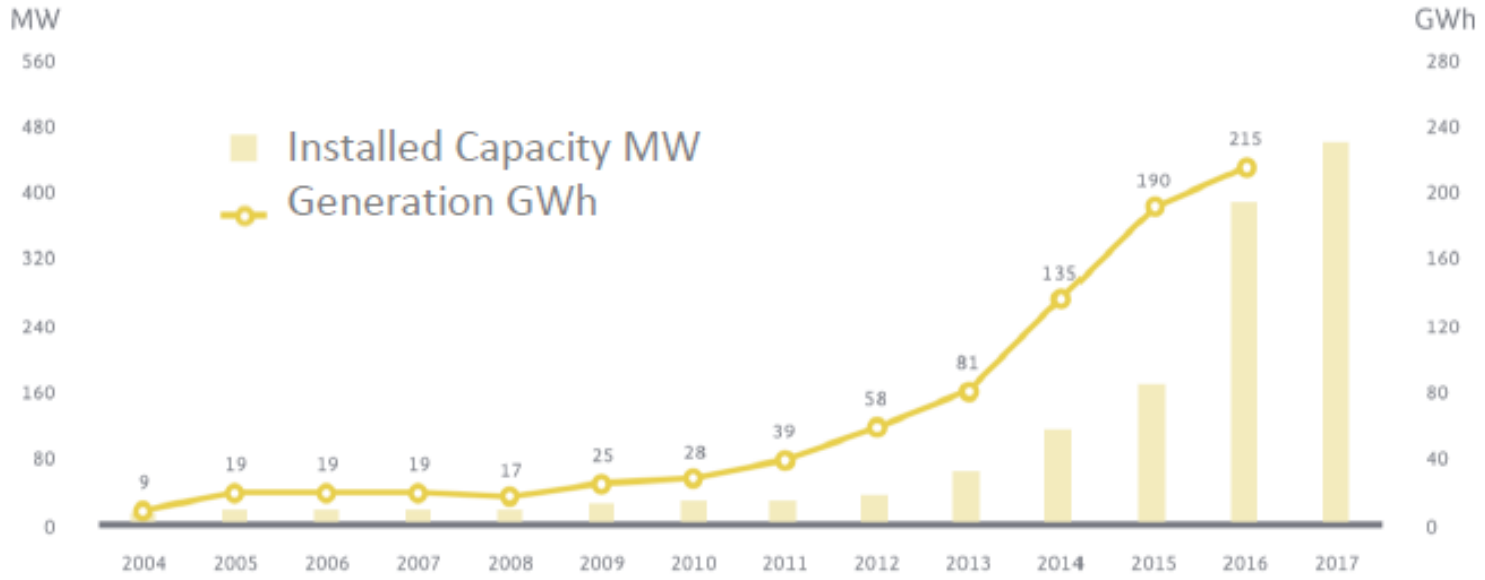


Geothermic power

HISTORICAL EVOLUTION OF SOLAR ENERGY

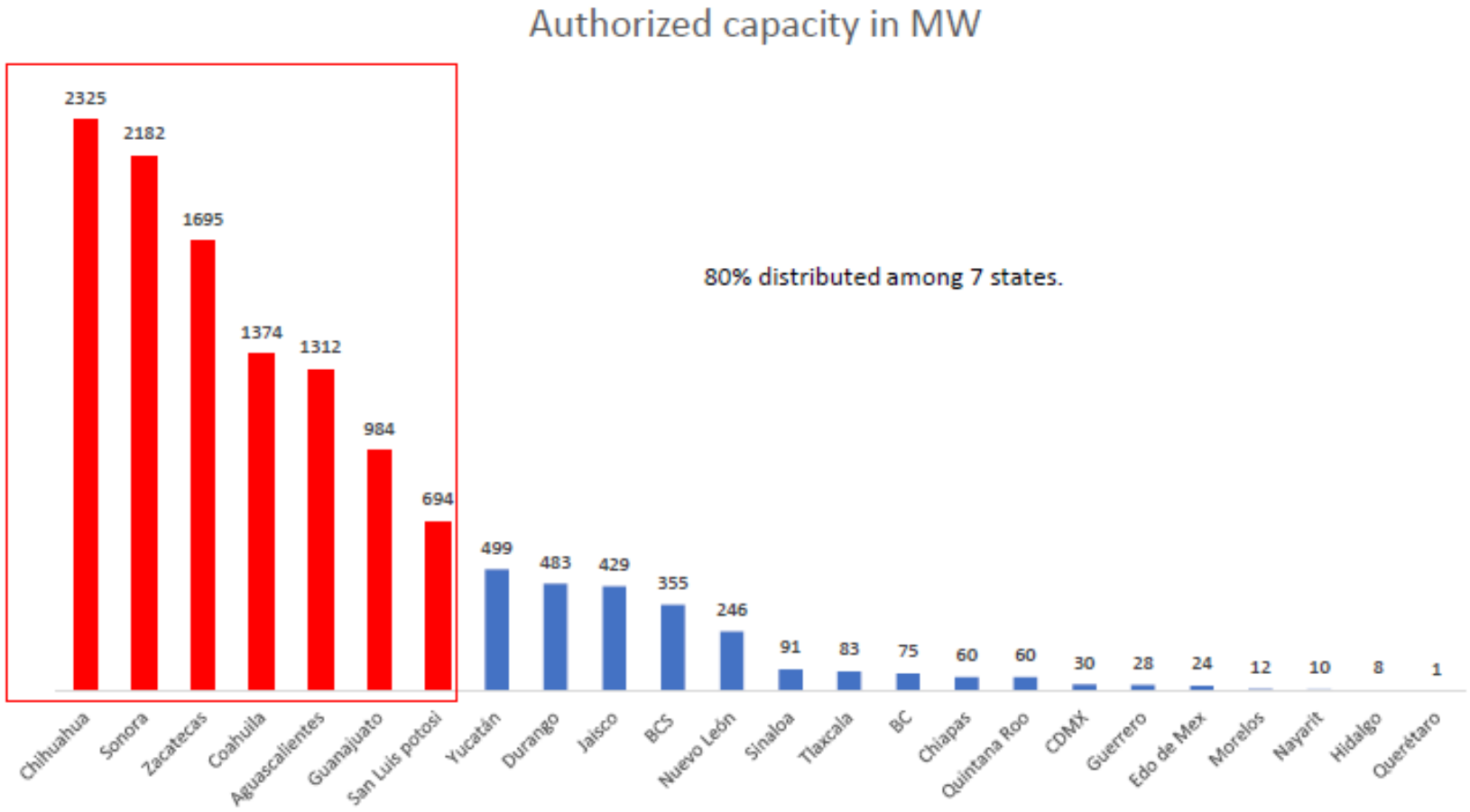
This type of energy represents 0.62% of the total capacity in the country. The average annual rate of growth in power generation from this source has been 30.5% since 2004.

In the last six months the installed capacity in photovoltaic projects grew by approximately 190.60 MW, which represents an increase of 70.56%. It is expected that by the end of 2019, 5400 MW of capacity will be added (24 times the annual capacity), considering the capacity additions of new plants, as well as the winning projects of the first and second auctions that will contribute 1691 MW and 1852 MW respectively.



Fuente: Reporte de Avance de Energías Limpias Primer Semestre 2017

AUTHORIZED GENERATION PERMITS: SOLAR



Source: Electric power generation and import permits administered as of July 31, 2017 CRE

At the end of 2016 the installed capacity of photovoltaic solar energy in operation reached 349 MW, until July 2017 the CRE has registered more than 13,000 MW in solar energy projects of which 17% are under construction, 74% by start works and 9% in operation.

Projects authorized by CRE for solar power generation until July 2017

State	Estimated Investment (MDD)	# of proyects	Under Construction	To begin Construction	In operation	Total
			MW			
Chihuahua	3,242	54	373	1,932	20	2,325
Sonora	2,961	53	452	1,730		2,182
Zacatecas	2,242	14	30	1,525	140	1,695
Coahuila	2,030	20	130	1,244		1,374
Aguascalientes	1,622	15	120	1,191	1	1,312
Guanajuato	1,400	25	119	1	864	984
San Luis Potosí	859	6	324	370		694
Yucatán	699	10	40	459		499
Durango	587	21	144	218	121	483
Jalisco	567	18	71	359		429
Baja California Sur	532	16	195	129	31	355
Nuevo León	389	6	2	244		246
Sinaloa	136	4	60	30	1	91
Tlaxcala	88	1		83		83
Baja California	103	4		74	1	75
Chiapas	70	2	30	30		60
Quintana Roo	69	2		60		60
Ciudad de México	54	1	30			30
Guerrero	42	1		28		28
Estado de México	36	3	19		5	24
Morelos	28	1	12			12
Nayarit	15	1		10		10
Hidalgo	10	1	8			8
Querétaro	2	1	1			1
Total	17,782	280	2,160	9,716	1,184	13,060

ource: Electric power generation and import permits administered as of July 31, 2017 CRE

MANUFACTURING CAPACITY

Mexico has the largest photovoltaic module manufacturing base in Latin America, with an annual production capacity of more than **1,427 MW.**

Among the main developers of photovoltaic energy are: Gauss Energy, Dragon Group, Sonora Energy Group, Enercity Alfa, and Eosol Energy.

Manufacturing companies of photovoltaic modules 2017

COMPANY	Country of origin	Production capacity MW	LOCATION
Baja Sun Energy SA de CV	Mexico	100	Baja California
ERDM Solar SA de CV	Mexico	200	Veracruz
IUSASOL SA de CV	Mexico	125	Estado de México
Solartec SA de CV	Mexico	172.5	Guanajuato
Risen Energy	China	400	Durango
SunPower Corp	USA	425	Baja California
SOLAREVER	Mexico	30	Querétaro
SOLARSOL	Mexico	20	Yucatán
SAYA Solar	Mexico		Aguascalientes
Total		1,472.5	

Source: BNEF 2017.

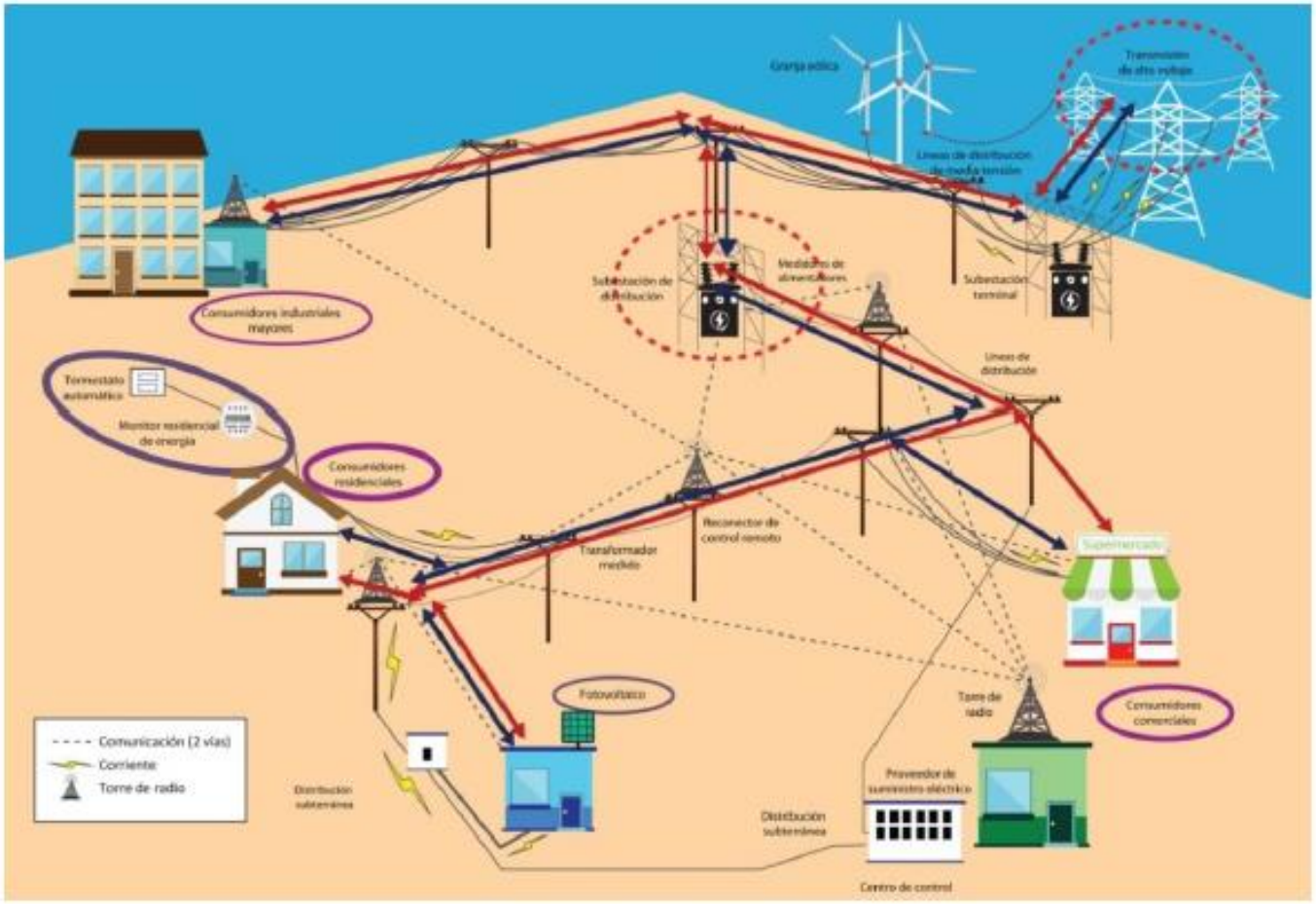
DISTRIBUTED GENERATION

The distributed generation in Mexico has had a very dynamic growth, reaching close to 120 MW installed at the end of 2015 in legacy interconnection contracts.

The CRE estimates that distributed generation could reach an installed capacity close to 2.2 GW by the year 2022, a figure that, prior to the energy reform, was expected to reach until 2028.

Source: SENER 2016-2030 Renewable Energy Outlook

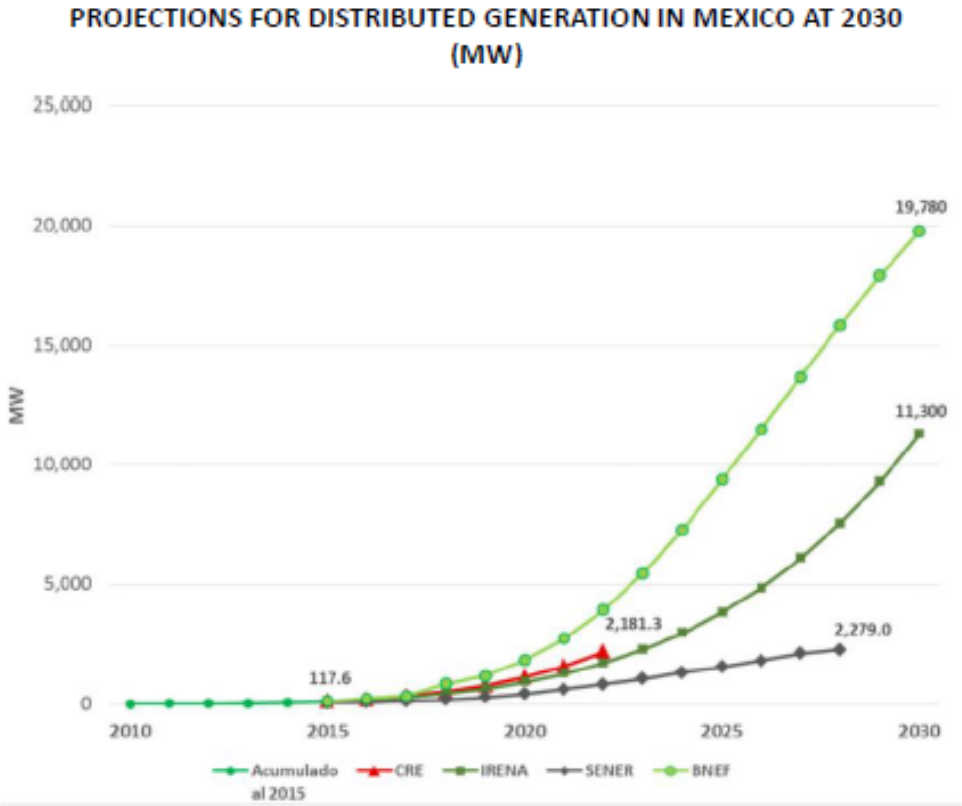
- **Bidirectional electricity** flows create value, consumer choice, operation of complex networks and cybersecurity.



Fuente: Subsecretaria Electricidad, SENER, Agosto 2017.

PROJECTION IN DISTRIBUTED GENERATION

According to estimates made by the International Renewable Energy Agency and by Bloomberg New Energy Finance, in conjunction with SENER and CRE, that Mexico has the potential to install between 11,300 and 19,780 MW by the year 2030 in photovoltaic solar systems in generation distributed



Source: SENER 2016-2030 Renewable Energy Outlook

MEXICO AMONG THE MOST ATTRACTIVE COUNTRIES FOR INVESTMENT IN SOLAR ENERGY

According to the latest report by Ernst & Young, Mexico ranks as the fourth most attractive country for investment in solar energy projects, only for low-income China, India and Germany.

2017	Country	RECAI Score
1	China	55
2	India	53
3	Australia	50
4	Mexico	49
5	United States	46

Source: EY RECAI 2017

Photovoltaic solar industry in Mexico Thin Film
(Number of Companies)

Raw material (silicon)	Ingots	Wafers	Cells	Modules	Balance of Plant	Project development	Instalation
			3	3	8	79	25

Photovoltaic solar industry in Mexico Silicon Cristalino
(Number of Companies)

Raw material (silicon)	Ingots	Wafers	Cells	Modules	Balance of Plant	Project development	Instalation
			2	3	1	77	25

Solar Thermal Industry in Mexico
(Companies)

Manufacture	Engineering	Project development	Instalation
1	9	78	2

Fuente: BNEF 2017

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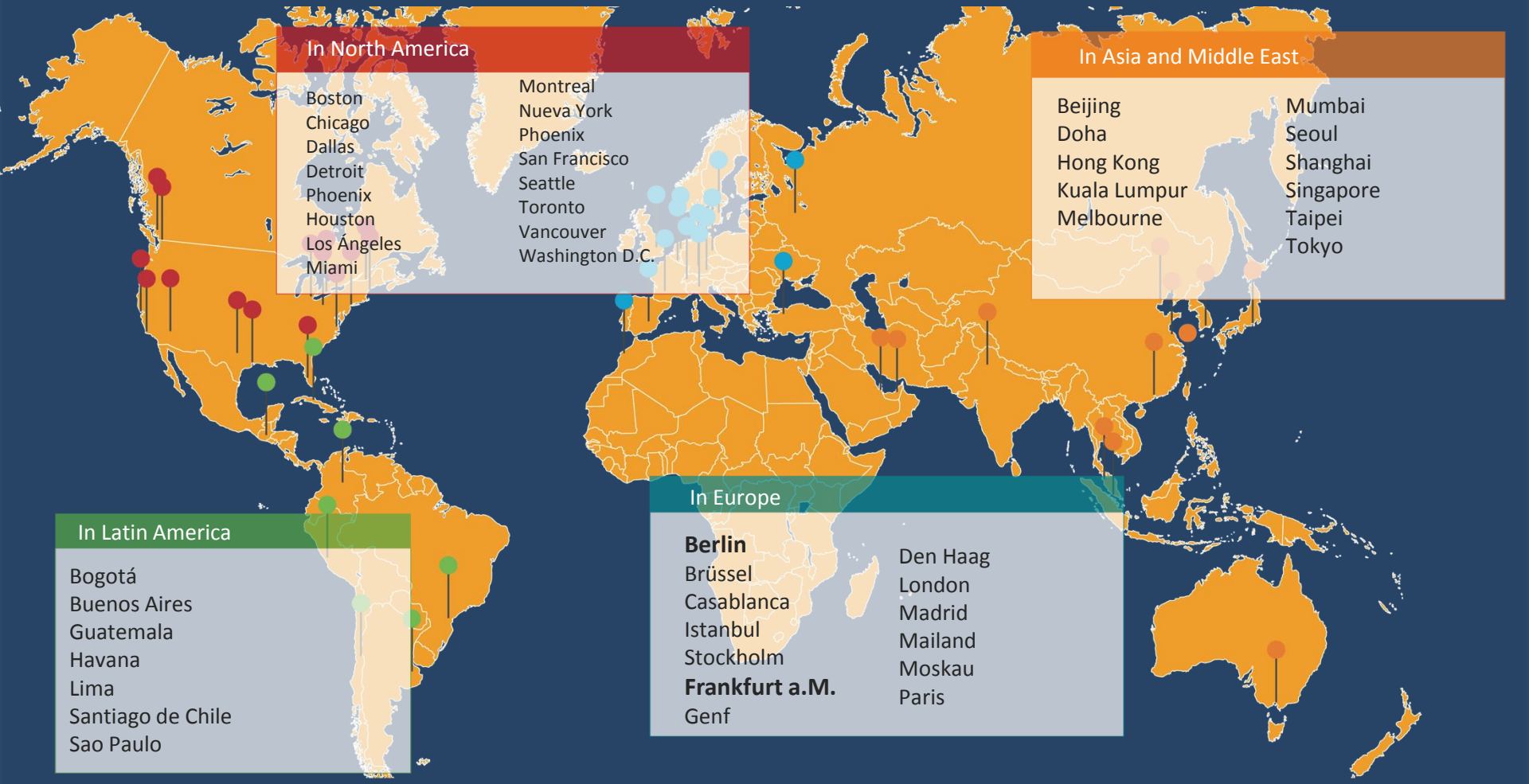

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PRO MÉXICO
Inversión y Comercio

www.promexico.gob.mx

mario.monsreal@promexico.gob.mx

@ProMéxico

+49 (69) 97 26 98-31

Taunusanlage 21

60325 Frankfurt a. M.

Deutschland