

ESTIMATING FINANCE NEEDS: THE LOW-CARBON TRANSITION OF THE MEXICAN POWER SECTOR

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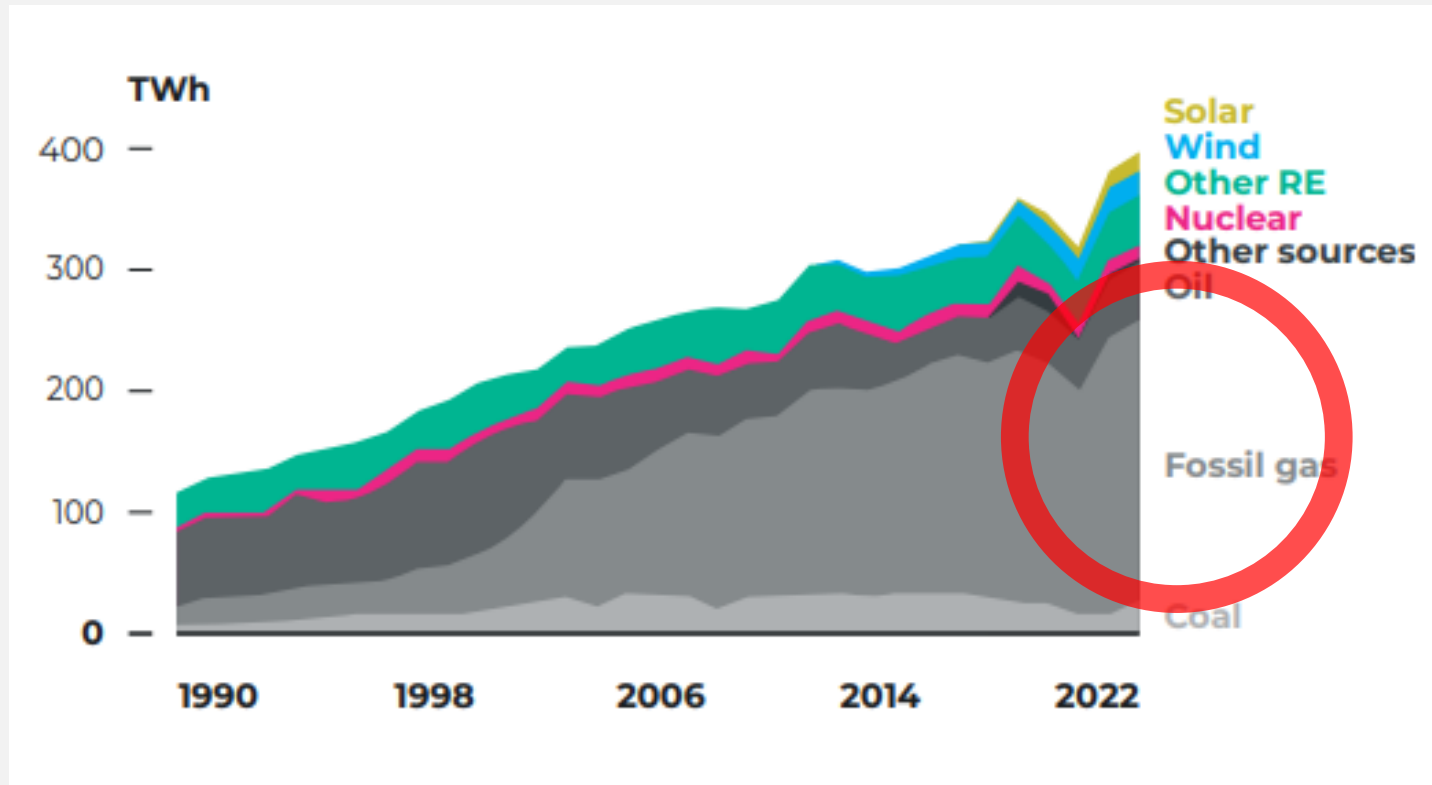
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NEW
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- **MEXICO'S POWER SECTOR**
 - Status quo
 - Net-zero scenarios
- **CLIMATE FINANCE NEEDS**
 - Compensation payments for early retirement of fossil gas plants
 - Renewable energy uptake
 - Just social transition
- **CONCLUSIONS**

MEXICO – HIGH RELIANCE ON FOSSIL GAS

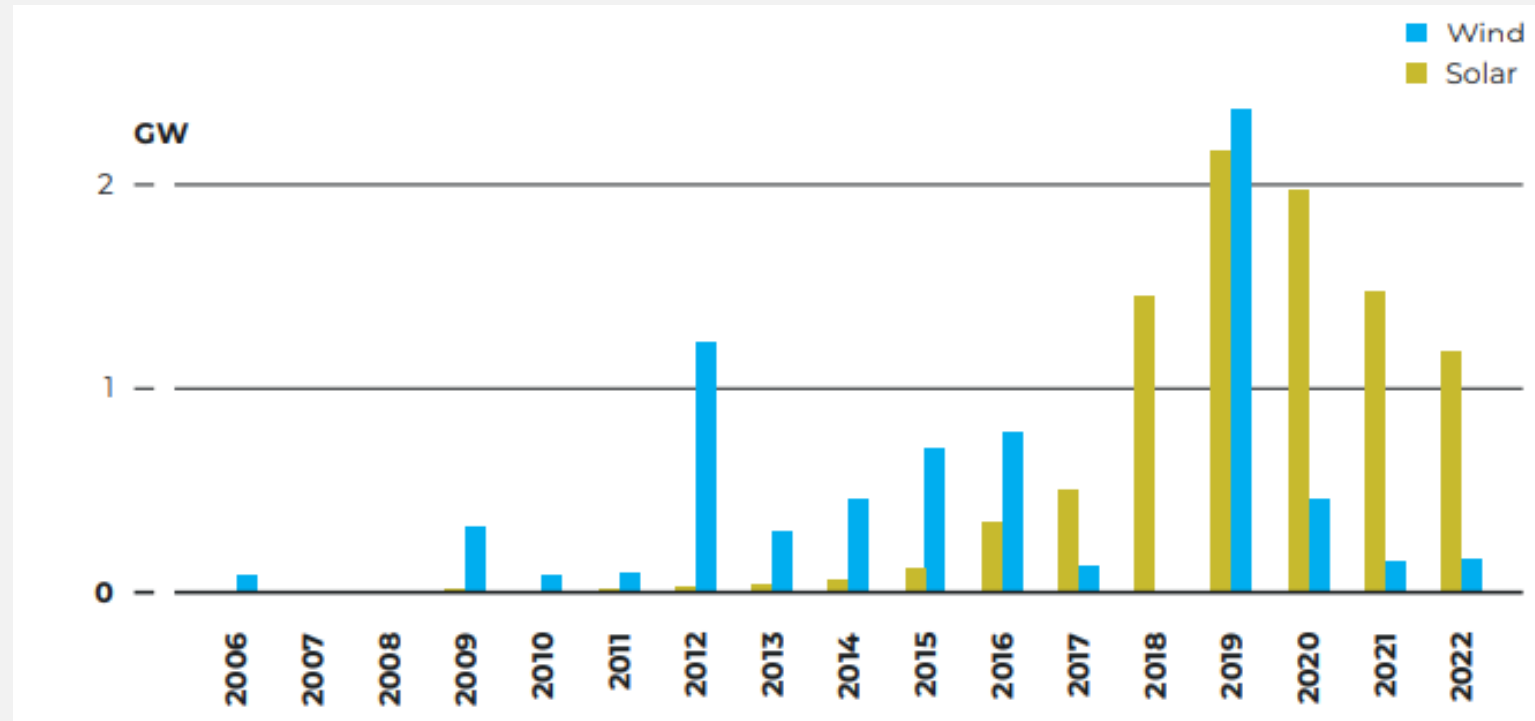


- 41% of installed capacity
- Increased in recent years (3.3% increase in 2023 compared to 2022)
- High reliance on imported fossil gas from the US
 - Gas crisis
 - Energy security

Source: [EMBER](#)

WHILE RE IS SLOWING DOWN IN MEXICO...

- **Renewables investments/** new capacity **decreased** significantly in recent years
- Investments in renewables significantly impacted by **lacking policy** framework after **discontinuation** of **auction scheme**
- Given these uncertainties WACC for renewables has increased in Mexico



Source: [EMBER](#)

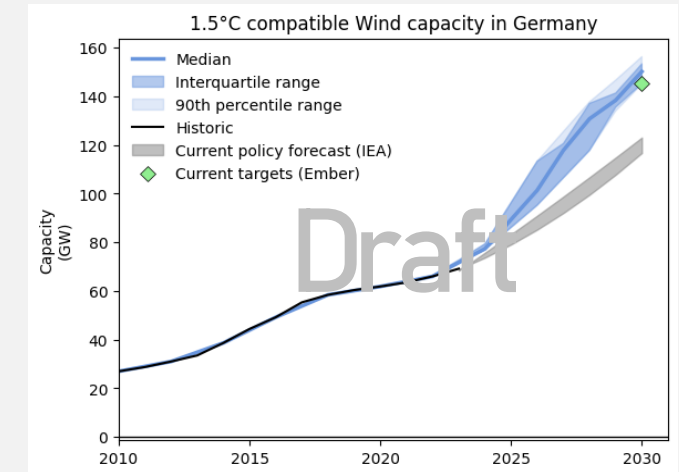
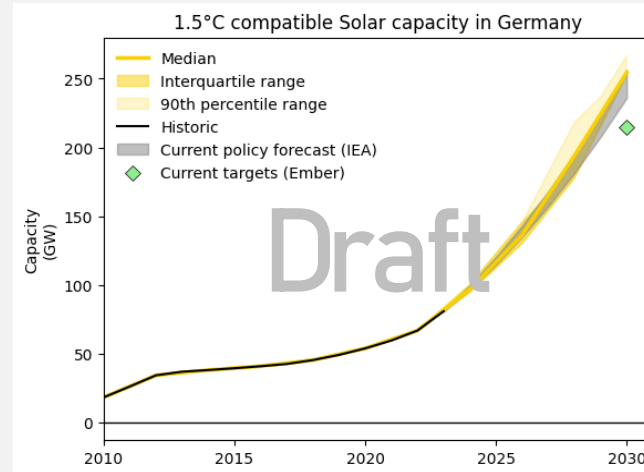
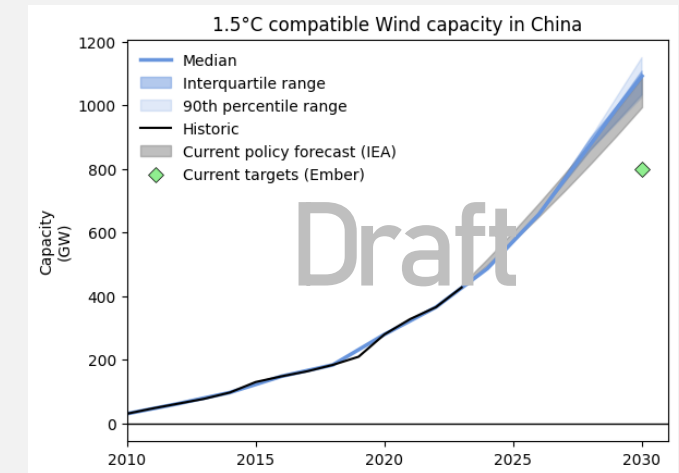
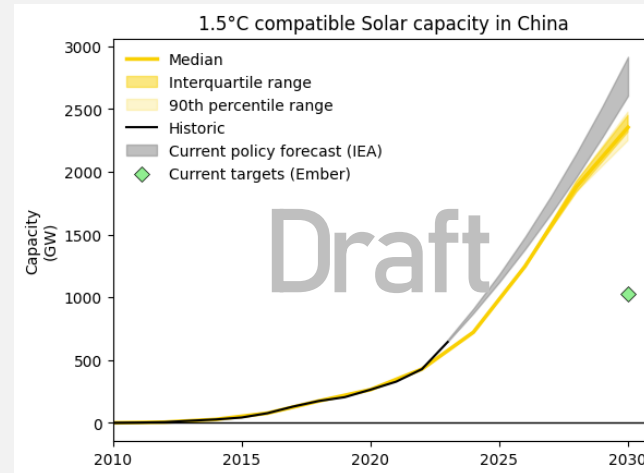
Year	WACC 100 MW Solar PV Project	WACC 250 MW Gas Fired Project
2019	9.0% - 10.0%	9.5% - 10.0%
2021	9.5% - 10.0%	9.5% - 10.0%
2022	11.0% - 11.0%	9.0% - 10.0%

Source: [IEA- Cost of capital observatory](#)

...BUT GROWING INTERNATIONALLY

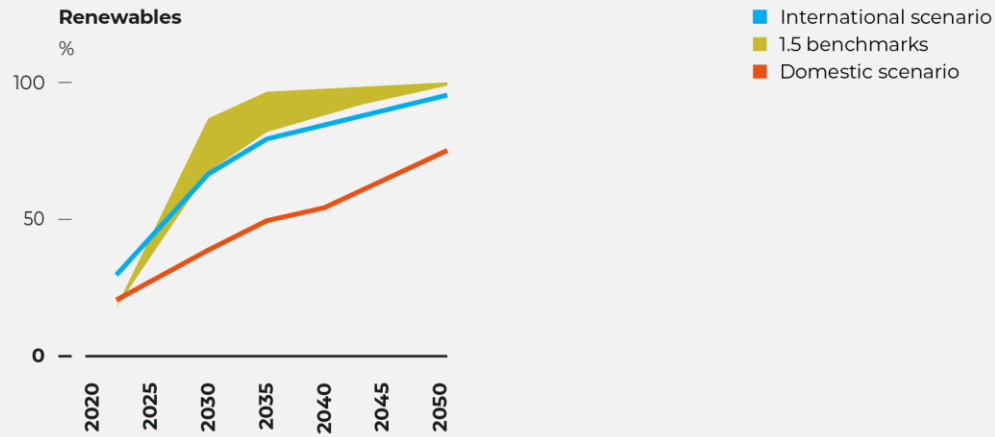
- Countries have seen **significant growth in renewables**
 - Especially solar driven by market forces
 - Wind facing more challenges (siting, permitting)
 - Build-out in some countries already on a net zero pathway

- Aligned (planned) **global manufacturing capacity growth**
 - PV modules and cells capacity already today at 2030 level required under IEA NZE scenario (globally)
 - Other technologies (e.g. batteries) also picking up significantly under Chinese, US and EU efforts

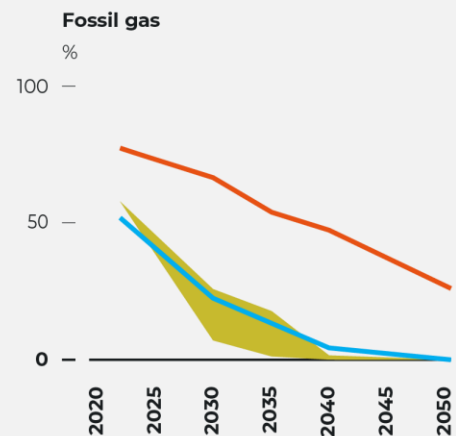
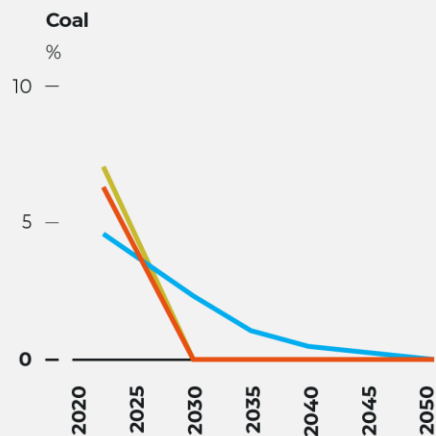


Source: Upcoming analysis

REQUIREMENTS TO STAY IN LINE WITH THE PARIS AGREEMENT



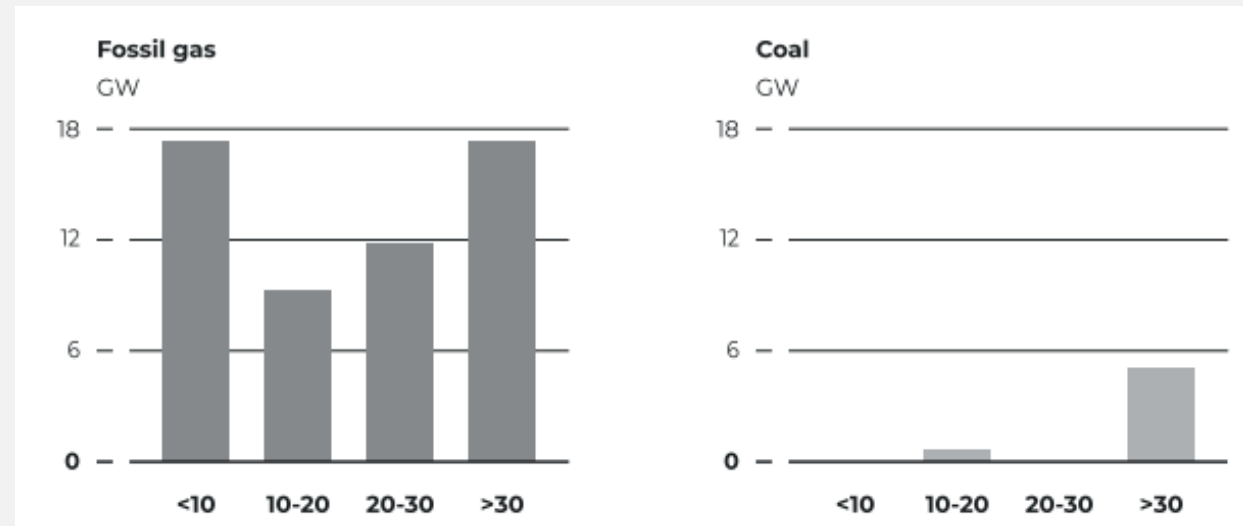
- Generally high agreement on the need for a **phase out of coal** in the short- to mid-term
- **Renewables deployment** need to accelerate rapidly already in the near term
- Higher level of **disagreement** on the future of **fossil gas**
 - Political vs technical feasibility
 - Increase political will through the aspects such as **economic competitiveness** and **energy security**



CURRENT PIPELINE

- The coal fleet is relatively **old** and there is currently **no new planned** capacity
- The **majority** of new **planned capacity** is **fossil gas**
Fossil gas is the **main challenge** to decarbonize the power sector, but there is a **lack of discourse**
- Also has the potential to **reduce the cost of electricity** while **improving energy security**, as we will demonstrate in our presentation

AGE DISTRIBUTION OF THE CURRENT OPERATING COAL AND FOSSIL GAS POWER GENERATION FLEETS IN MEXICO



KEY AREAS OF CLIMATE MITIGATION FINANCE FOR THE POWER SECTOR

Overview of just transition elements in the power sector



Infrastructure: Clean build-up

- New renewable energy
- New power storage solutions
- New and upgraded grid connections
- Energy efficiency measures
- System management / balancing
- New manufacturing for components



Infrastructure: Fossil phase-out

- Early retirement of fossil fuel based power plants
- Restricted operation of fossil fuel based power plants
- Reduced fossil fuel production
- Decommissioning of plants / mines
- Repurposing or remediation of sites



Just social transition

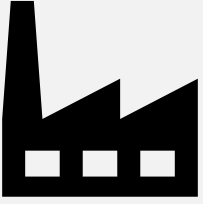
- Support to retiring workforce
- Reskilling / training programmes
- Economic diversification from coal
- Relocation support
- Community investments
- Education and skilling new workforce



Institutional capacity

- Sector planning and delivery
- Project permitting / licensing
- Monitoring progress
- New policy development
- Public engagement and awareness

- Order-of-magnitude estimates
- Finance **instruments** and **types** are also important aspects
 - Need for more **grants** and **concessional finance**



INFRASTRUCTURE: FOSSIL FUEL PHASE OUT

ESTIMATING CLIMATE FINANCE NEEDS FOR FOSSIL FUEL PHASE OUT



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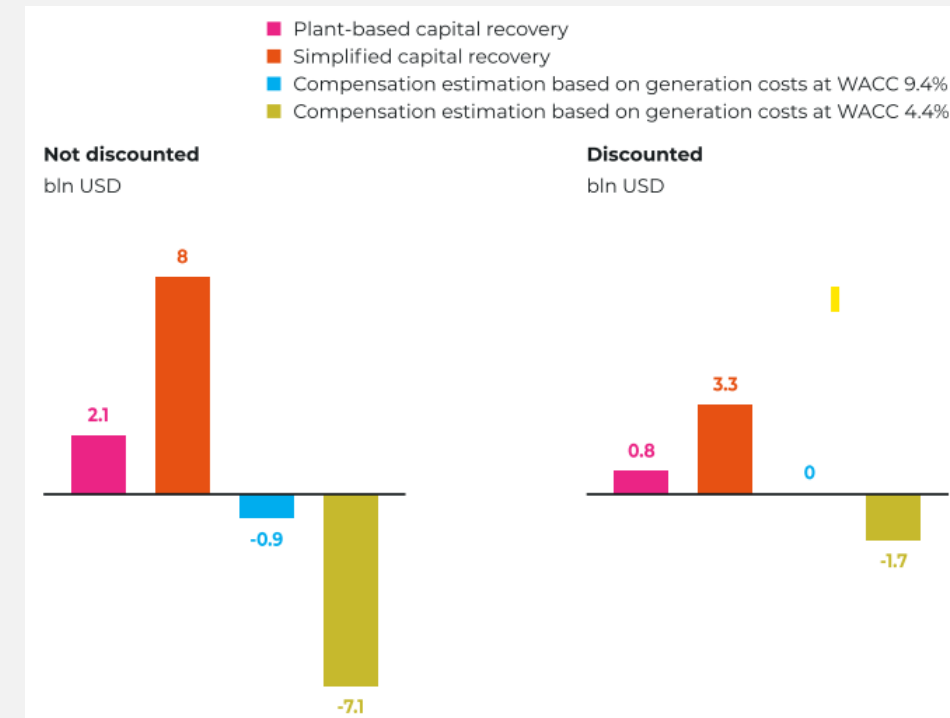
Institutional capacity

Sector planning and delivery
Project permitting / licensing
Monitoring progress
New policy development
Public engagement and awareness


- Following a **Paris Agreement compatible** pathway will require:
 - **No new build-out** of fossil gas
 - The **early retirement** of 82 fossil gas plants
 - **Restricted operation** of some fossil gas plants
- ➡ This could impact the profitability of affected fossil gas plants
- How much **financial compensation** to fossil gas plants is justified for **early retirement**?
 - Compensation for early retirement can only be justified if the plant has not yet broken even
 - The aim is not for the fossil fuel plant to generate additional profit
 - Three methods applied


EARLY RETIREMENT: KEY TAKE-AWAYS


- Compensation needs range from **negative** values to around **9 bln USD**
 - Highly dependent on the approach used
- Many fossil gas plants have run at a **constant loss** and rely on **energy subsidies**
- Replacing fossil gas capacity with **renewables** could **improve the economic situation** of power plant owners
 - Highly sensitive to the perceived risk of making investments in Mexico and the future cost of fossil gas



THREE METHODS TO ESTIMATE COMPENSATION

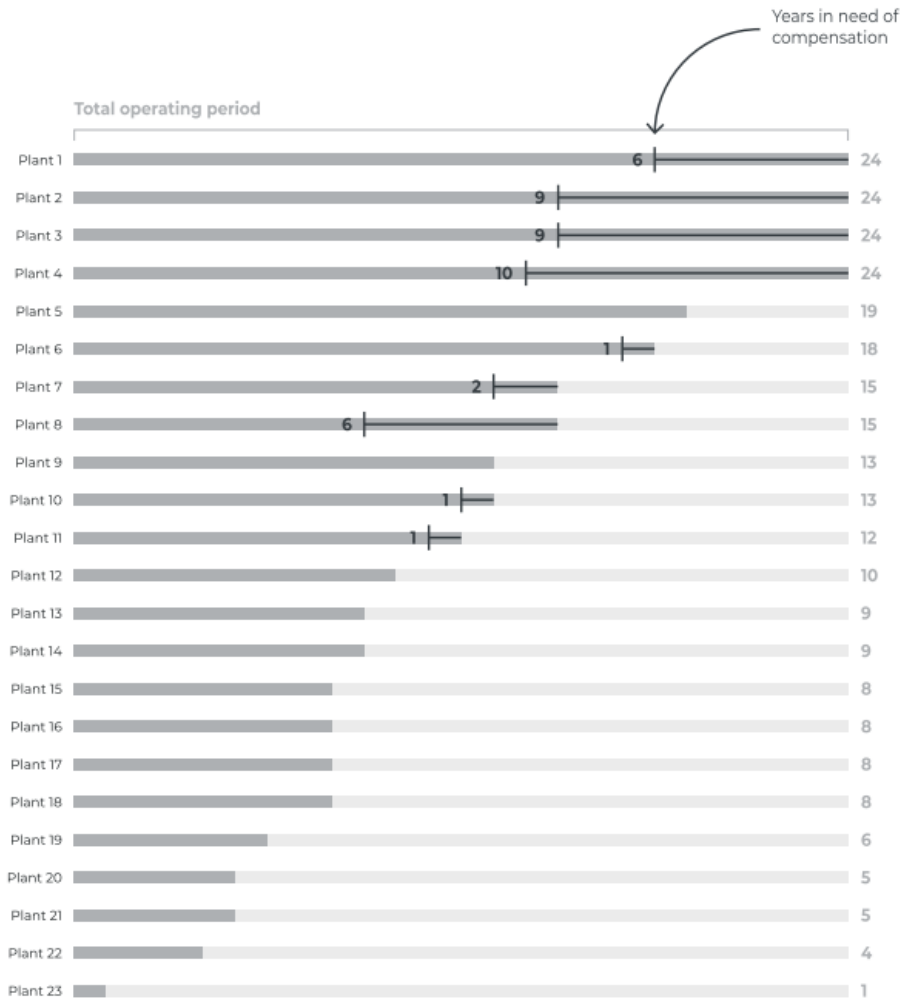
1. Plant-based capital recovery 

In what year did or will the plant break even?
2. Simplified capital recovery 

Assuming that plants break even at the end of its technical lifetime
3. Compensation estimation based on generation costs 

Compares the generation cost of existing fossil gas plants with new renewables

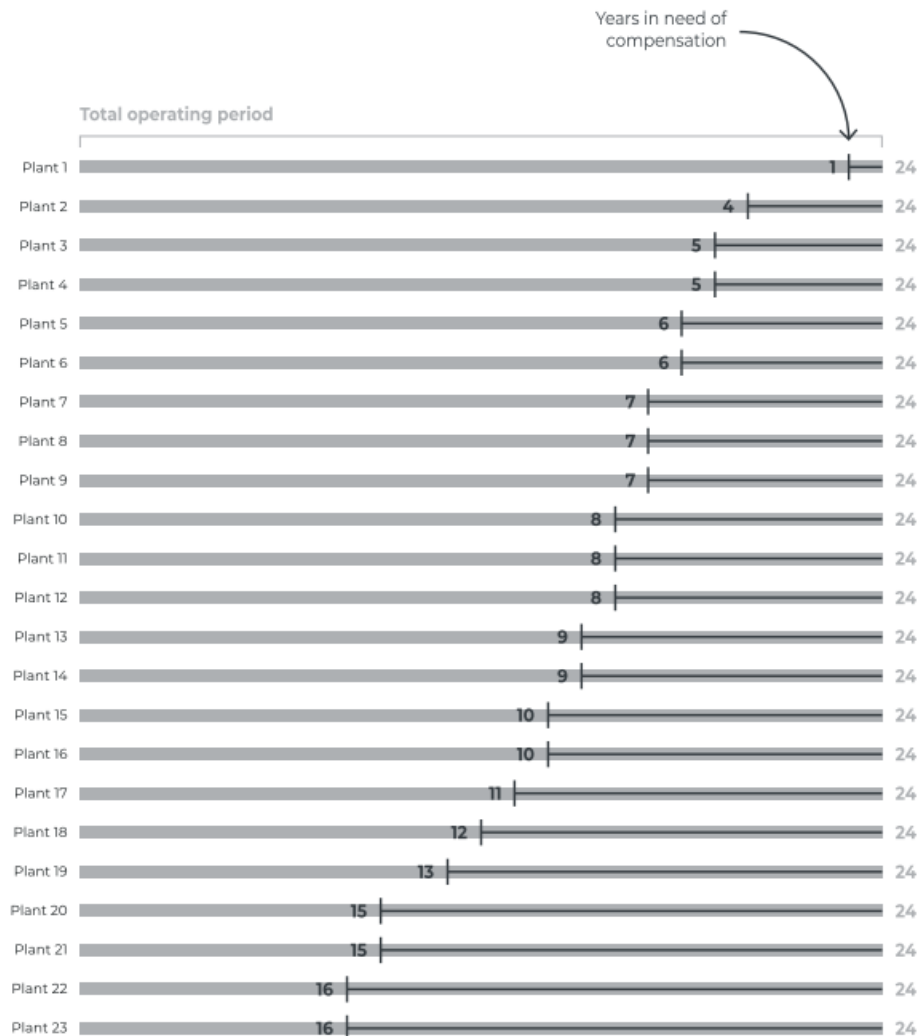
PLANT-BASED CAPITAL RECOVERY



- In total **37 plants** (7.9 GW) that would **break-even before the early retirement year**
- **9 plants** (1.6 GW) would be in need of **economic compensation**
- Remaining **39 plants** (1.7 GW) run at a **constant loss** >> Compensation payment is estimated assuming break-even at end of lifetime
- Heavily reliant on **assumptions**

Figure: Operating period before fossil gas fired power plants in Mexico break-even and years in need of compensation for plants over 50 MW (Method 1)

SIMPLIFIED CAPITAL RECOVERY



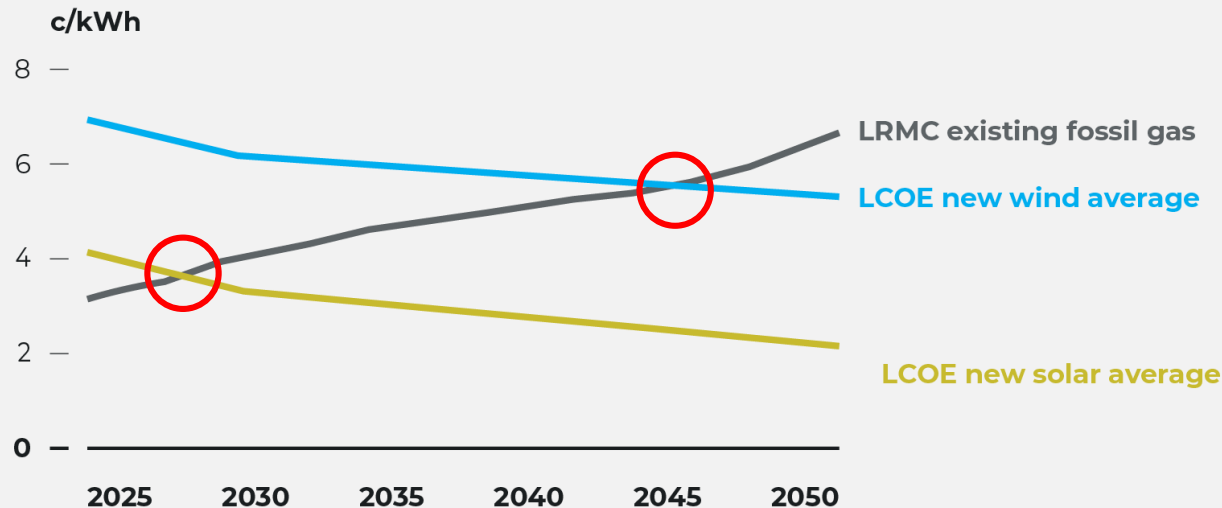
- All plants would need compensation by definition
- Does not reflect the reality
- Significantly inflates the compensation estimates

Figure: Operating period before fossil gas fired power plants in Mexico break-even and years in need of compensation for plants over 50 MW (Method 2)

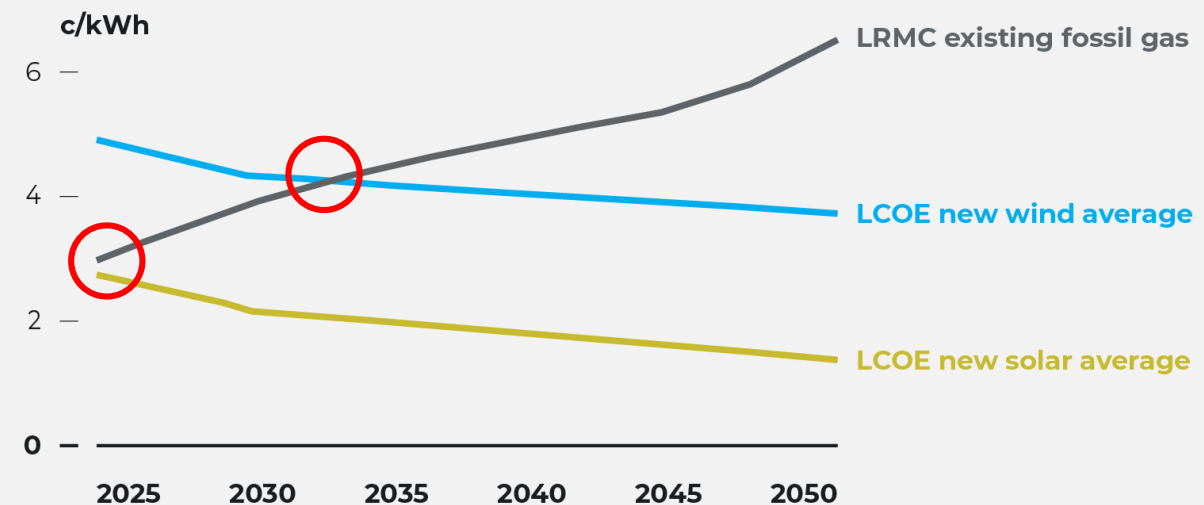
COMPARING ELECTRICITY GENERATION COSTS

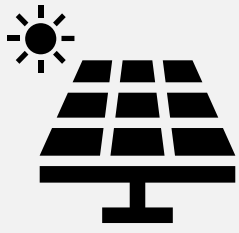
- Renewables are **currently more expensive** based on current interest rate
- LRMC of fossil gas **increases over time** while cost of **renewables is decreasing** following learning curves and economies of scale
- With **lower cost financing**, solar is already cheaper than fossil gas, and wind would reach that point before mid-2030s

WACC 9.4%



WACC 4.4%



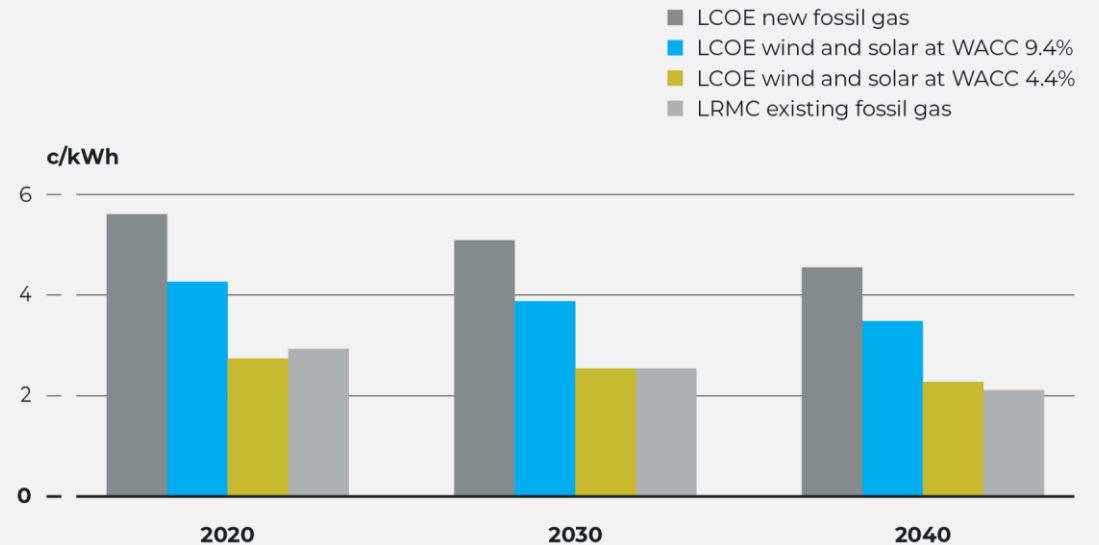
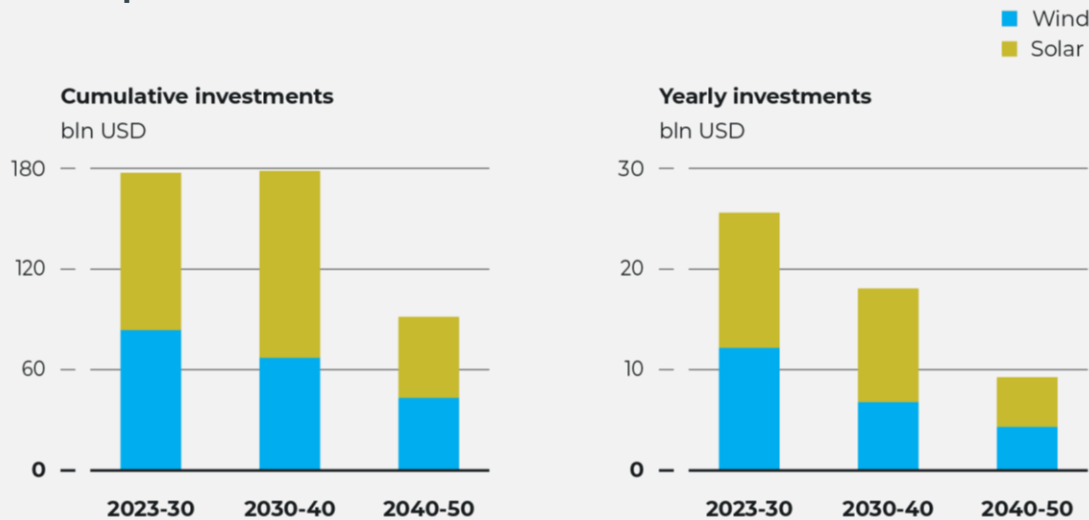


INFRASTRUCTURE: CLEAN BUILD-UP

ESTIMATING CLIMATE FINANCE NEEDS FOR RENEWABLE ENERGY BUILD OUT

- Following a Paris Agreement compatible pathway **significant investment in RE are needed**
 - Yearly capacity build out needs to increase for 2024 – 2030
 - **7 times per year** for solar
 - **28 times per year** for wind
- compared to 2020 – 2023

- The **buildout of RE** is also the **cheapest option** in Mexico:
 - LCOE of wind and solar mix already lower than NEW fossil gas, **EVEN with current financing**
- RE buildout makes more economic sense than expansion of fossil gas **EVEN under low price gas scenarios**

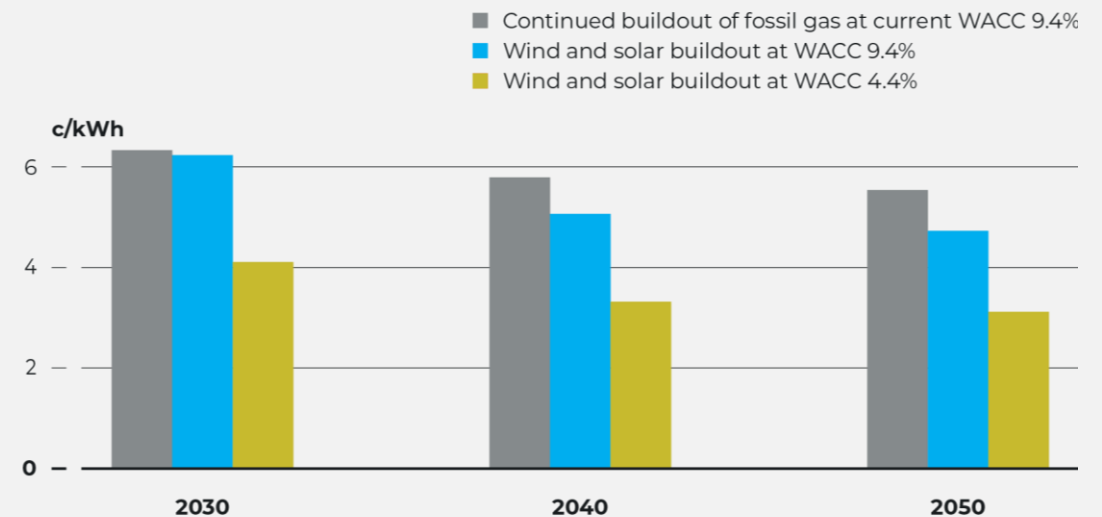


LEVERAGING CLIMATE FINANCE FOR RENEWABLE ENERGY BUILD UP



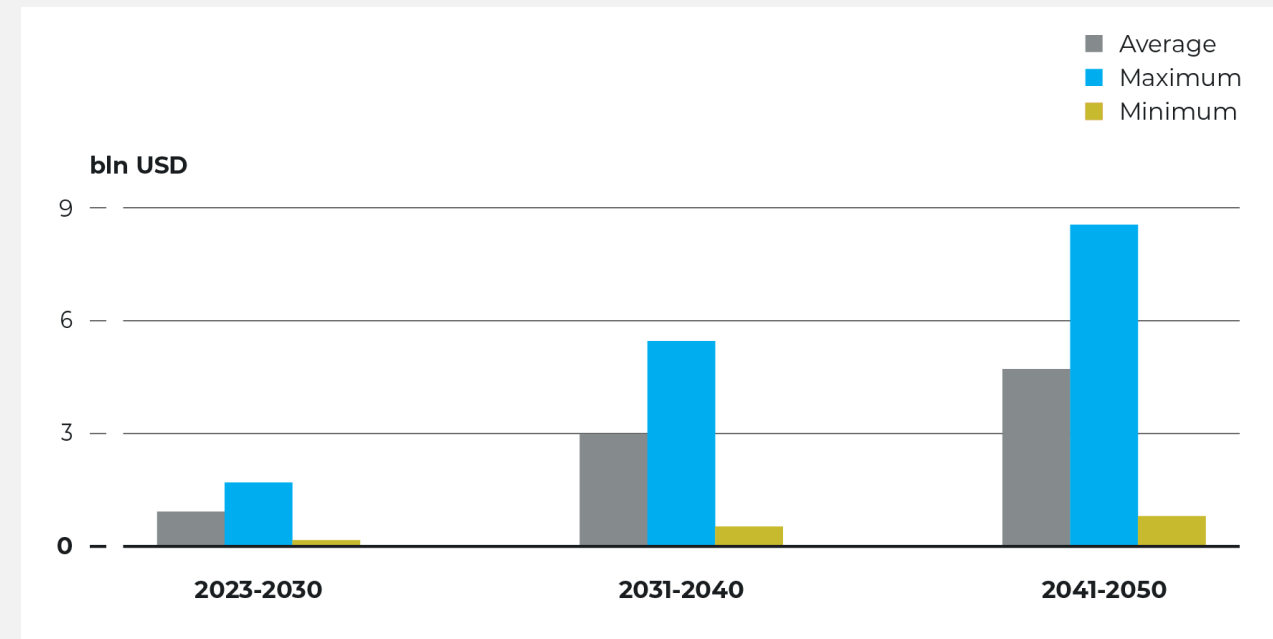
- » **Solid enabling framework** to reduce risk and provide investor certainty
 - Reliable, long-term renewables remuneration regimes
 - Long-term renewables targets
- » **Targeted international support** could be to help overcome barriers
 - Low cost (concessional) financing or even just commercial financing
 - Financial instruments such a guarantee funds to lower investor risks
 - Technical and financial support to overcome permitting, siting and planning risk
- » → Renewables is an area that can leverage significant gains with limited financial support

- » RE could help **reduce electricity generation costs** and **lower current energy subsidies**
 - Current subsidy levels at 9.9 c/kWh could be reduced by between 0.4 c/kWh (current WACC) and 2.3 c/kWh (low-cost financing)
 - Savings could amount to between 33.8 mln USD and 129.3 mln USD per year



ESTIMATING FINANCE NEEDS FOR GRID EXPANSION

- Grid buildout planning/ modelling in line with a net zero scenario **requires national planning/modelling** which **does not** exist in Mexico yet
- Major **areas of focus** should be the buildout of **transmission grid, distribution grid** and **digitalisation** (e.g. demand management)
- First estimates based on a meta study of experience in the US suggest an order of magnitude from 20 bln USD to almost 160 bln USD to connect RE capacity coming online





JUST SOCIAL TRANSITION

JUST SOCIAL TRANSITION

- Difficult to quantify without consultation - **Local context is key**
 - **Combination** of **bottom-up inputs** and **top-down coordination** and finance most successful internationally
 - Key areas include **brown job transition**, **regional development** (coal), vulnerabilities caused by **temporarily increased electricity costs**, vulnerabilities due to **land use impacts** on selected groups
 - Brown job transition and regional development are heavily interlinked
 - Various **measures/ funds** could be considered in Mexico:
 - Regional transition fund(s) – to help regions transition
 - Social transition funds – to support vulnerable groups
 - Workers compensation funds – to help workers transition
 - National/ regional just transition plans – to form the basis for structured funding
-  International support could help capitalise these funds

CONCLUSIONS

- Identifying **support needs** is a **political process** that requires deep **engagement** with **affected stakeholders** in the local context
- A **robust** and **credible evidence base** is **needed** to support this process, also to attract international finance
 - Provide order-of-magnitude figures, clarify important trade-offs, highlight potential pitfalls (such as windfall profits) and provide a starting point for investors and other financing institutions to engage with a country
- Any quantification **highly depends** on the **underlying assumptions** made, policy and prioritisation decisions as well as the availability of often proprietary data
 - A focus on short to mid-term support needs is advisable
- **Not all areas are as easily quantified** – Some (e.g., just transition) require extensive stakeholder processes, which should not lead to a prioritisations of funds
- **Investment** and **finance needs vary significantly** across these different dimensions in scale and type and tailored approaches should be considered in all areas