RENEWABLE ENERGY AND ELECTRIFICATION

A NEW DEVELOPMENT PLAN FOR MEXICO



Mexico's Long Term Auctions

First Auctions

2085 megawatts @ 2018 47.7 USD/MWh Average LCoE Solar: 1,681; Wind: 394 MW

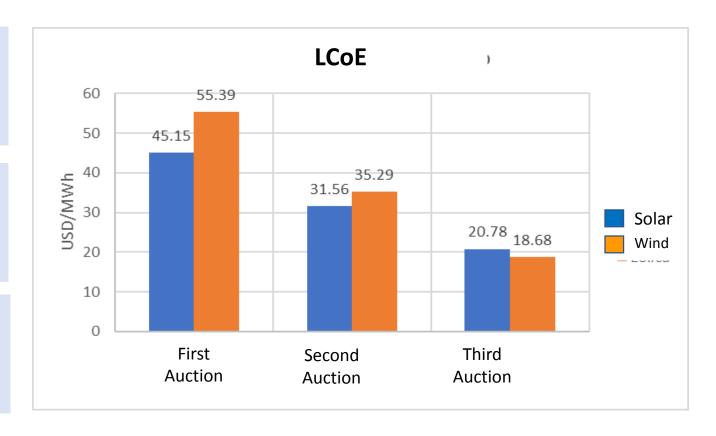
2.6 billion USD.

Second Auction

2891 megawatts @ 2019 33.4 USD/MWh Average LCoE Solar: 1,853; Wind: 1,038 MW 4.0 billion USD.

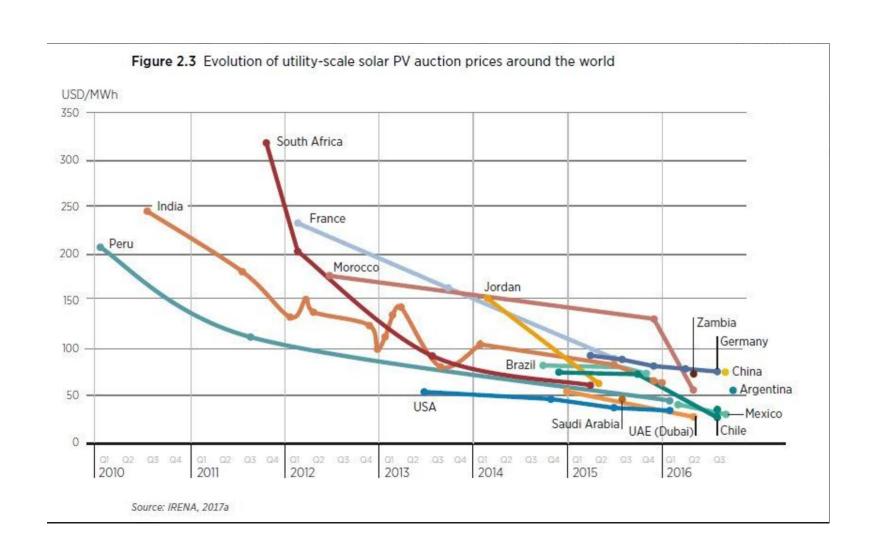
Tercera Subasta

2562 megawatts @ 2020 20.5 USD/MWh Average LCoE Solar: 1,419; Eólica: 689 2,400 millonesUSD.



...and the fourth?

Auction Results for Several Countries

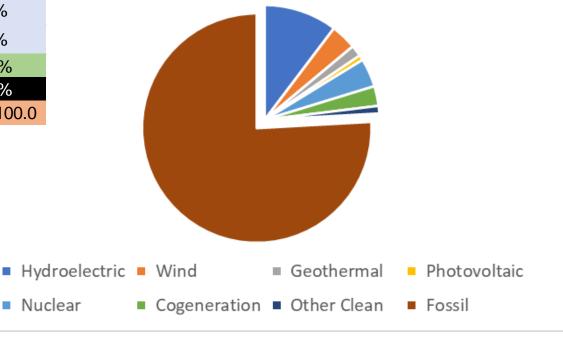


First Half, 2018				
Technology	Capacity MW	Capacity %	Gross Gen. GWh	Gross Gen. %
Hydroelectric	12,598.1	16.5%	17,307.6	10.3%
Wind	4,367.3	5.7%	6,093.0	3.6%
Geothermal	925.6	1.2%	2,676.9	1.6%
Bagasse	865.4	1.1%	1,365.8	0.8%
Photovoltaic	1,646.6	2.2%	1,204.5	0.7%
Biogas	217.2	0.3%	378.8	0.2%
Hybrid	-	0.0%	-	0.0%
Cogeneration	1,834.8	2.4%	4,679.7	2.8%
Nuclear	1,608.0	2.1%	6,744.9	4.0%
Black liquor	22.5	0.0%	45.5	0.0%
Brakes	6.6	0.0%	2.4	0.0%
Subtotal Clean	24,092.1	31.6%	40,499.1	24.1%
Fossils	52,043.6	68.4%	127,394.1	75.9%
Total	76,135.7	100.0	167,893.2	100.0

Electricity Capacity and Generation by Source



Clean Energy Compulsory Goals



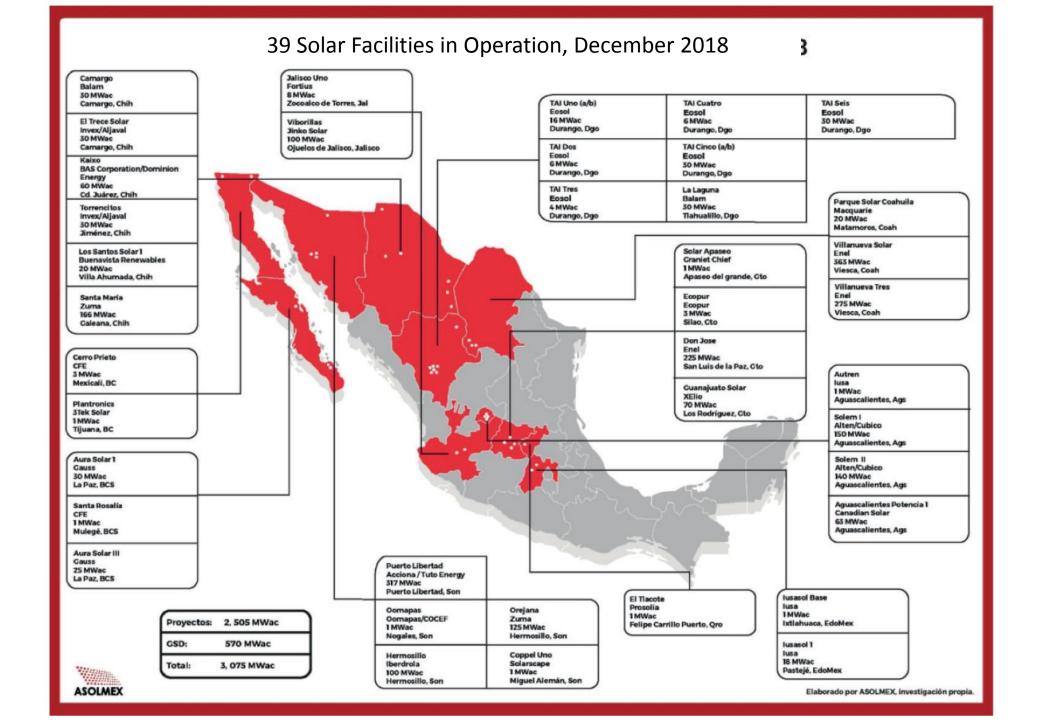
Wind Energy Growth





18 Estados

Fuente: AMDEE



Barriers to **RE** in Previous Administration

Obama effect

RE Launching in spite opposition from vested interest groups, senate members, CFE and some sectors within government

Eagle Ford effect

Continued
lobbying in favor
of natural gas,
particularly by CFE
and closely linked
groups. RE growth
just to comply
with short terms
goals



Fighting gas

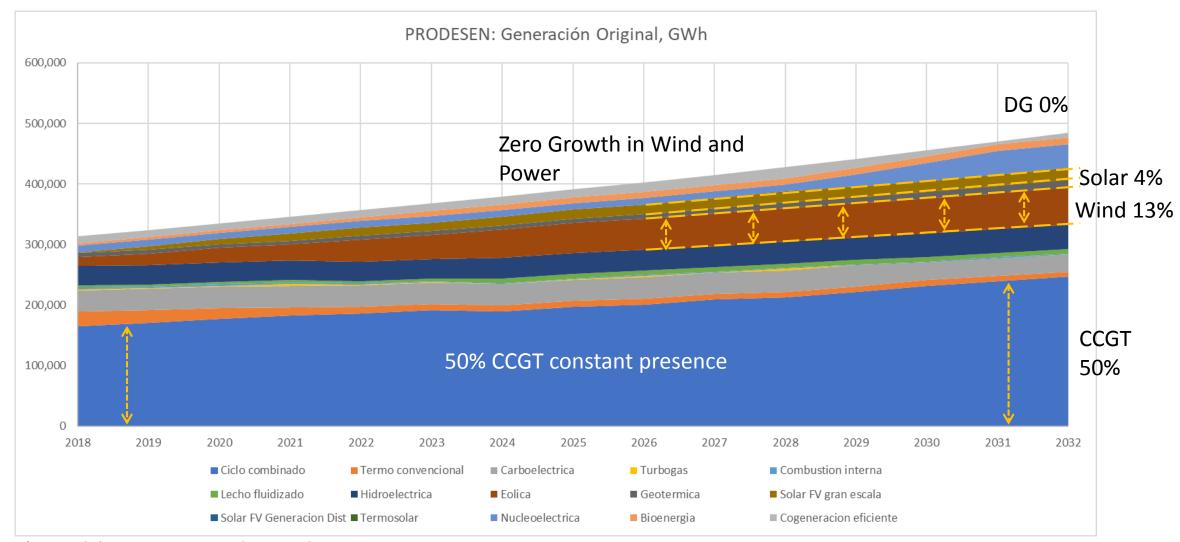
encroachement

and stranded

assets

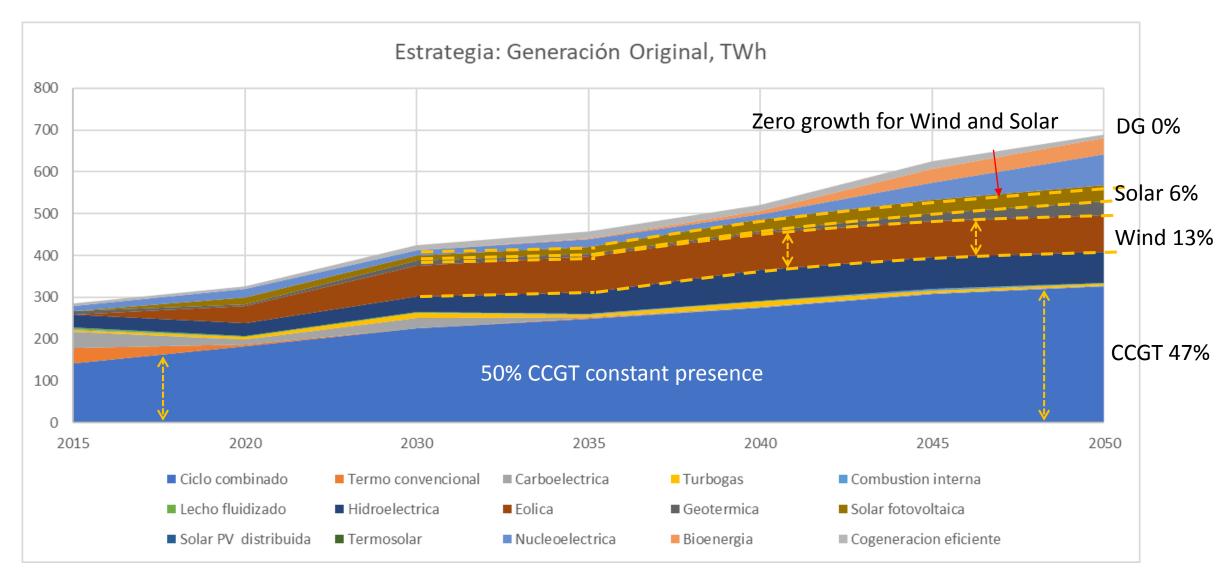
Energy Reform with open markets and private investment for oil and electricity

PRODESEN* 2018-2032



^{*}National Electricity System Development Plan

Long Term Strategy



Overcosts and Stranded Assets

PRODESEN

2018-2032

Overcosts with CCGT:

\$18.7 billion USD*

Stranded Assets:

24.4 GW

Equivalent to more tan 40 CCGT plants and associated infrastructure

LONG TERM STRATEGY

2015-2050

Overcosts with CCGT :

\$94.6 billion USD*

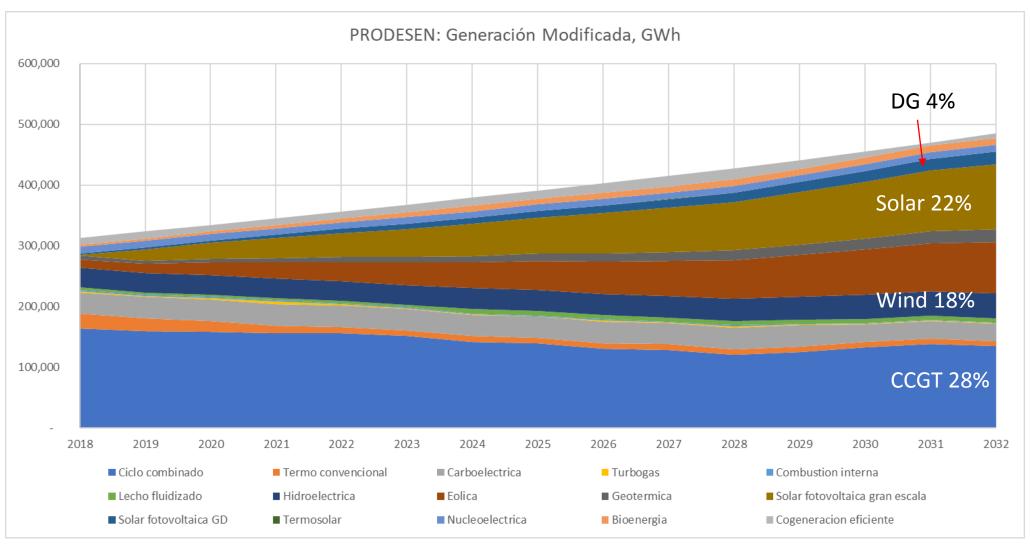
Stranded Assets:

36.2 GW

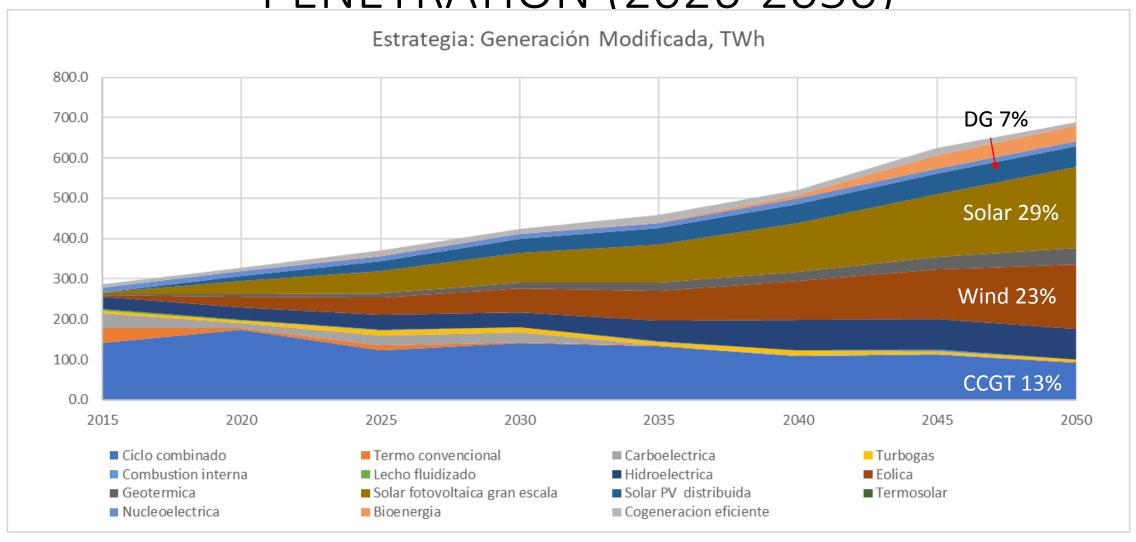
Equivalent to more tan 40 CCGT plants and associated infrastructure

Based on LCoE differences between CCGT (42 USD/MWh) and Second Auction's solar and wind costs (35 USD/MWh) and a 2°C emissions mitigation trajectory

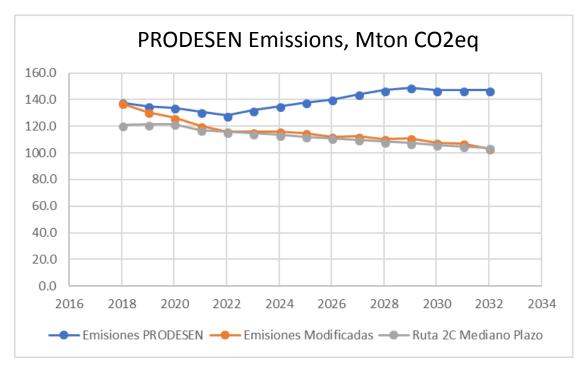
PROPOSED PRODESEN WITH HIGHER **RE** PENETRATION (2018-2032)

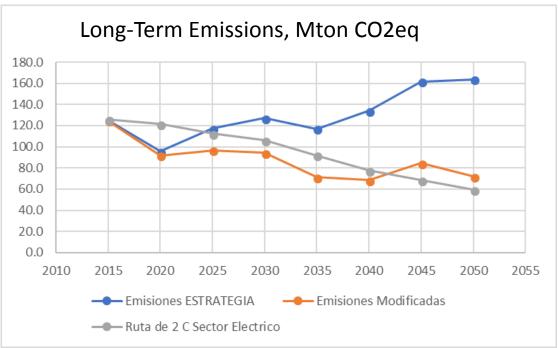


LONG TERM STRATEGY WITH MORE **RE**PENETRATION (2026-2050)

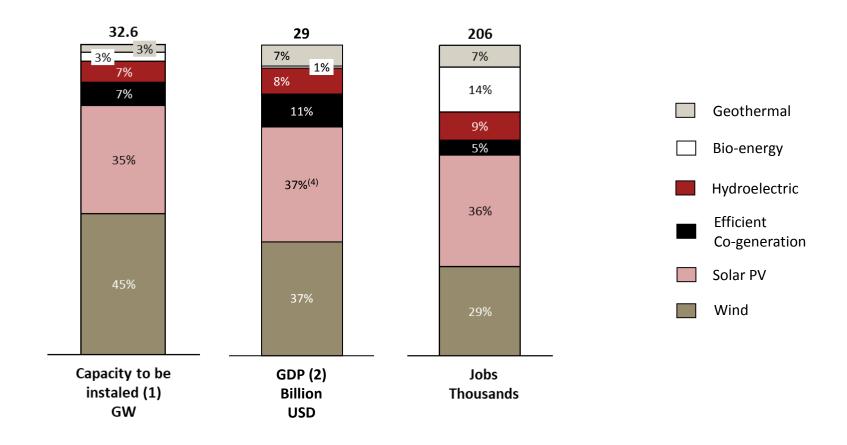


EMISSIONS COMPARISON





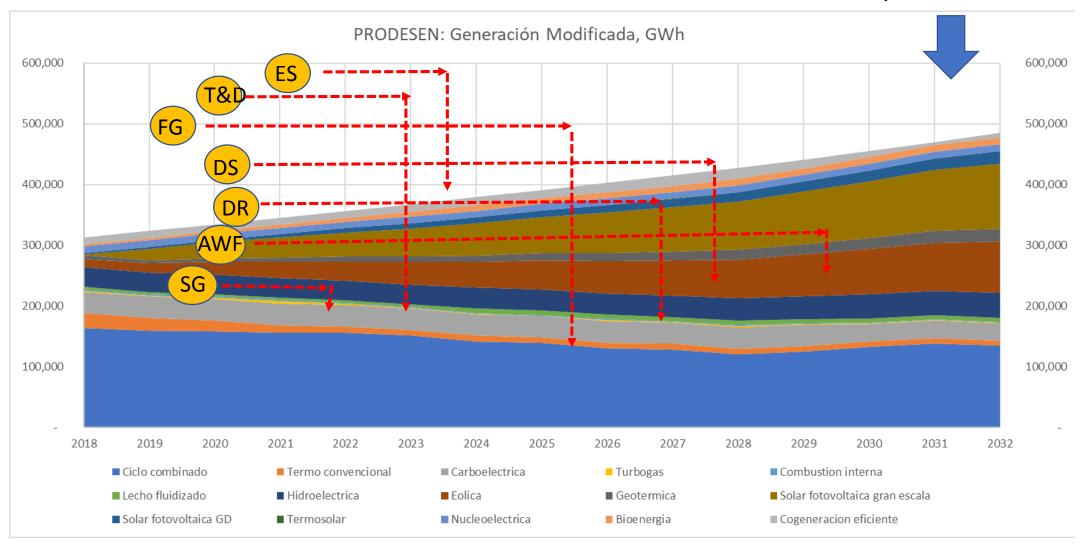
Accrued Co-benefits by 2032



Source: PwC

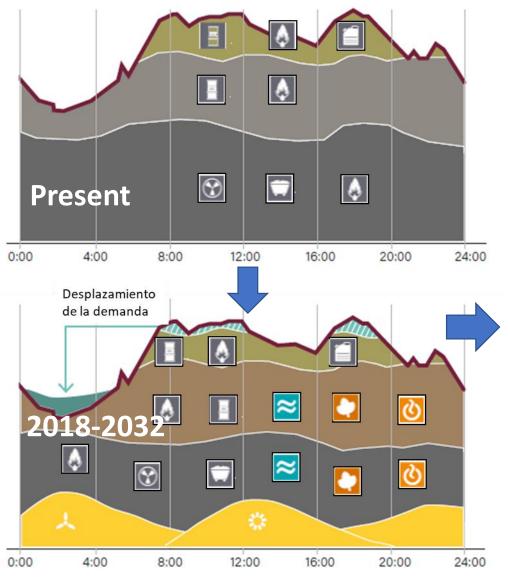
What is Needed?:

To be ready for growing renewables penetration



Energy Storage (ES); Demand shift (DS); Advanced weather forecast (AWF); Demand Response (DR); Smart Grid (SG); Flexible generation (FG); Transmission and Distribution TyD;

The Coming Dispatch

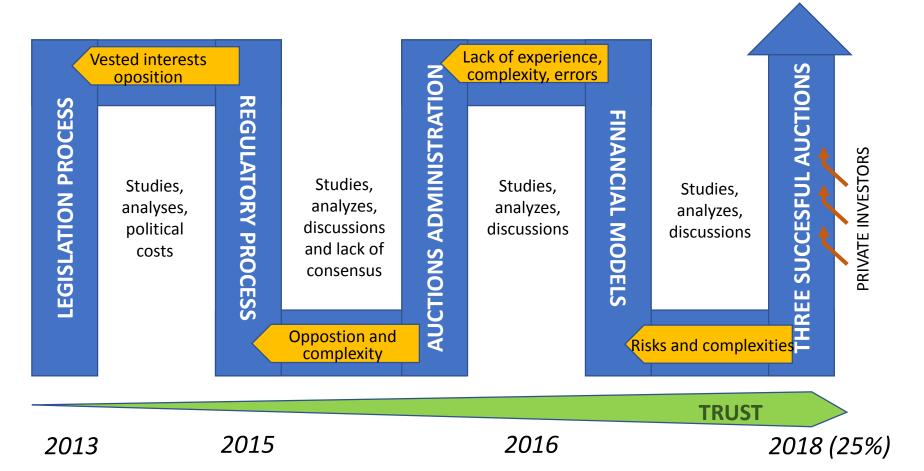


Sobre-producción para almacenar y exportar Towards 2050 0:00 4:00 8:00 12:00 16:00 20:00 24:00 Carbón Hidro Sobre-producción Demanda desplazada Petróleo Bioenergía **Punta** Almacenamiento Intermedia/despachable Despachable Diesel Solar Demanda Base Nuclear Geotermia E. Renovable Variable Gas Natural Eólica * Termosolar con almacenamiento de energía Almacenamiento para solar y eólica

FUENTE: REN21

Mexico's *Energiewende* has been a complex process

7,538 MW renewable capacity \$9,000 MUSD Private sector investment



Barriers to **RE** in Present Administration

Gas burning in a limbo: AMLO not in favor of fracking but SENER officials doubting due to industry mounting pressure. 80% gas for electricity comes from US



Emphasis in
PEMEX financial
and operational
rescue aimed to
recover oil
production and
refining capacities.
No consideration
to GHG emissions



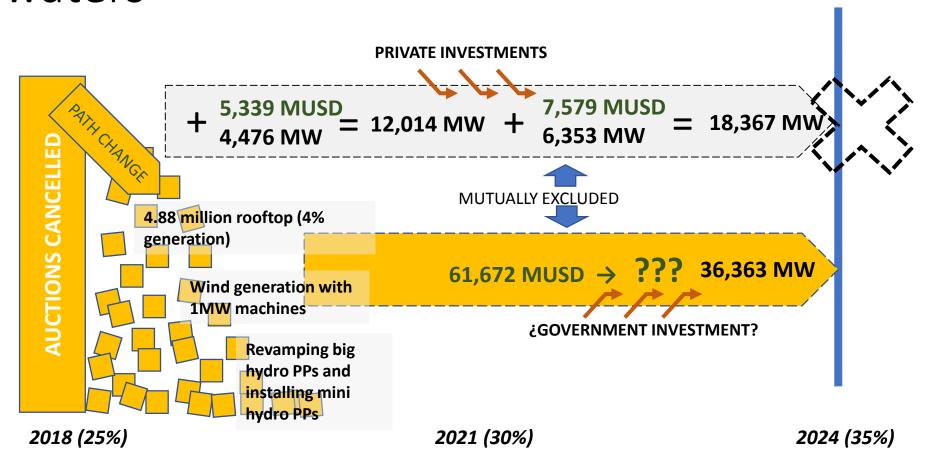
In spite of political discourse, renewables are under siege by CFE and SENER:
Auctions cancellation
RE atomization



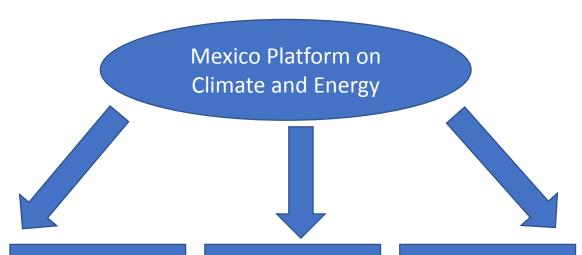
Focus of CFE seems to be the refurbishment and use of existing thermal capacity, new coal and hydropower. RE are an add on, rather than strategic.

Reassurances to keep the open market in the discourse.
However, actions aim to disregard energy reform in the facts

Mexico's Energiewende in unchartered waters



Refocusing Strategy



Advocating against fracking menace

Propose a hybrid scheme: utility-scale RE plus small-scale Fighting fake news on RE and market dismissal Advocating against new oil's GHG emissions

Promote

Energiewende
at subnational
governments

Dank

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