

Renewable Energy Roadmap for Central America: *Towards a Regional Energy Transition*

Presenters:

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SPEAKERS



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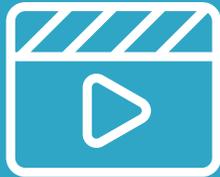
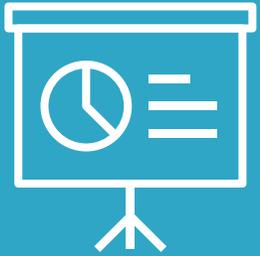
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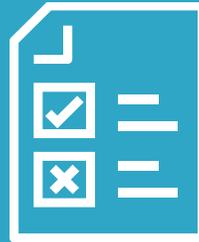
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REmap Central America (CA)

Assessing the roadmap – An analysis in joint effort with key stakeholders of the region

1. Case study by country

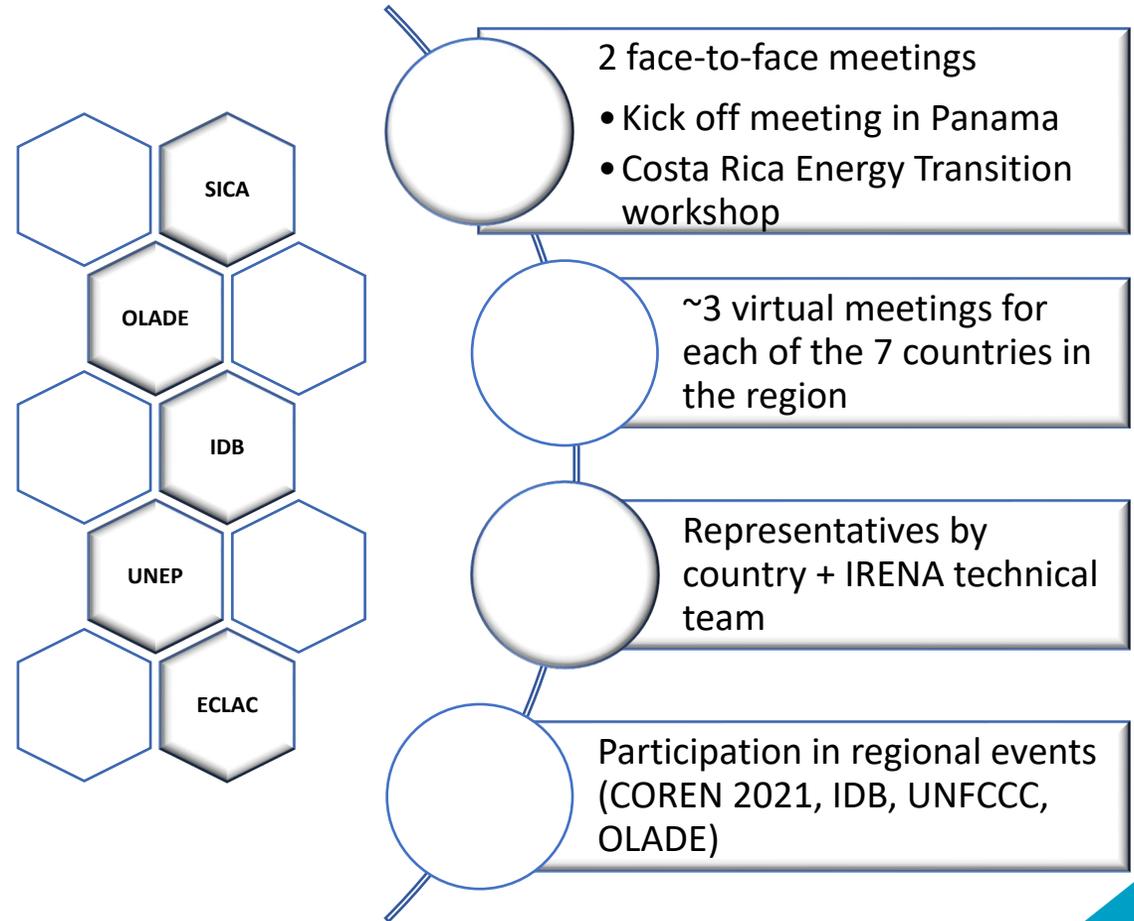
- Definition of energy scenarios → BES, PES, TES, DES
- End-use sectors modelling → REmap *Activity Tool*
- Power sector modelling → MESSAGE
- Flexibility analysis → FlexTool
- Slide deck with results by sector

2. Country engagement

- Feedback from the country's technical team
- Model adjustments based on feedback
- Final validation

3. Regional analysis

- Analysis of energy supply and demand
- Investment analysis
- Final report, dashboard and other deliverables



The roadmap brings benefits to the region that would help address major challenges at similar costs as current plans

Universal access to electricity and clean cooking technologies and carriers

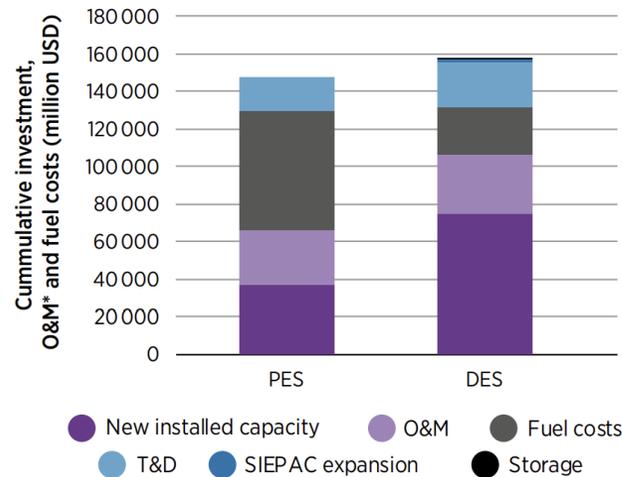
Increase of the use of local renewable resources, and energy security

Reduction of CO₂ emissions and local pollution

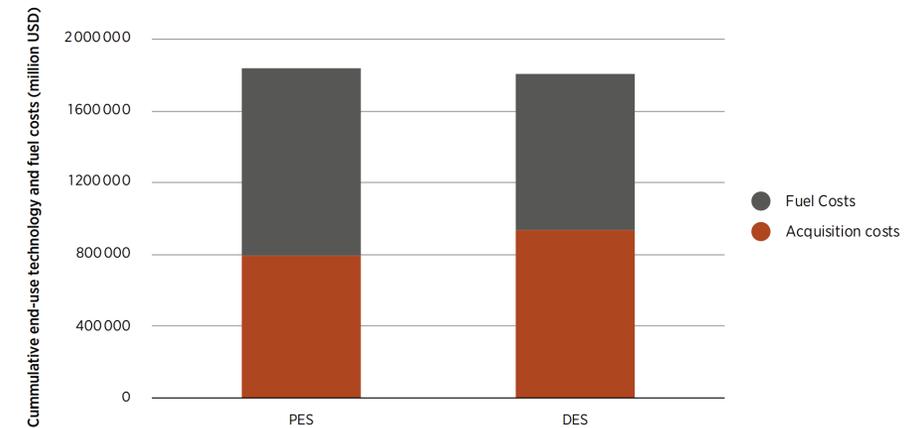
Reduction of fossil fuel imports and related payments

Increase of investment and stimulus to the economy

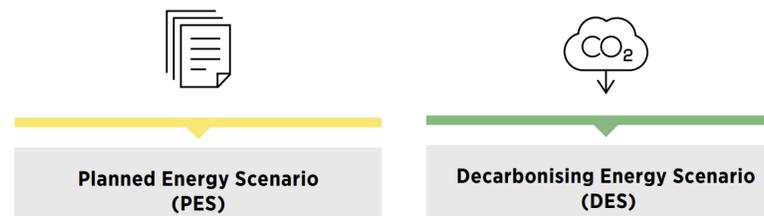
Power sector cumulative investment



End-use sectors cumulative costs



Note: EUS = end-use sector; O&M = operations and maintenance



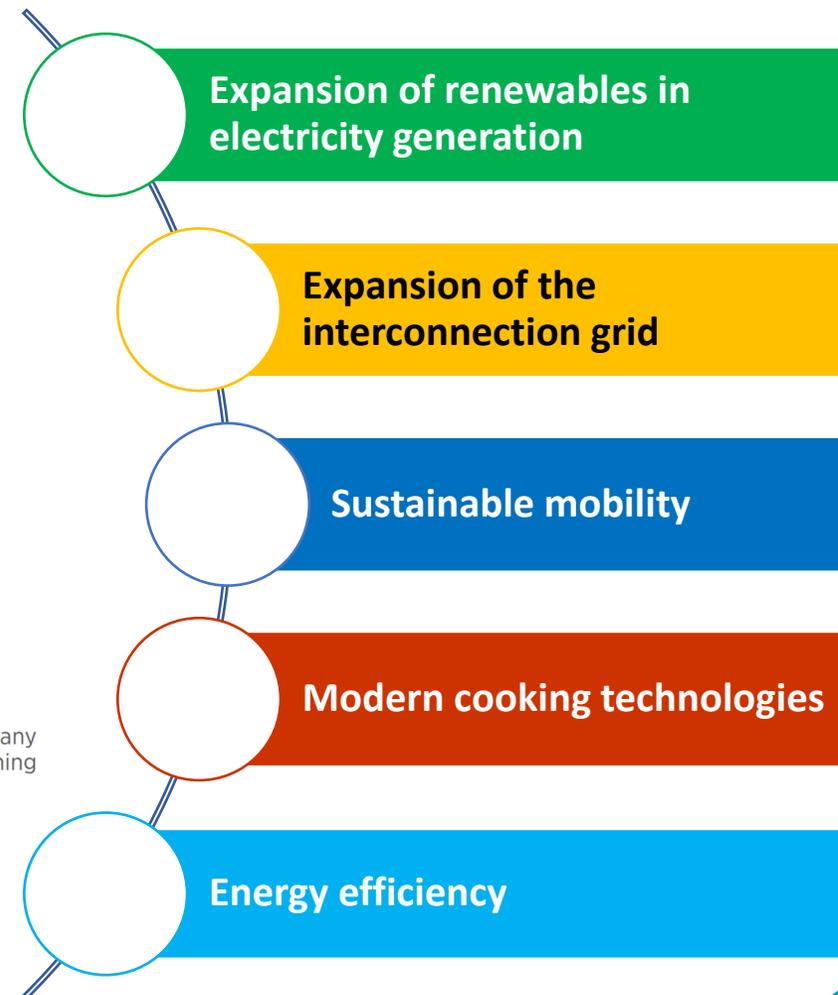
The 5 key pillars of the energy transition in Central America

An integrated planning of the regional energy transition is key



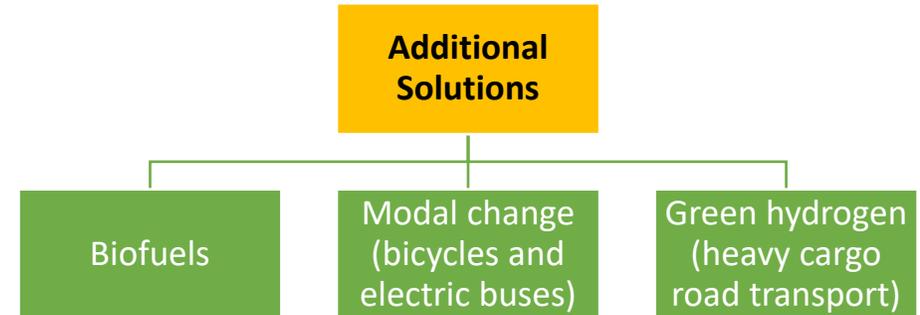
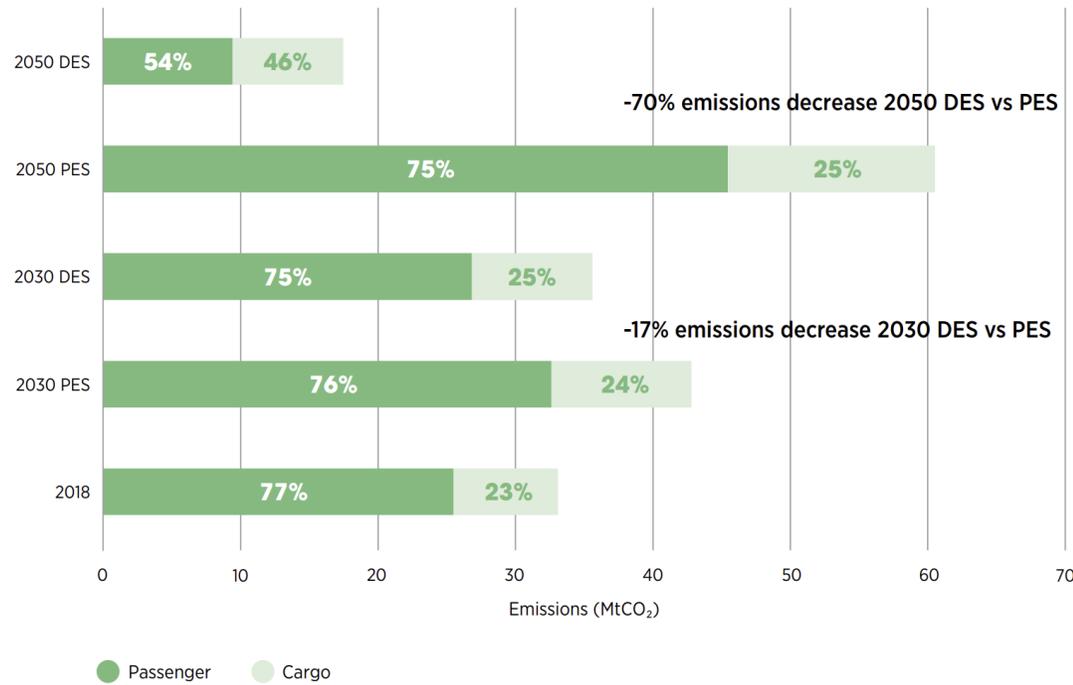
- Belize
- Republic of Costa Rica
- Republic of El Salvador
- Republic of Guatemala
- Republic of Honduras
- Republic of Nicaragua
- Republic of Panama

Disclaimer: This map is provided for illustration purposes only. Boundaries and names shown do not imply the expression of any opinion on the part of IRENA concerning the status of any region, country, territory, city or area or of its authorities, or concerning the delimitation of frontiers or boundaries.



The electrification of the fleet will be crucial to reduce the transport sector emissions by ca. 70% compared to the effect of current plans

- By 2050, $\approx 80\%$ of the passenger fleet and $\approx 54\%$ of the cargo fleet is electrified under DES, from $\approx 0\%$ in 2018
- Cumulative costs of 486 billion USD is needed, covering fleet acquisition (82%) and infrastructure (18%)

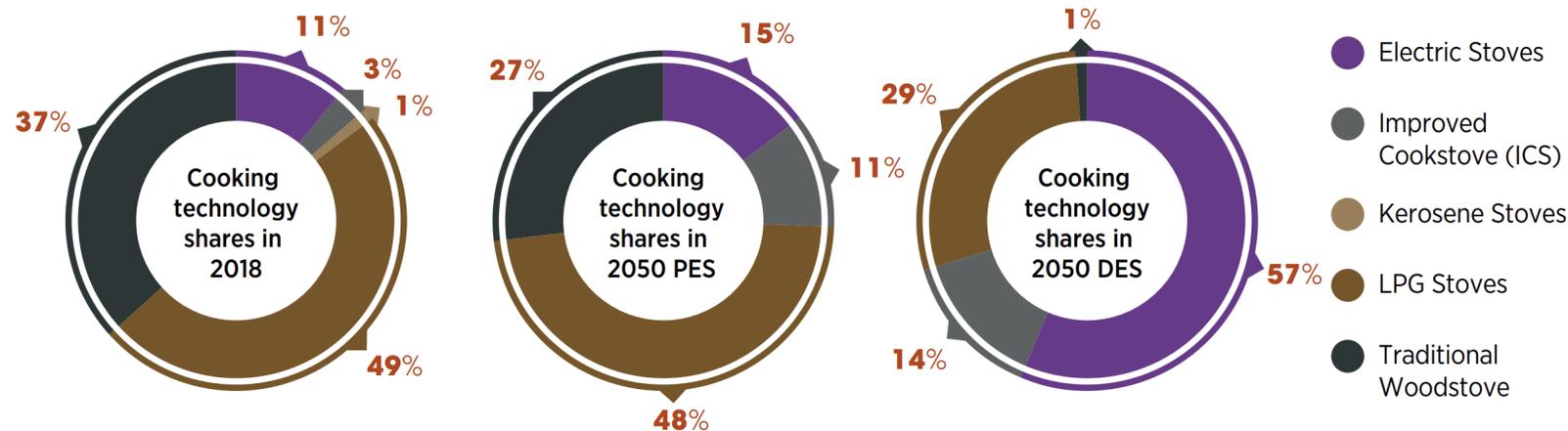


Action plan for investment in sustainable mobility

- Development of infrastructure of charging points for electric vehicles at national and regional level
- Programs for the promotion of electric vehicles, both public and private
- Design of solutions and tariff schemes for smart charging and regional regulation

Provision of universal access to clean cooking technologies and fuels thanks to the introduction of electric stoves and improved cooking stoves

- Increase of electric and improved stoves by around 9 times in 2050 with respect to 2018
- Average annual investment in electric and improved stoves of USD 395 million/year
- Deployment of electric stoves
 - 230 000 units/year during 2021-2030 and 330 000 units/year during 2030-2050

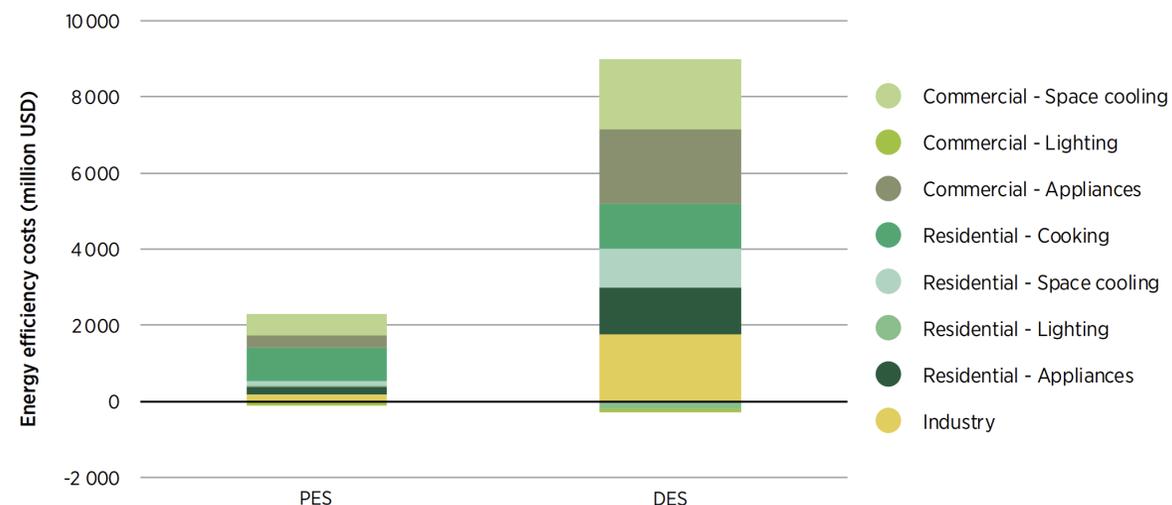
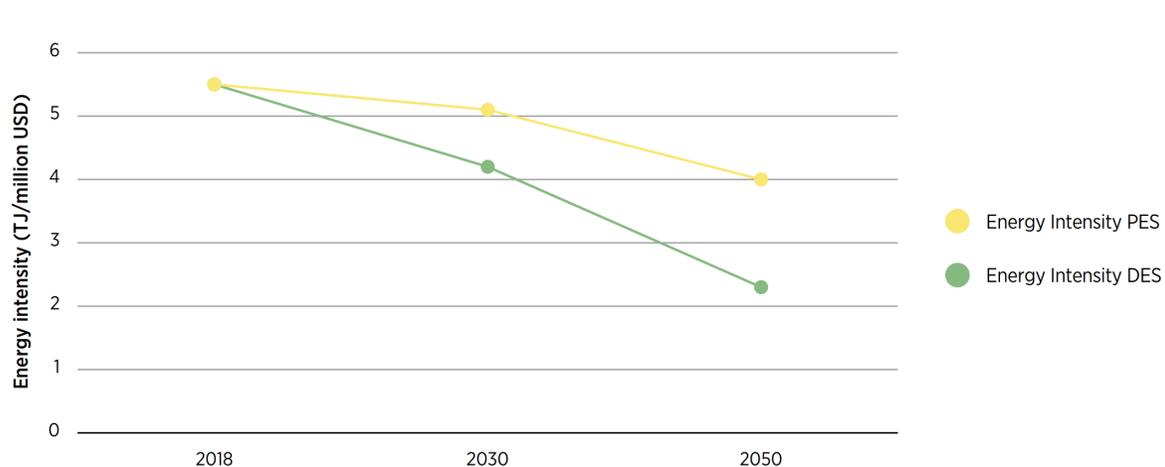
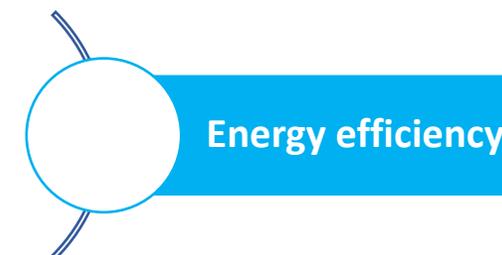


Action plan for investment in modern cooking technologies

- Regional plan for the promotion of improved cookstoves
- Regional plan to promote electric cooking
- Financing for the acquisition of more efficient equipment

The cumulative costs of energy efficiency measures would be 8.3 billion USD to reduce energy intensity in 43% by 2050

- New regional energy efficiency standards (“RTCA’s”) for high consumption equipment and sustainable building codes
- Increase in current energy efficiency indexes in DES
- Average energy efficiency costs of around USD 260 000 per year are required in DES

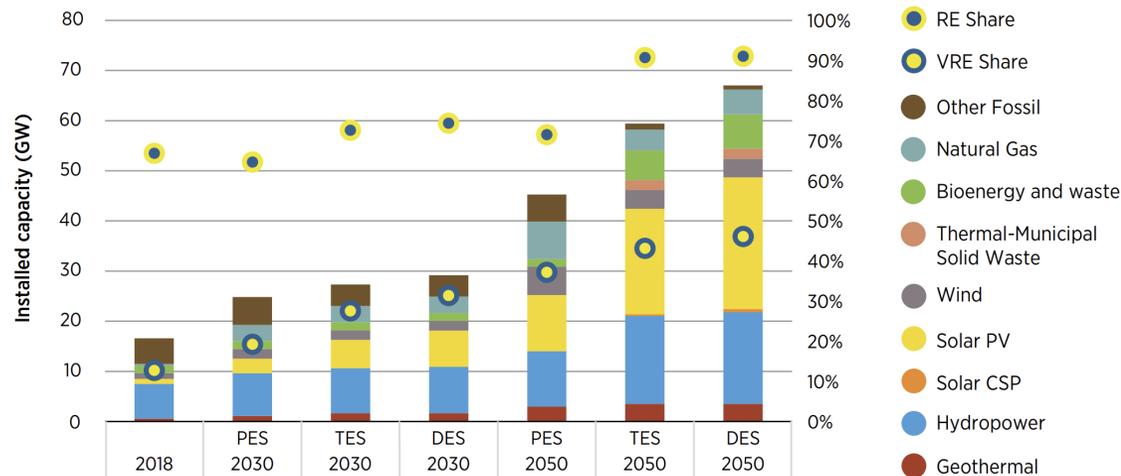


Regional action plan for promoting energy efficiency

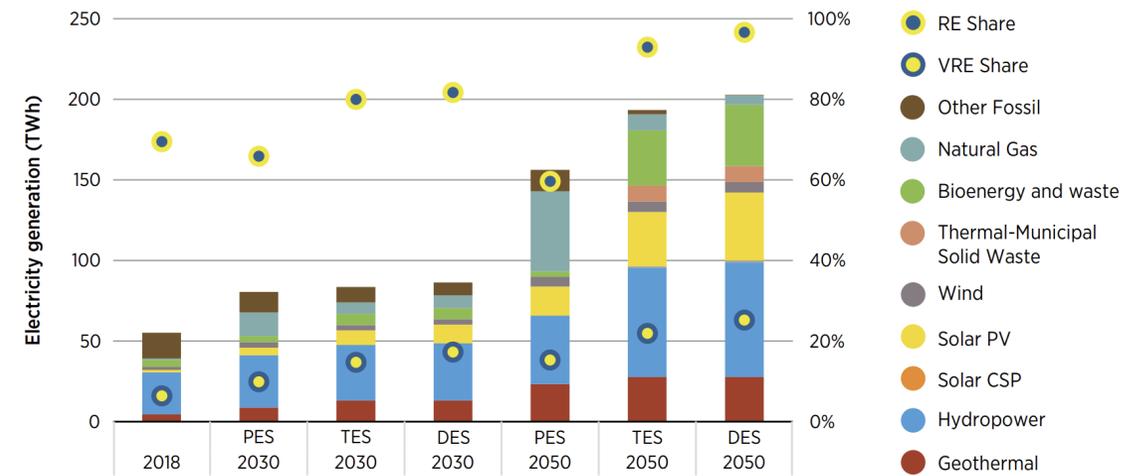
- Labelling and minimum standards for electrical equipment, particularly for air conditioners and refrigerators
- Financing for the acquisition of more efficient equipment
- Characterization of the industry sector and promotion of energy efficiency and direct use of renewables solutions
- Minimum standards and emission limits for vehicles

The annual deployment of renewables of 1.4 GW will increase the share of renewables by 2050 to 90%, compared to 67% in 2018

- **Cumulative investment** in new installed capacity in the DES scenario is expected to be **75 billion USD**
- **Average annual investment** in installed capacity during the period 2021–2050 (600 million USD estimated between 2015-2020, of **1.3 billion USD** in PES and **2.6 billion USD** in DES)
- **Solar PV rooftop electricity generation** covers 10% of buildings electricity demand by 2050 in DES



Note: RE = renewable energy; VRE = variable renewable energy; CSP = concentrated solar power

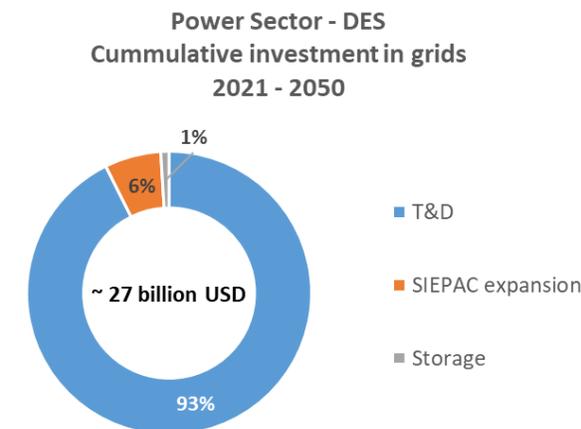
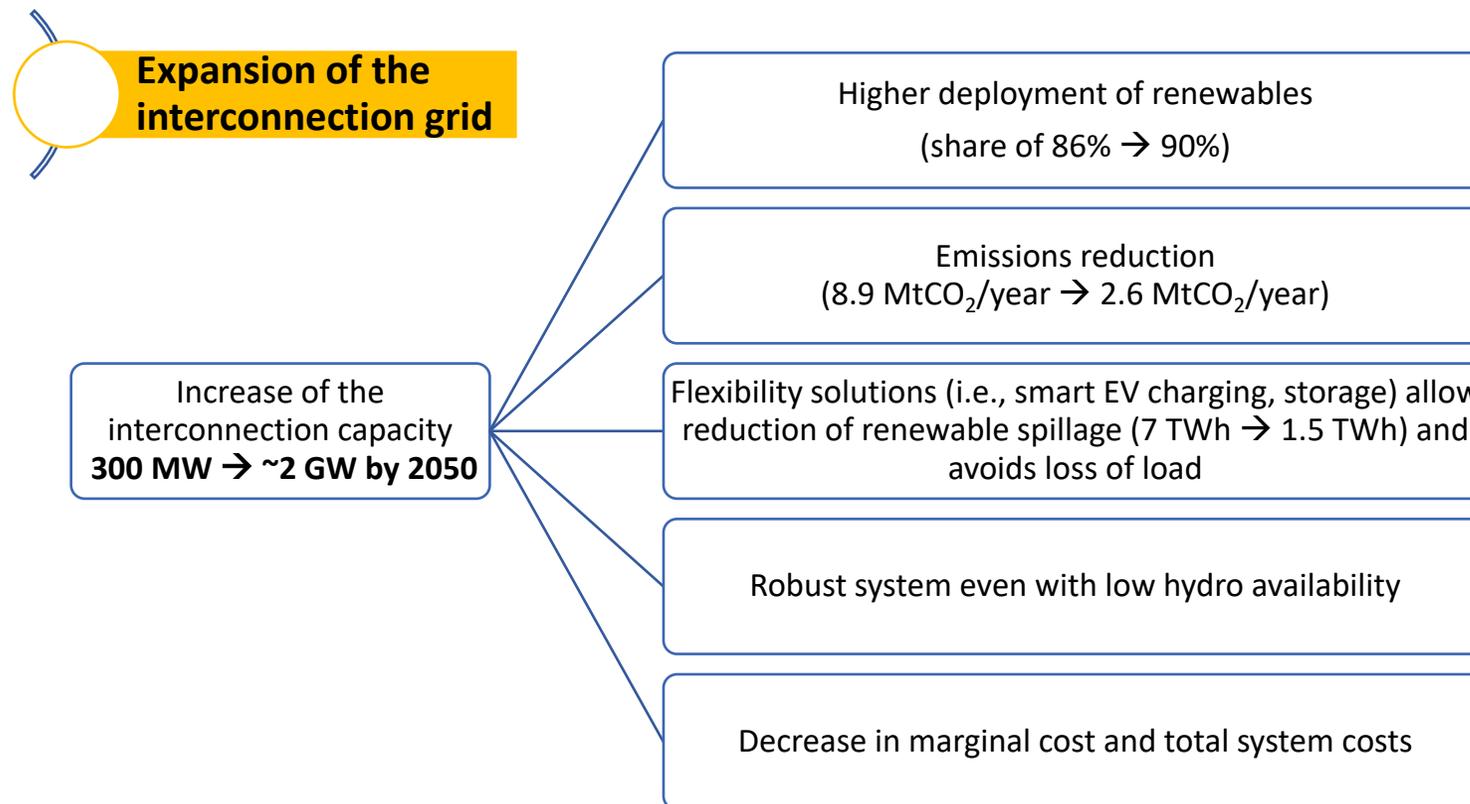


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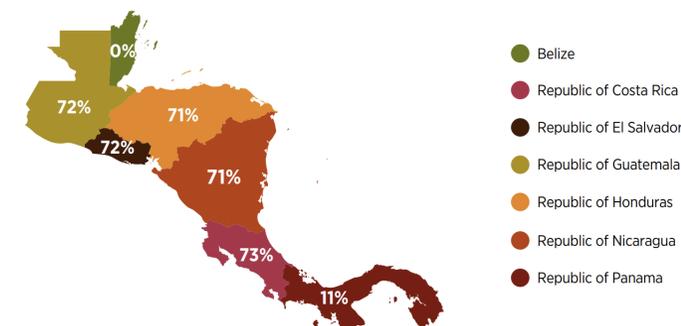
Action plan to scale-up investment in renewables

- Financing of feasibility studies for the development of a portfolio of renewable-based generation and transmission projects
- De-risking and adjusted contract models to reduce the cost of capital and promote investment attraction

The regional integration of the power system could be fostered to further exploit the total renewable potential of around 180 GW



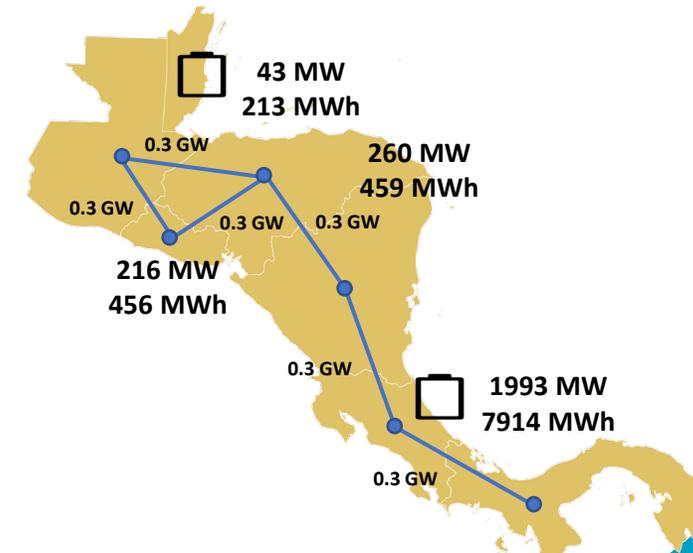
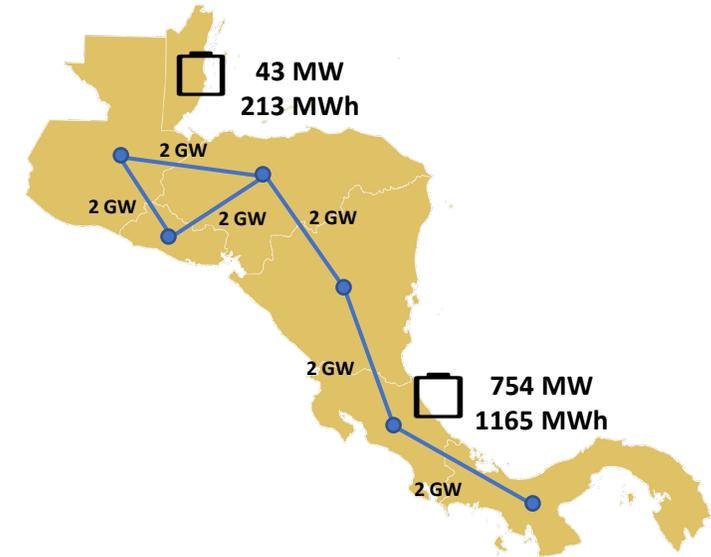
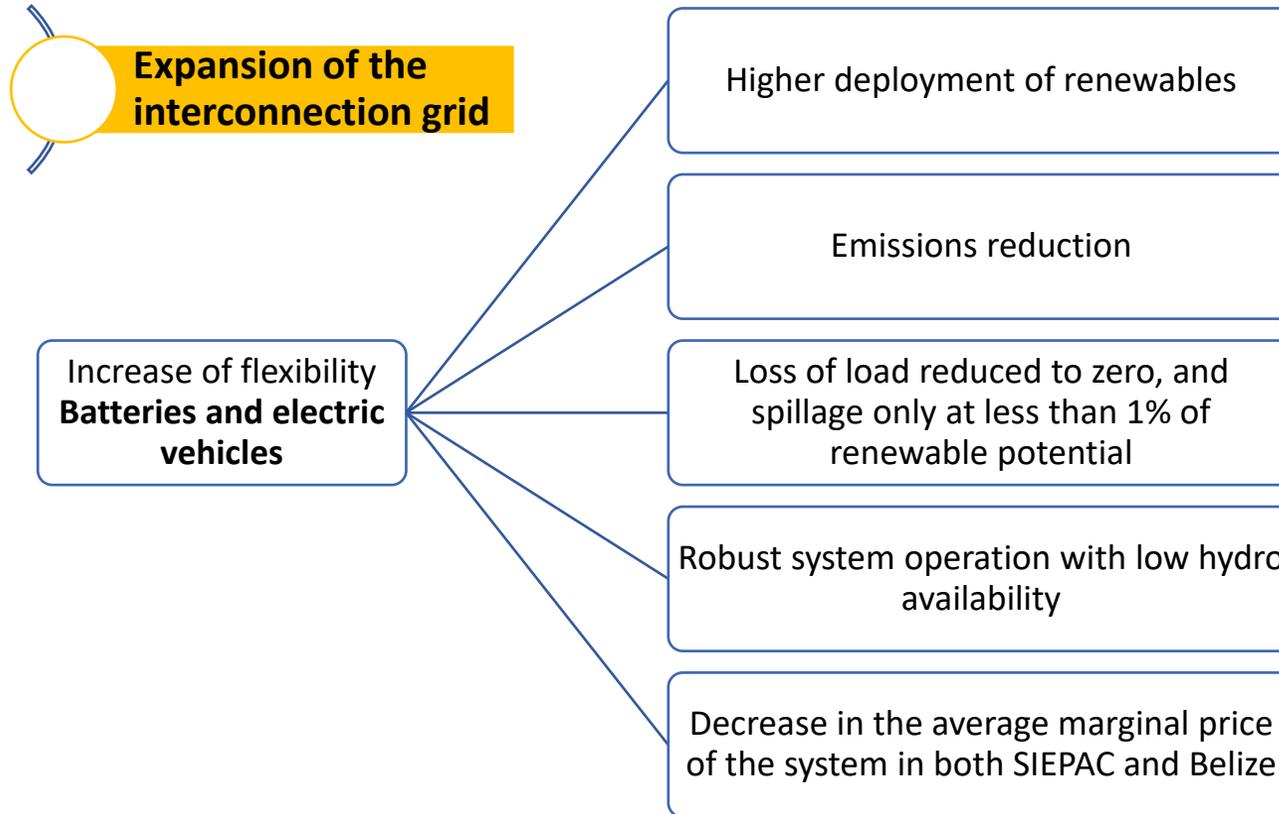
Reduction of the marginal price in the increased interconnection scenario



Regional action plan for the expansion of the interconnection network

- Financing of studies and the expansion of the interconnection among the countries of the region
- Regional projects for the integration of energy storage solutions in the grid
- Closer integration of the functioning of the market and the regional dispatch

The installation of energy storage as well as flexible charging of electric vehicles could further foster renewables



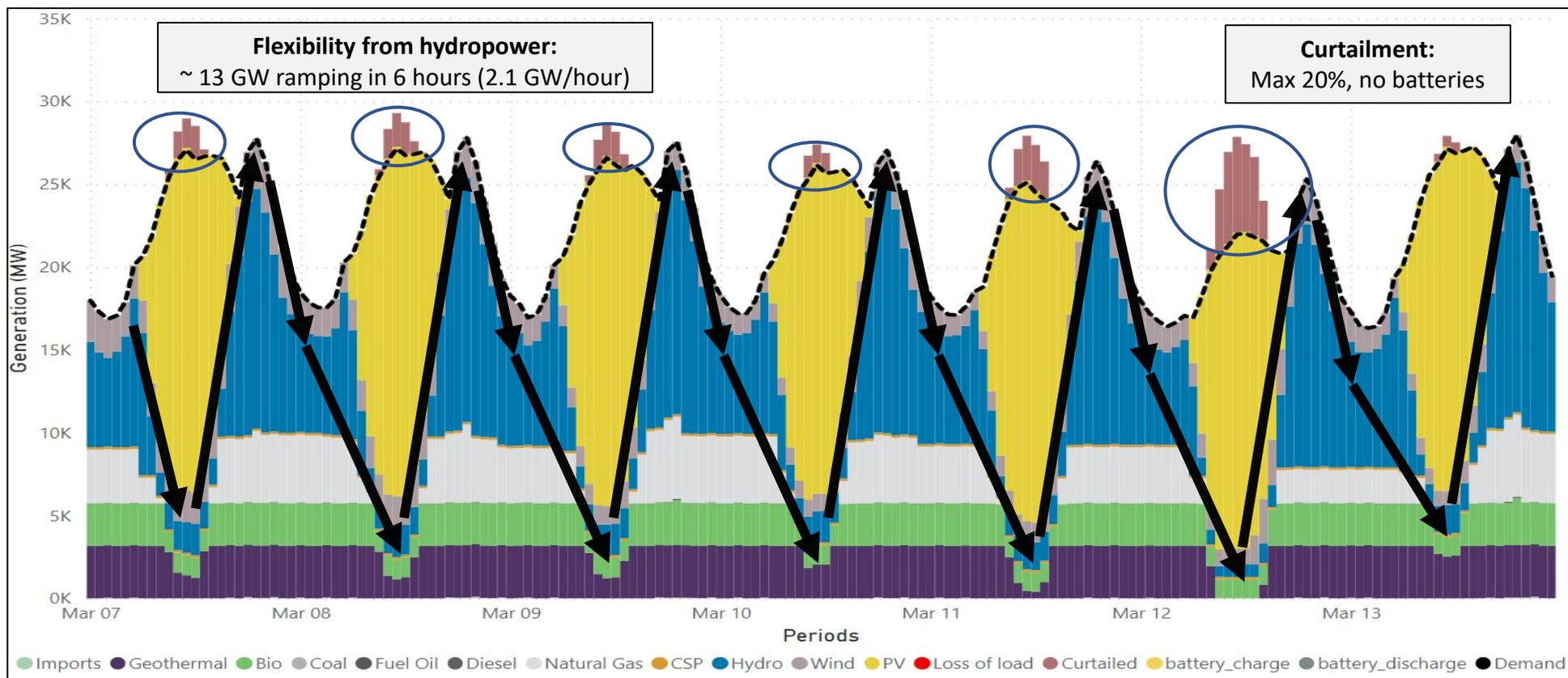
Regional action plan to increase the flexibility of the system

- Development of strategies for smart charging of electric vehicles
- Installation of energy storage systems to integrate renewables, especially solar
- Enabling of demand flexibility through time-of-use rates and aggregators

The combination of Flexibility resources paves the way for solar energy

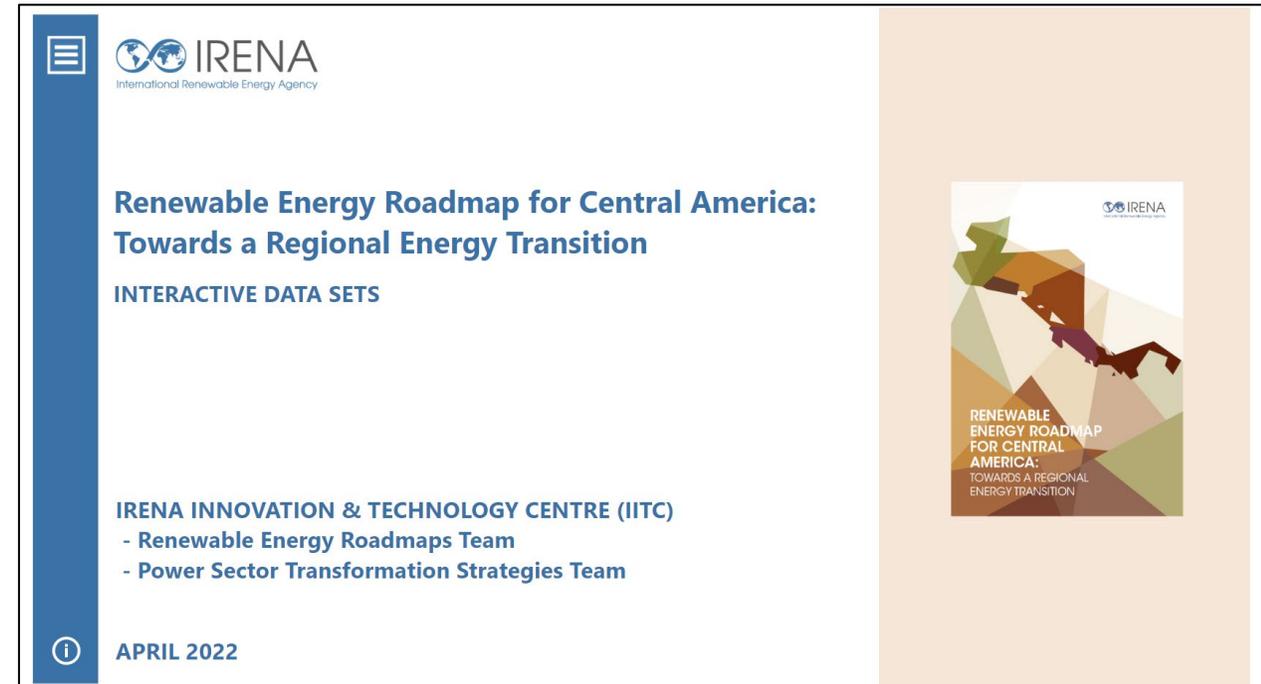
Helping balance supply and demand with flexibility

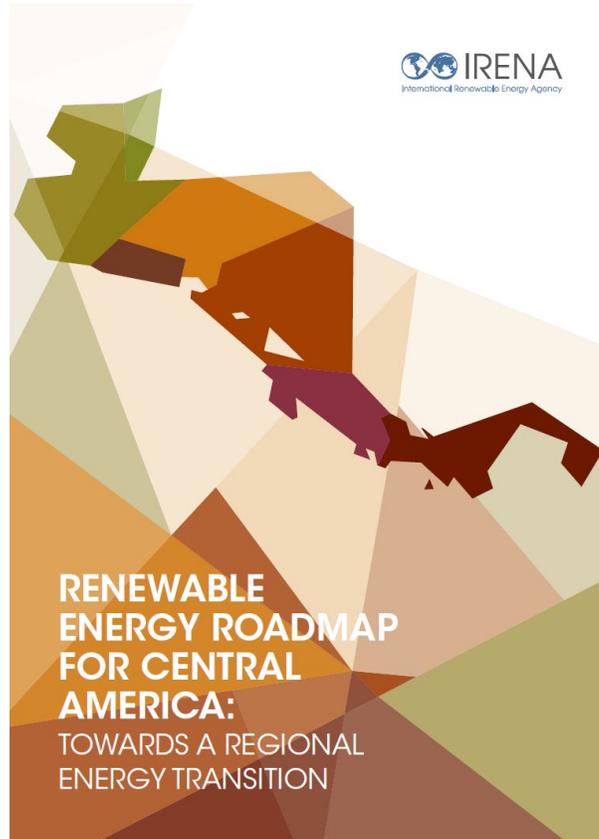
- **Hydropower** ramping requirements: **coordination of 20-40 plants** (300-600 MW) increasing/decreasing power at the same time
- **Storage** complements **absorbing overgeneration and decoupling solar supply and demand**. Yet, there may be cost-effective curtailment amounts
- **Smart charging** of electric vehicles **and demand flexibility** could **alleviate peak hours and displace demand** by the availability of energy



- **Strong country engagement during the process**
 - Analysis results used as inputs for national plans
- **Data driving concrete actions**
 - Perceived as data rich analysis
 - Supported concrete objectives and plans definition
- **Access to finance is still a key challenge**
 - Availability of funds for pilot projects
- **Regional collaboration can play a key role**
 - To further exploit local resources and look for complementarity
 - To promote regional collaboration and sharing of good practices
- **Next steps**
 - Collaboration with IDB to promote analysis outcomes
 - Participation in regional events to keep the discussion open

Power BI online dashboard





Thank you!

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Q & A



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