

RENEWABLE ENERGY AND ELECTRIFICATION

A NEW DEVELOPMENT PLAN FOR MEXICO



Mexico's Long Term Auctions

First Auctions

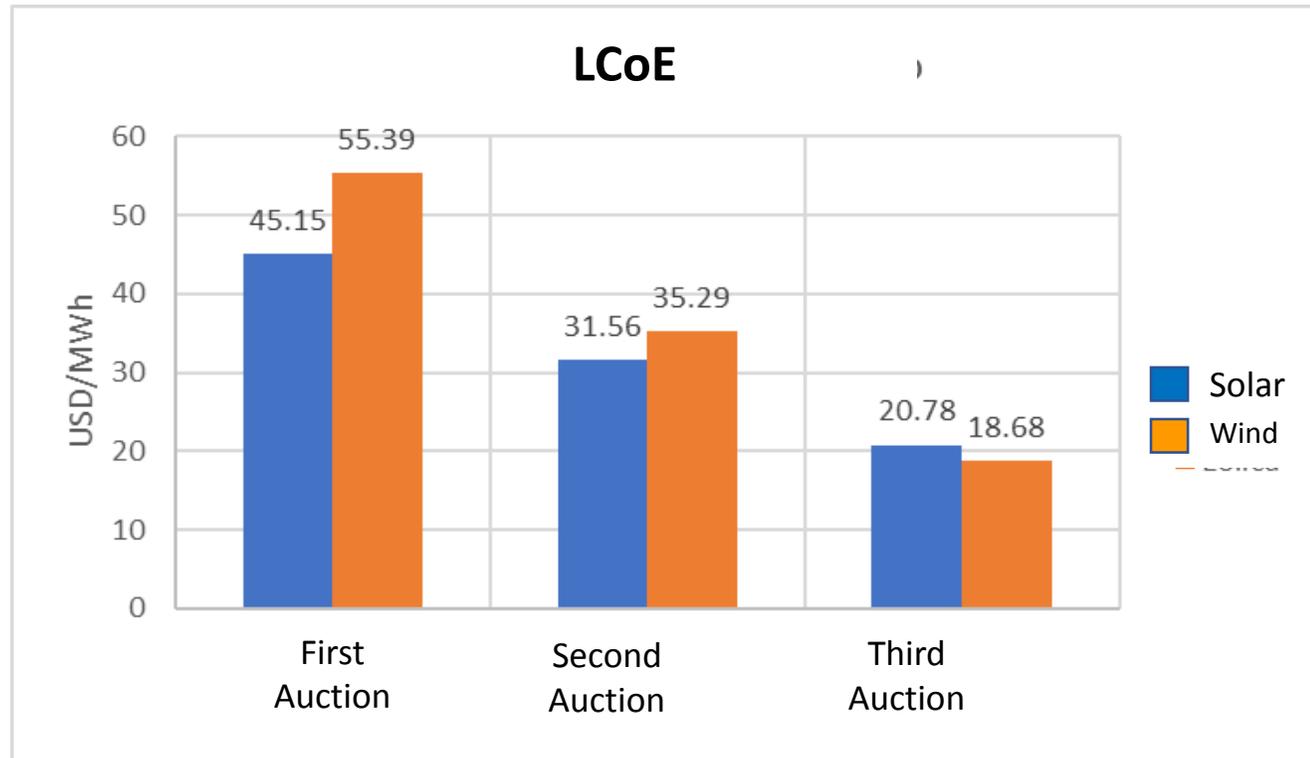
2085 megawatts @ 2018
47.7 USD/MWh Average LCoE
Solar: 1,681; Wind: 394 MW
2.6 billion USD.

Second Auction

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

Tercera Subasta

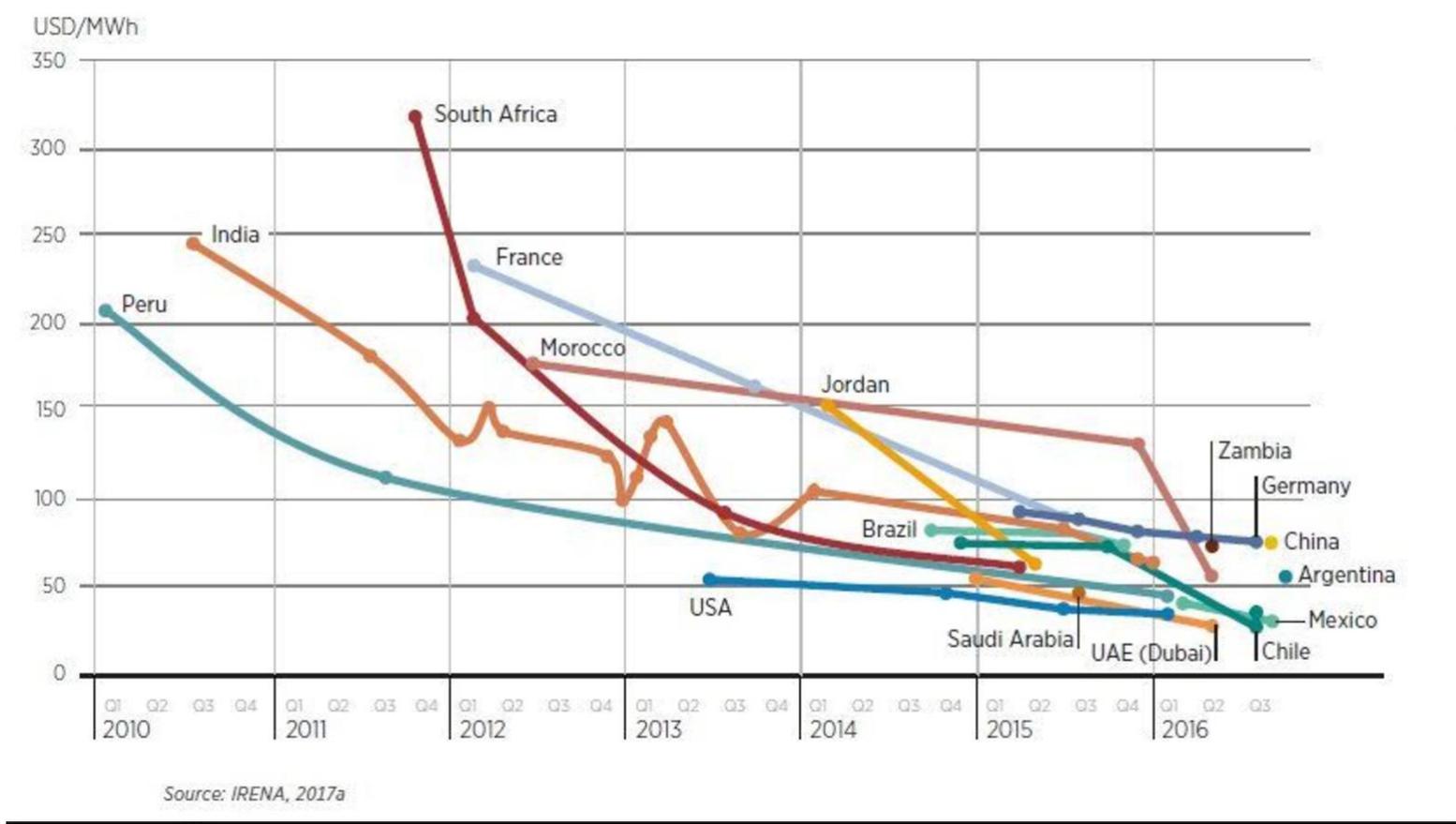
2562 megawatts @ 2020
20.5 USD/MWh Average LCoE
Solar: 1,419; Eólica: 689
2,400 millonesUSD.



...and the fourth?

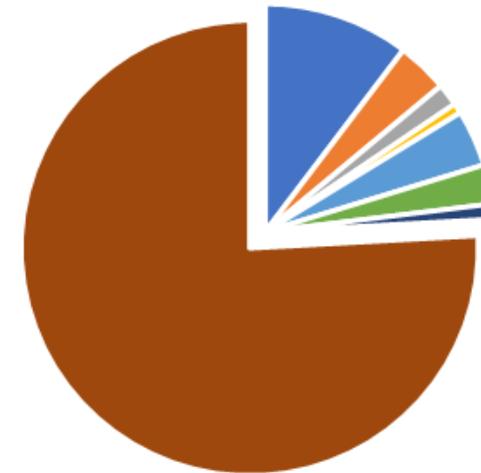
Auction Results for Several Countries

Figure 2.3 Evolution of utility-scale solar PV auction prices around the world



Electricity Capacity and Generation by Source

Technology	First Half, 2018			
	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



25 % @ 2018 30% @ 2021 35% @ 2024 ?% @ 2030

Clean Energy Compulsory Goals

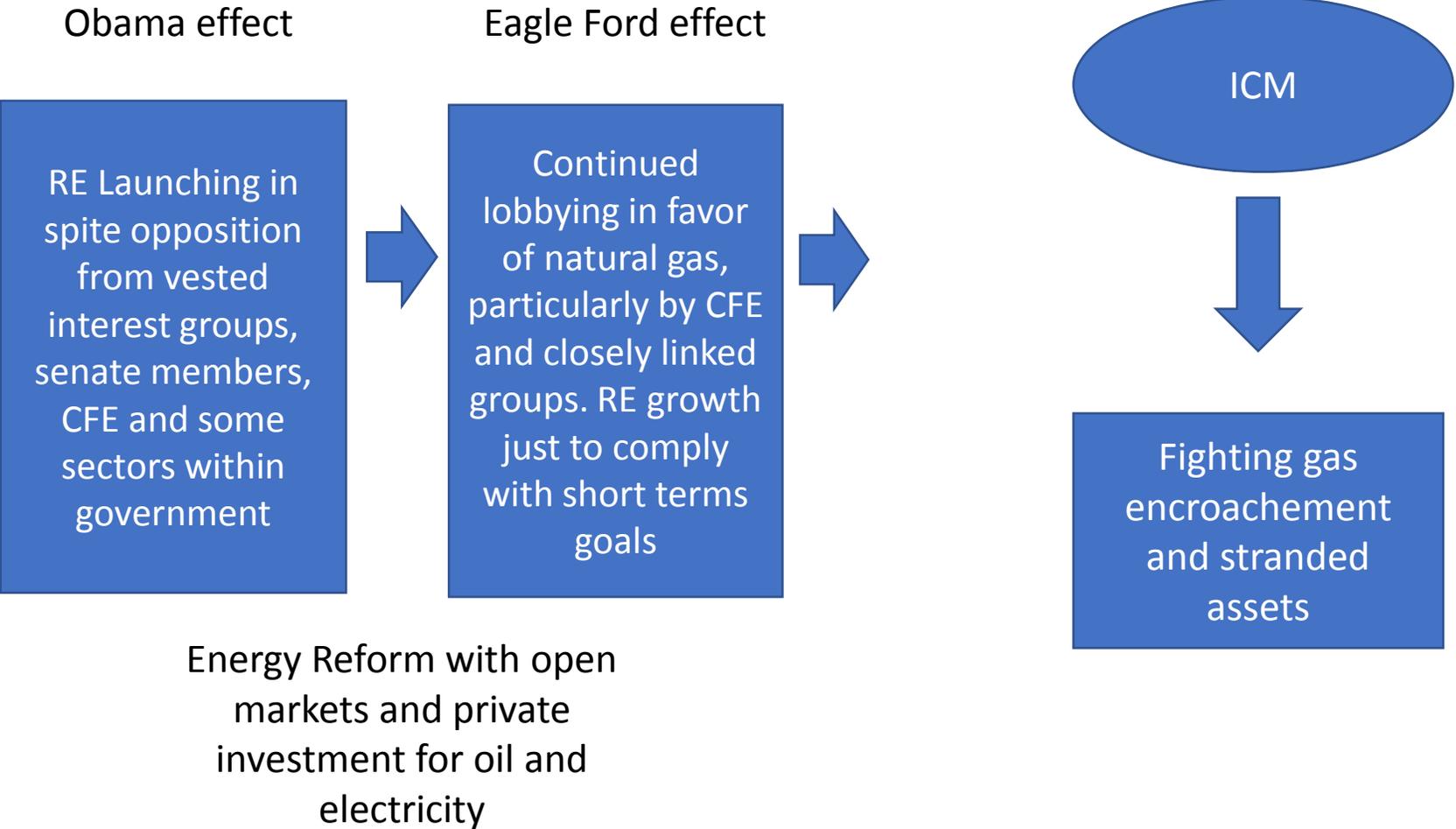


Wind Energy Growth

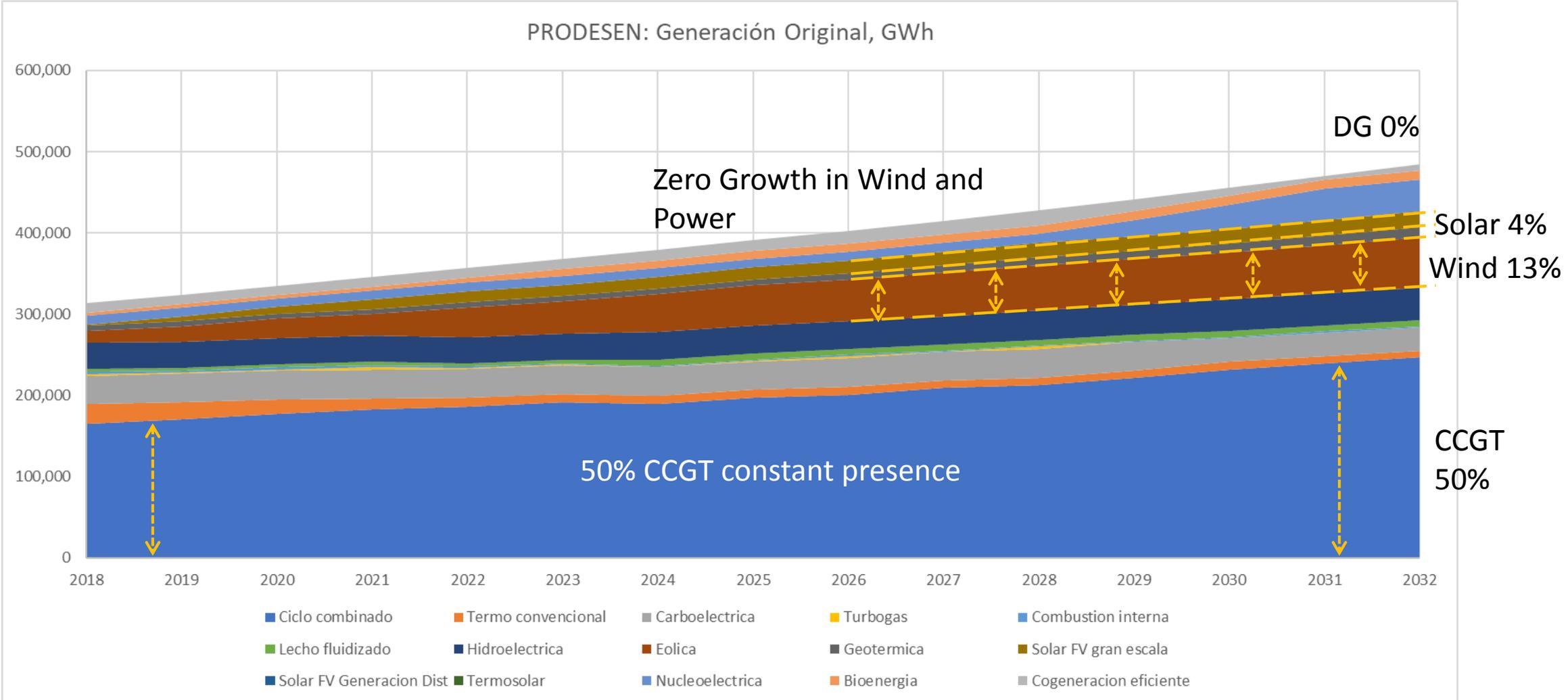


Fuente: AMDEE

Barriers to RE in Previous Administration

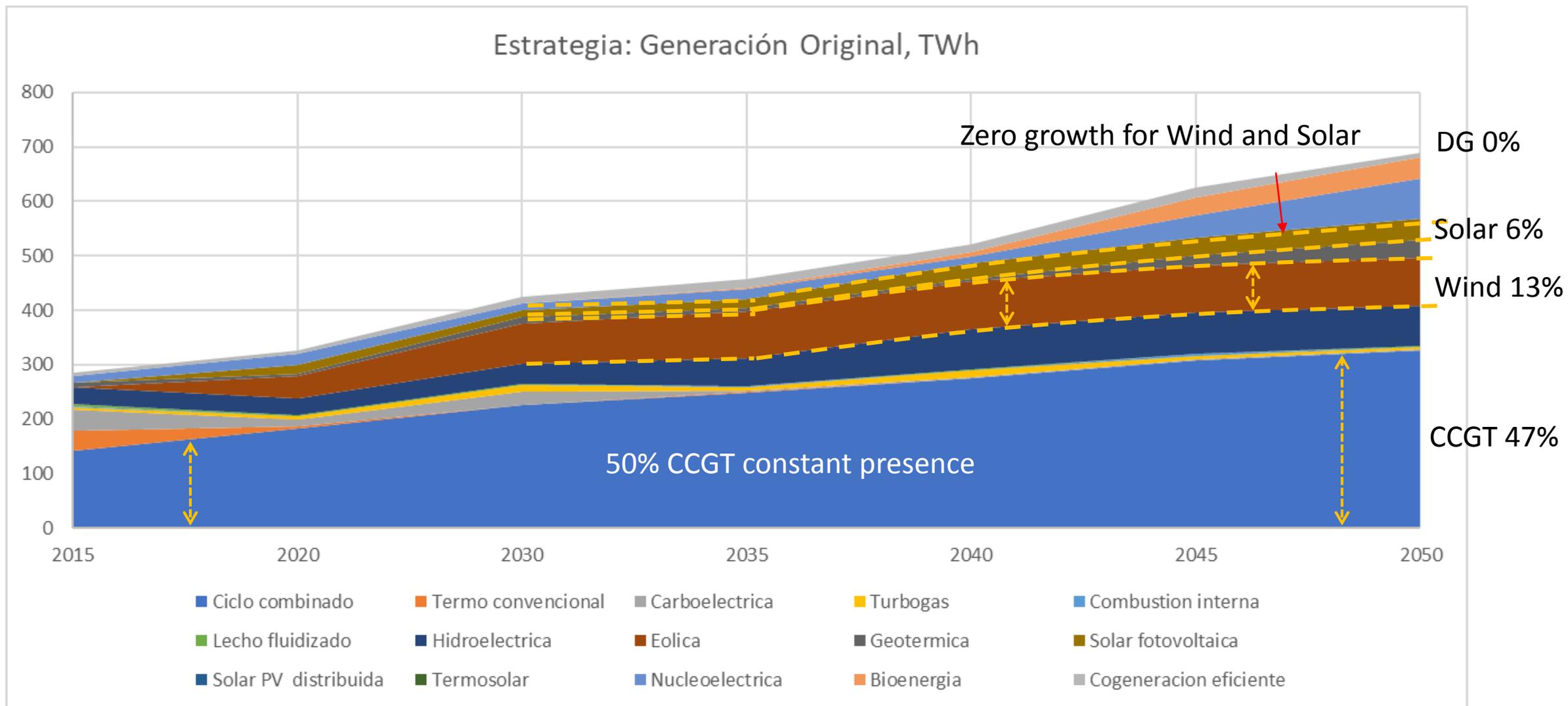


PRODESEN* 2018-2032



*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 than 40 CCGT plants
and associated infrastructure**

LONG TERM STRATEGY

2015-2050

- Overcosts with CCGT :

\$94.6 billion USD*

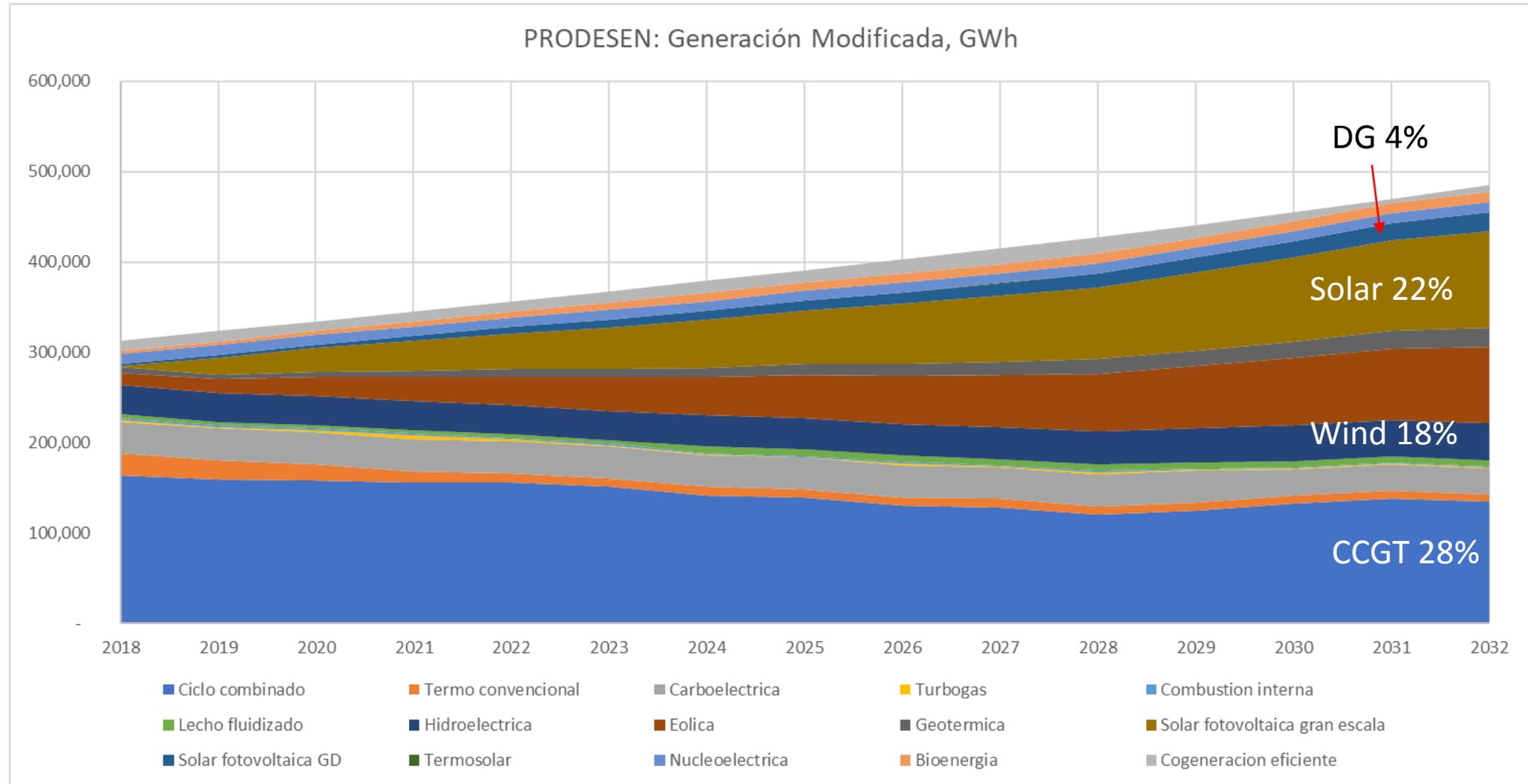
- Stranded Assets:

36.2 GW

**Equivalent to more than 40 CCGT plants
and associated infrastructure**

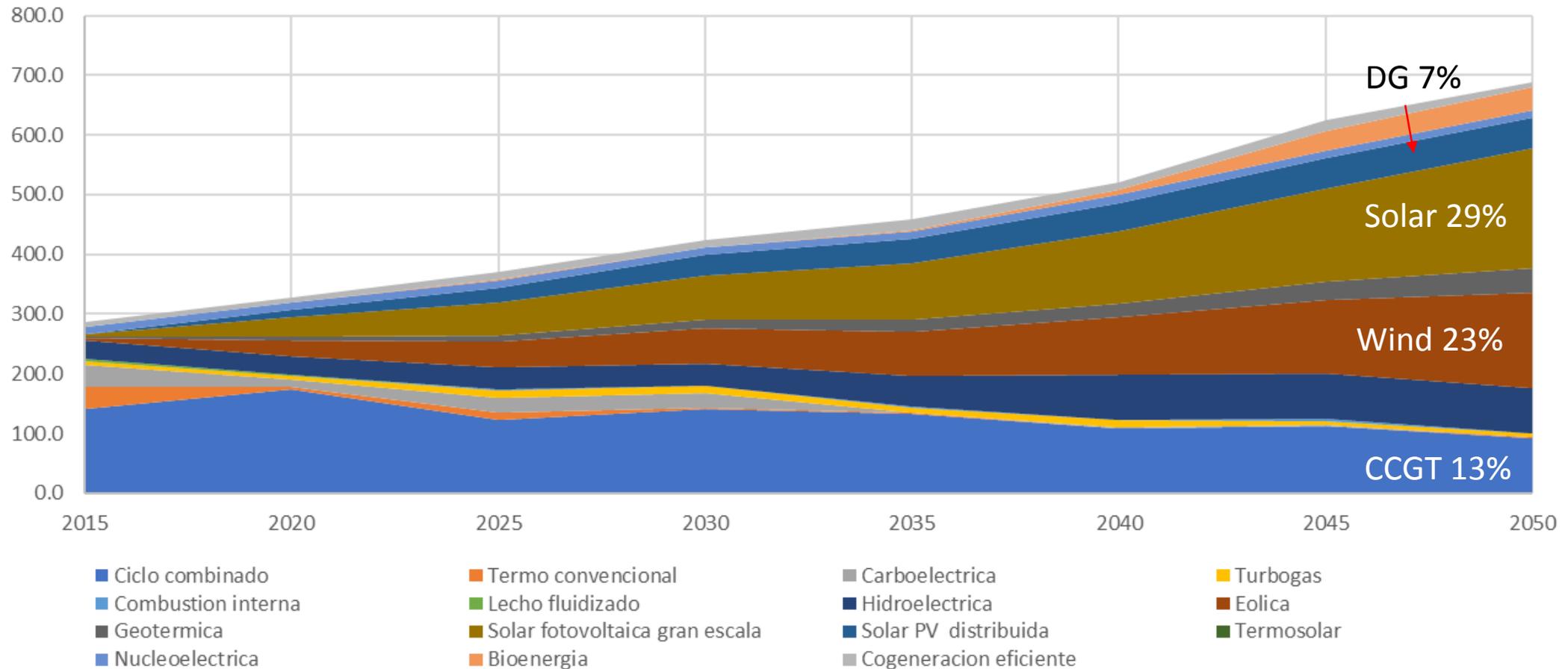
Based on LCoE differences between CCGT (42 USD/MWh) and Second Auction's solar and wind costs (35 USD/MWh) and a 2°C emissions mitigation trajectory

PROPOSED PRODESEN WITH HIGHER RE PENETRATION (2018-2032)

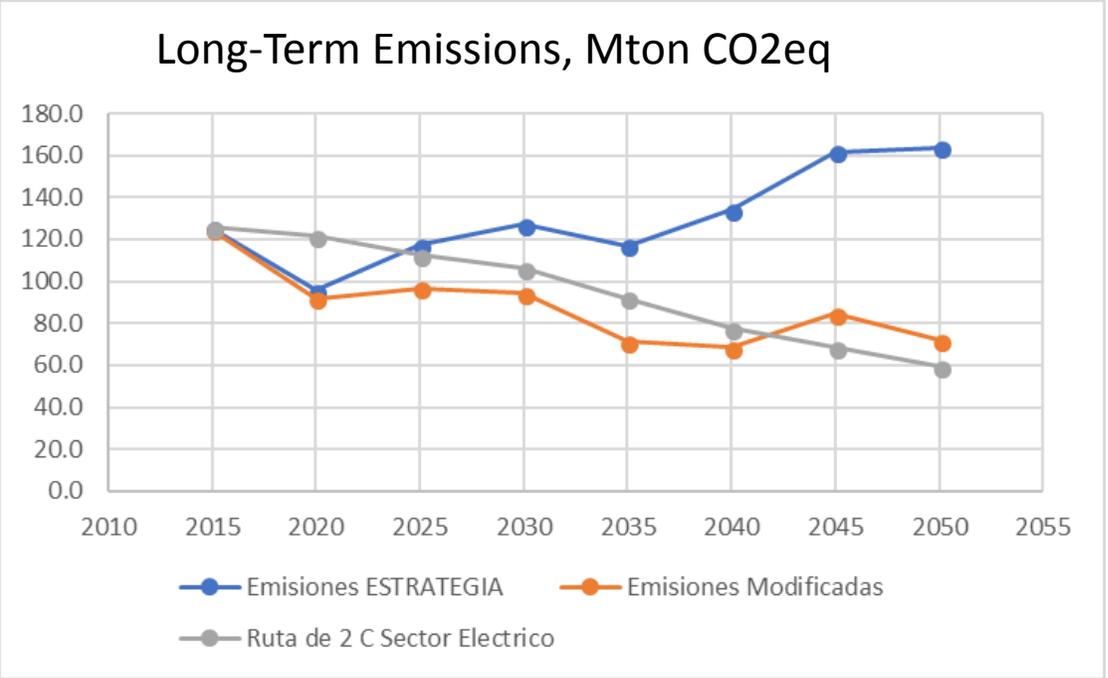
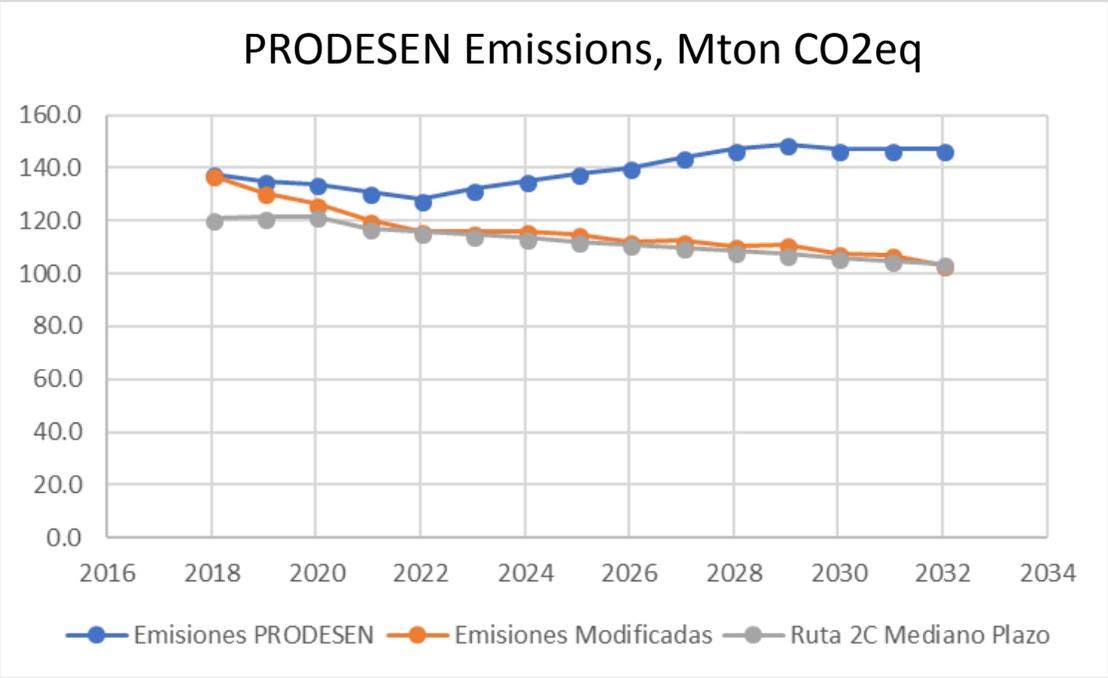


LONG TERM STRATEGY WITH MORE RE PENETRATION (2026-2050)

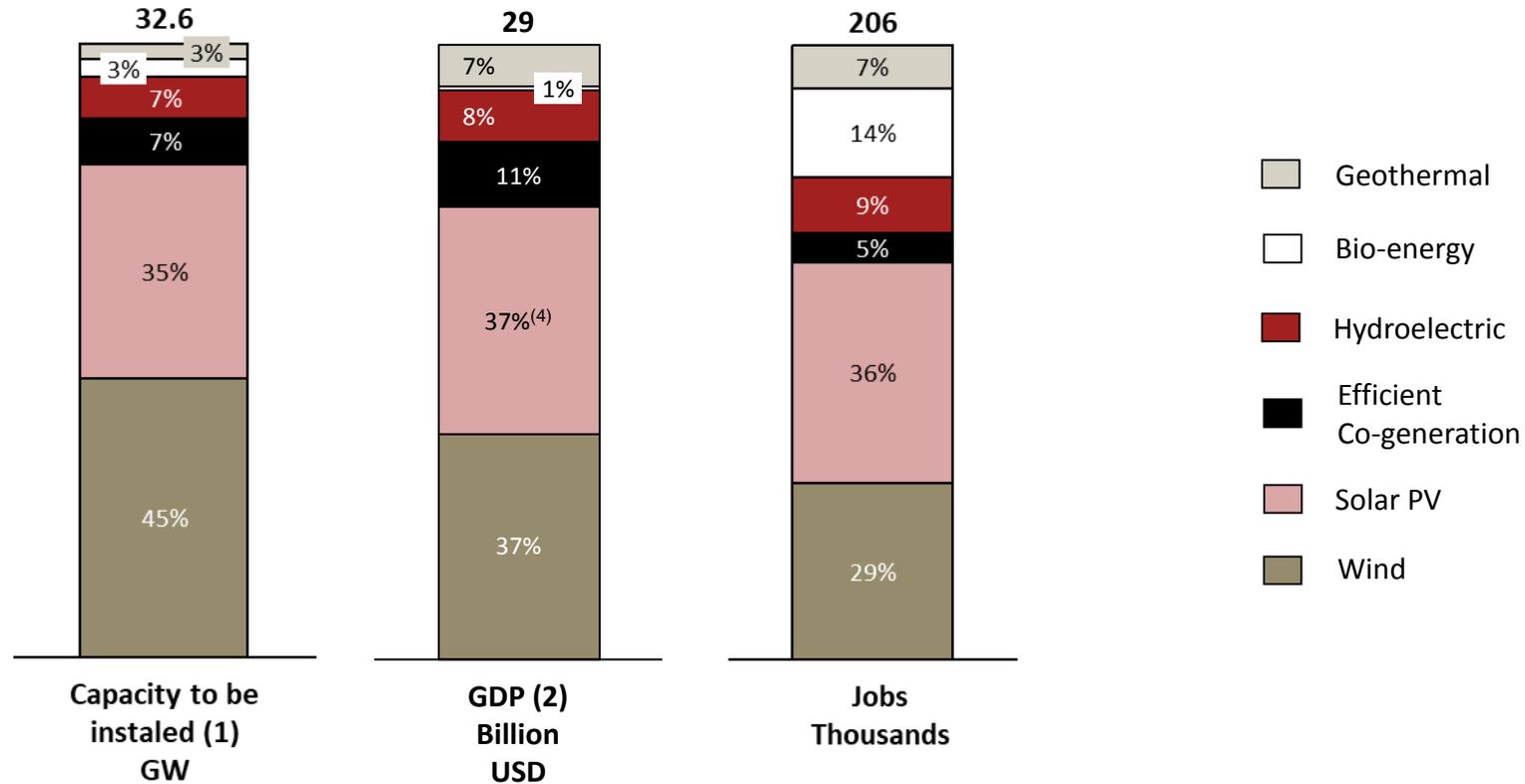
Estrategia: Generación Modificada, TWh



EMISSIONS COMPARISON



Accrued Co-benefits by 2032

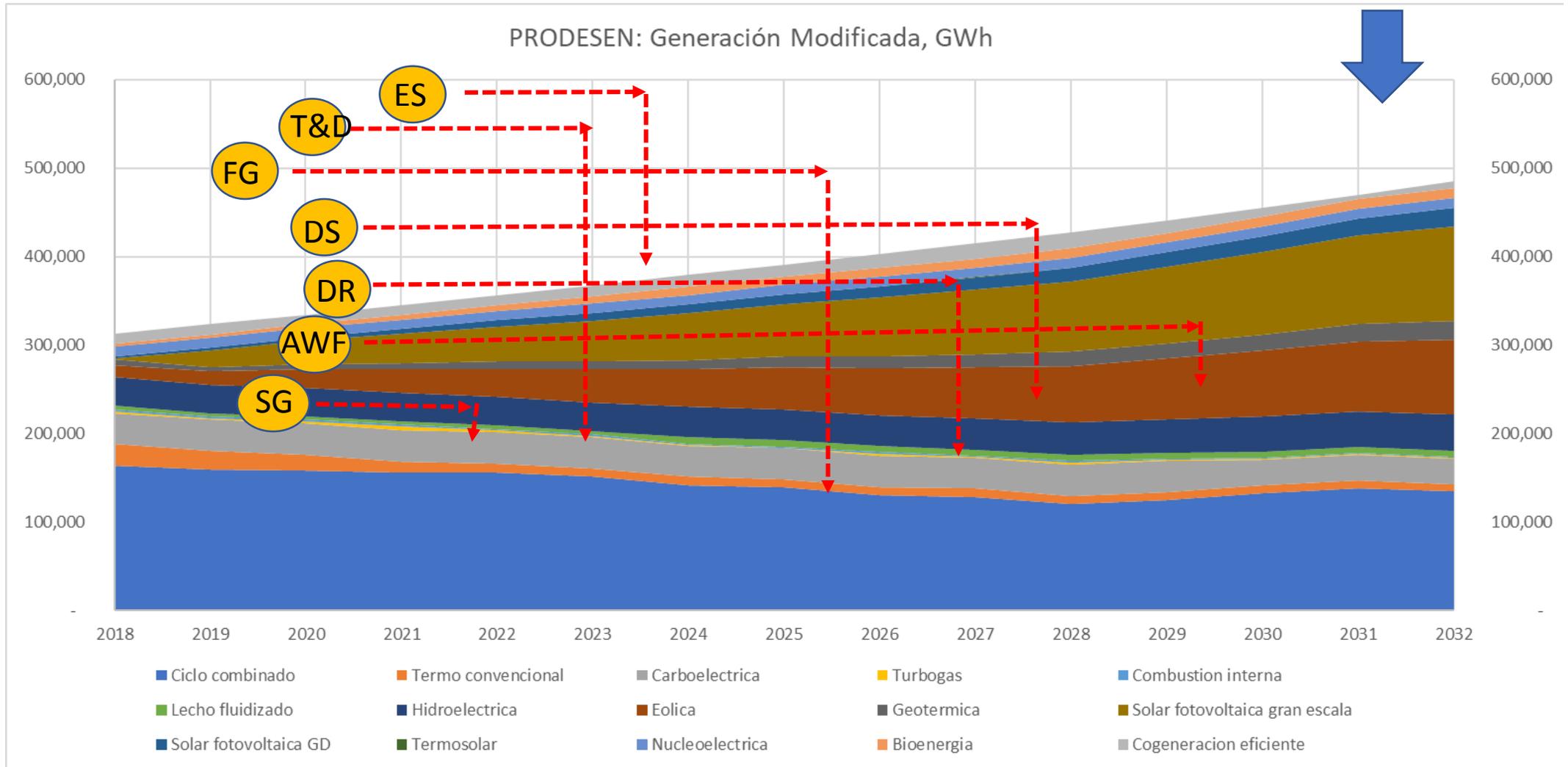


(1) No nuclear included, (2) Exchange Rate at 1USD=19MXN;

Source: PwC

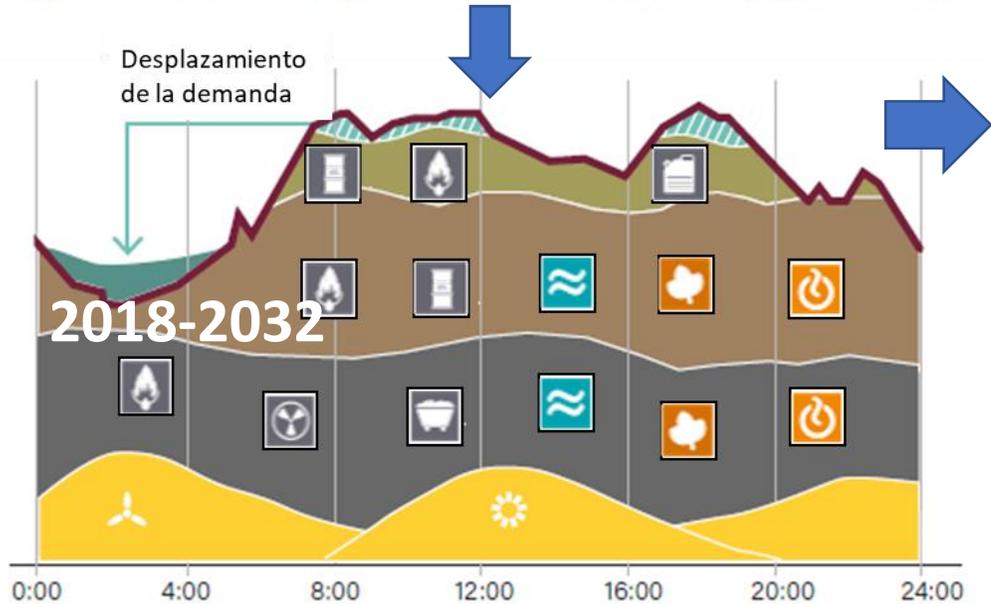
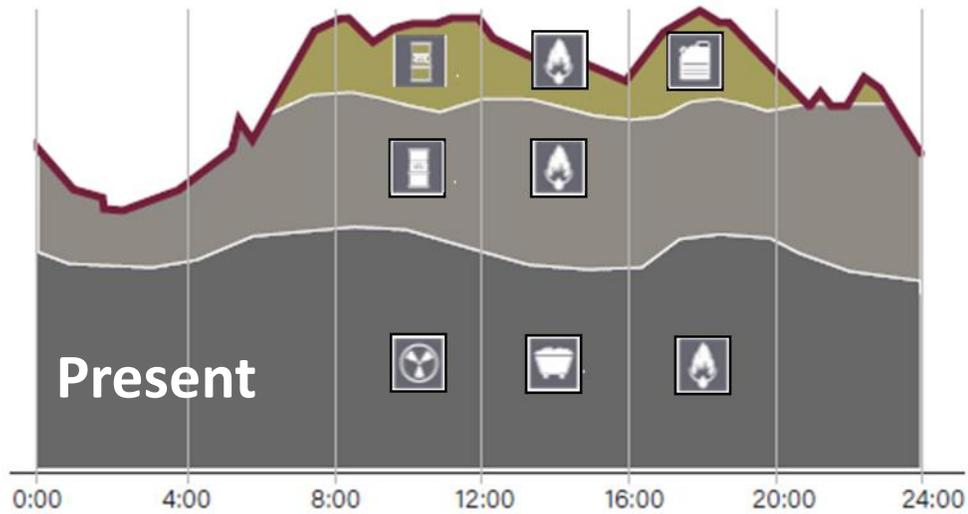
What is Needed?:

To be ready for growing renewables penetration

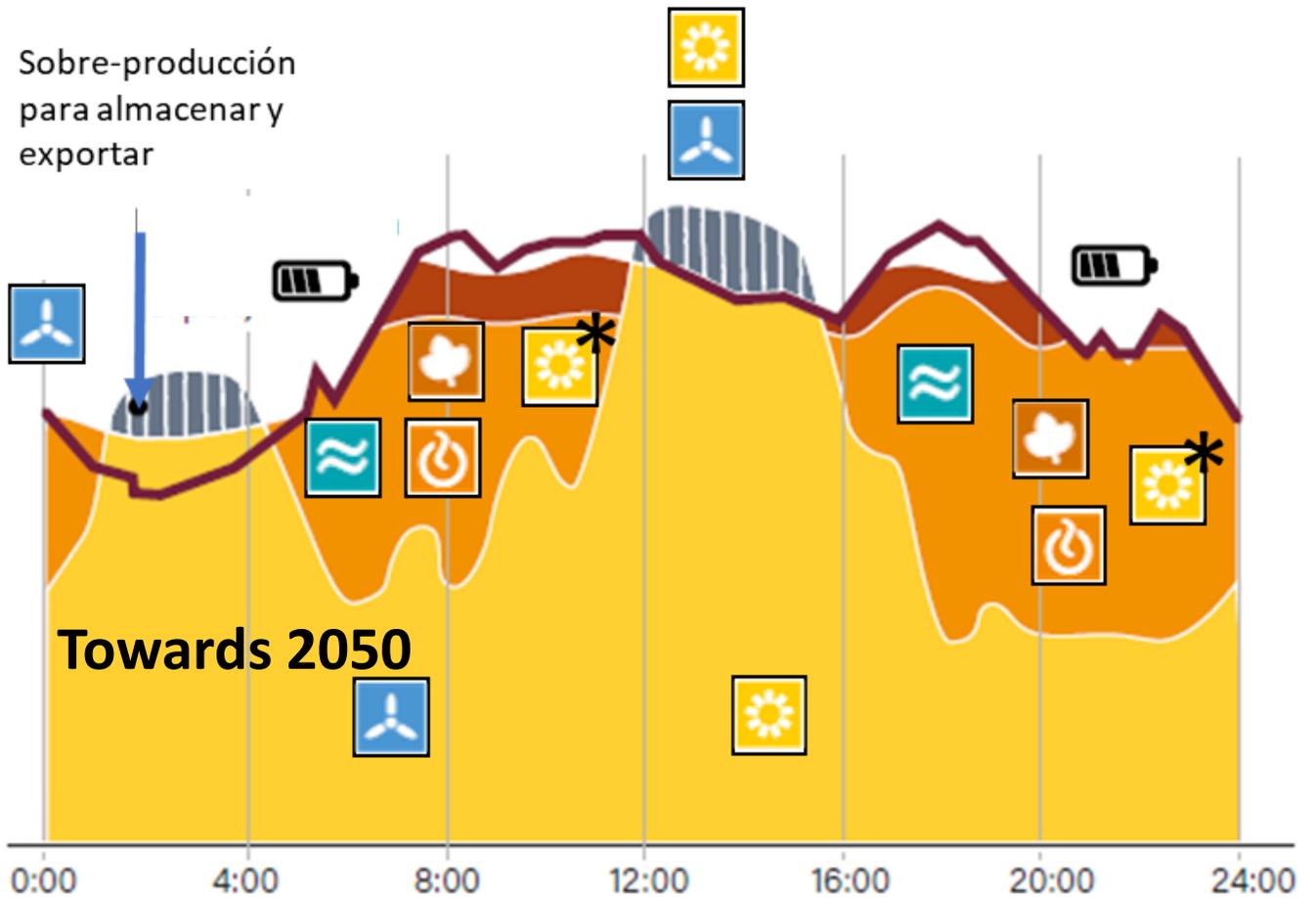


Energy Storage (ES); Demand shift (DS); Advanced weather forecast (AWF); Demand Response (DR); Smart Grid (SG); Flexible generation (FG); Transmission and Distribution TyD;

The Coming Dispatch



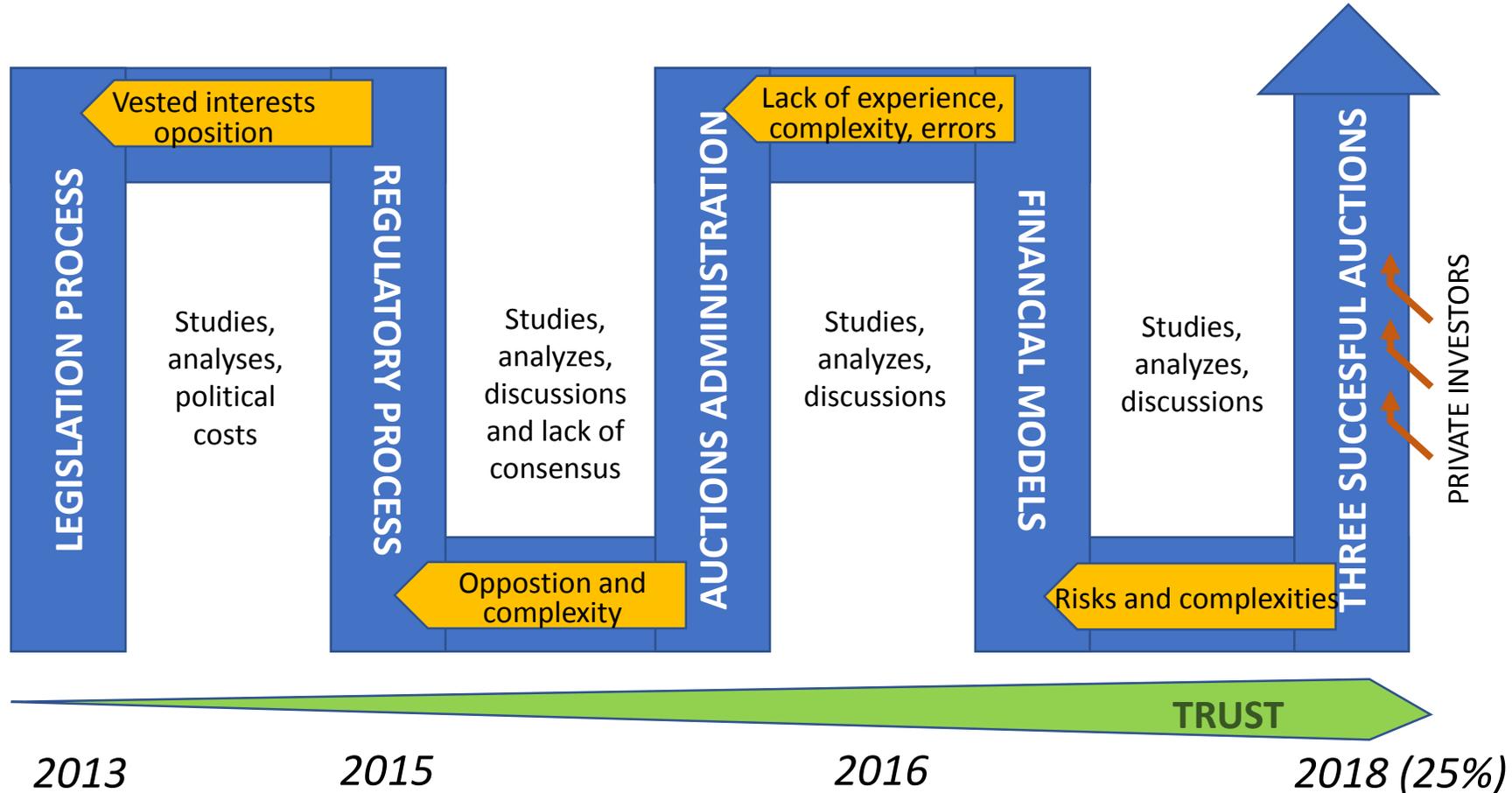
FUENTE: REN21



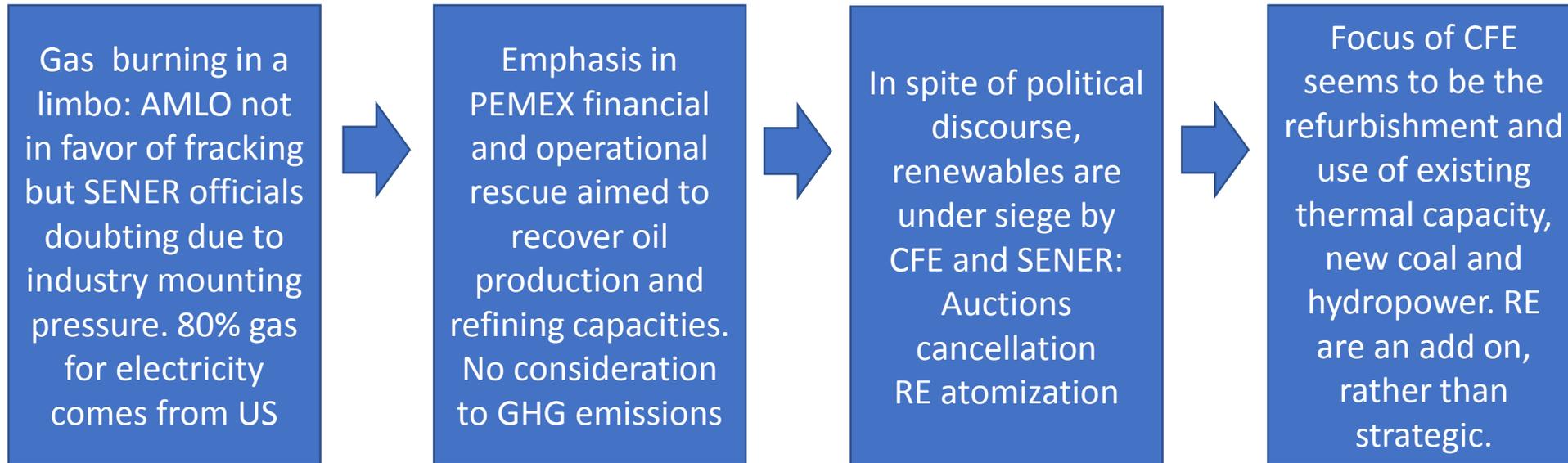
- | | | | |
|------------------------|------------------|------------------------------------|------------|
| Demanda desplazada | Sobre-producción | Carbón | Hidro |
| Punta | Almacenamiento | Petróleo | Bioenergía |
| Intermedia/despachable | Despachable | Diesel | Solar |
| Demanda Base | | Nuclear | Geotermia |
| E. Renovable Variable | | Gas Natural | Eólica |
| | | Almacenamiento para solar y eólica | |
- * Termosolar con almacenamiento de energía

Mexico's *Energiewende* has been a complex process

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

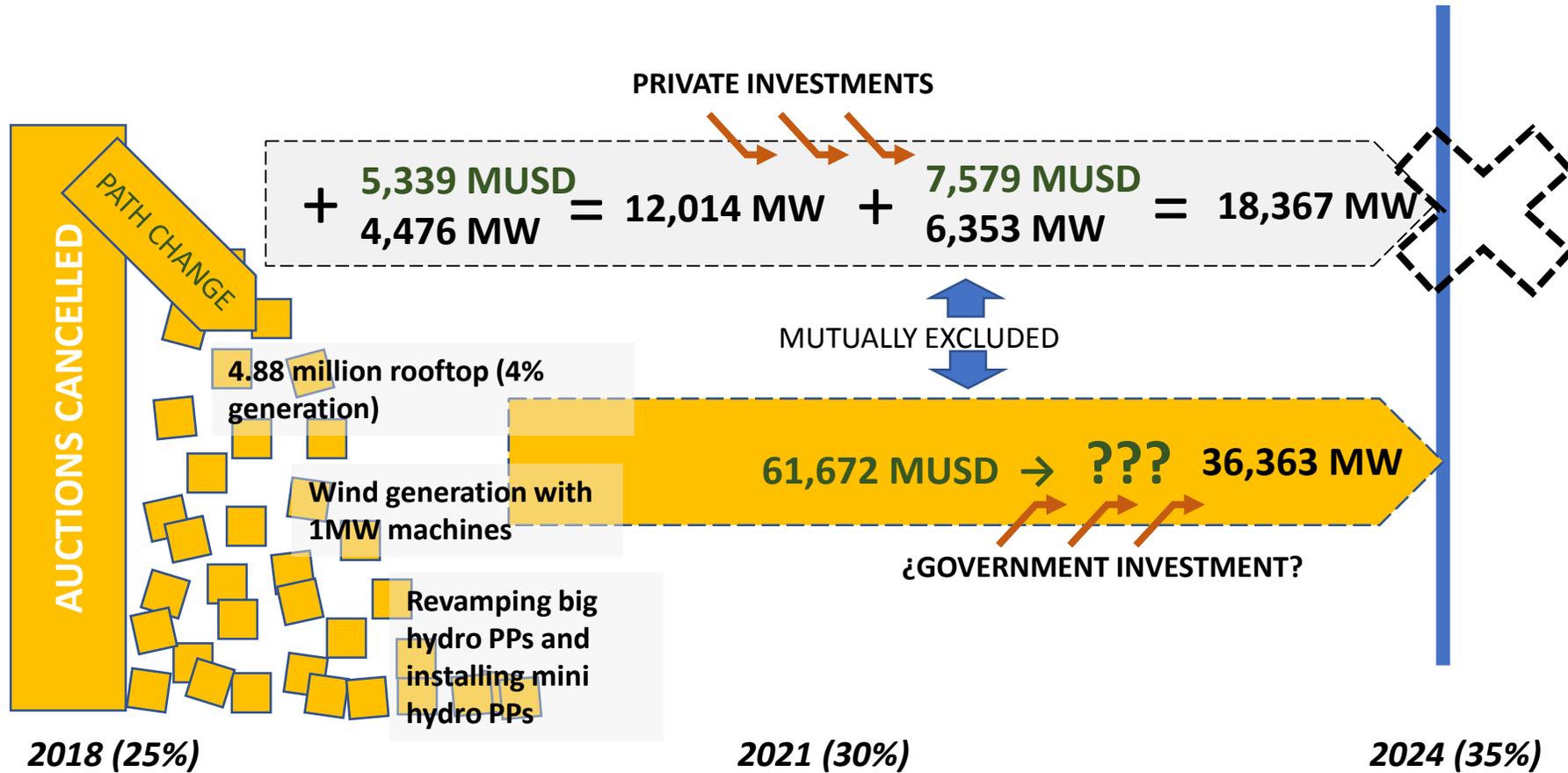


Barriers to RE in Present Administration

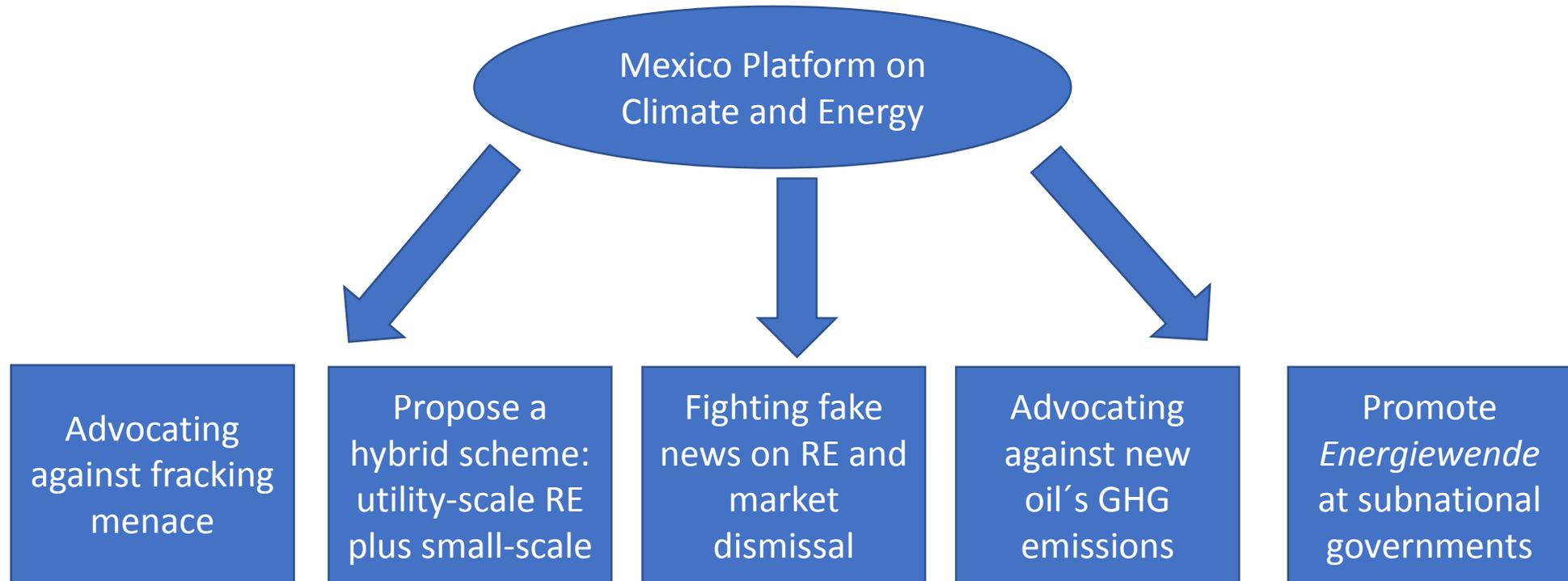


Reassurances to keep the open market in the discourse. However, actions aim to disregard energy reform in the facts

Mexico's Energiewende in unchartered waters



Refocusing Strategy



Dank

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