FUNDACION TORCUATO DI TELLA

En el marco del proyecto DECARBOOST
Catalizando Inversiones para Descarbonizar LAC

Decarbonizing Latin America: a portfolio of investment opportunities in key sectors

Argentina

Pillars for Decarbonizing the energy and transport sectors

Luciano Caratori - FTDT

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Content

Key pillars have been identified to guide the transition to decarbonization in the energy and transport sectors in Argentina

Energy and Transport

Electrify

- *Electric energy over final consumption to increase from 21% (current) to 70%.*
- *The majority of light vehicles should be electric*

Decarbonize

- *Emission-free electricity generation must reach +90% of total*
  - *hydroelectric, nuclear and non-conventional renewables*
  - *Seek decentralization*

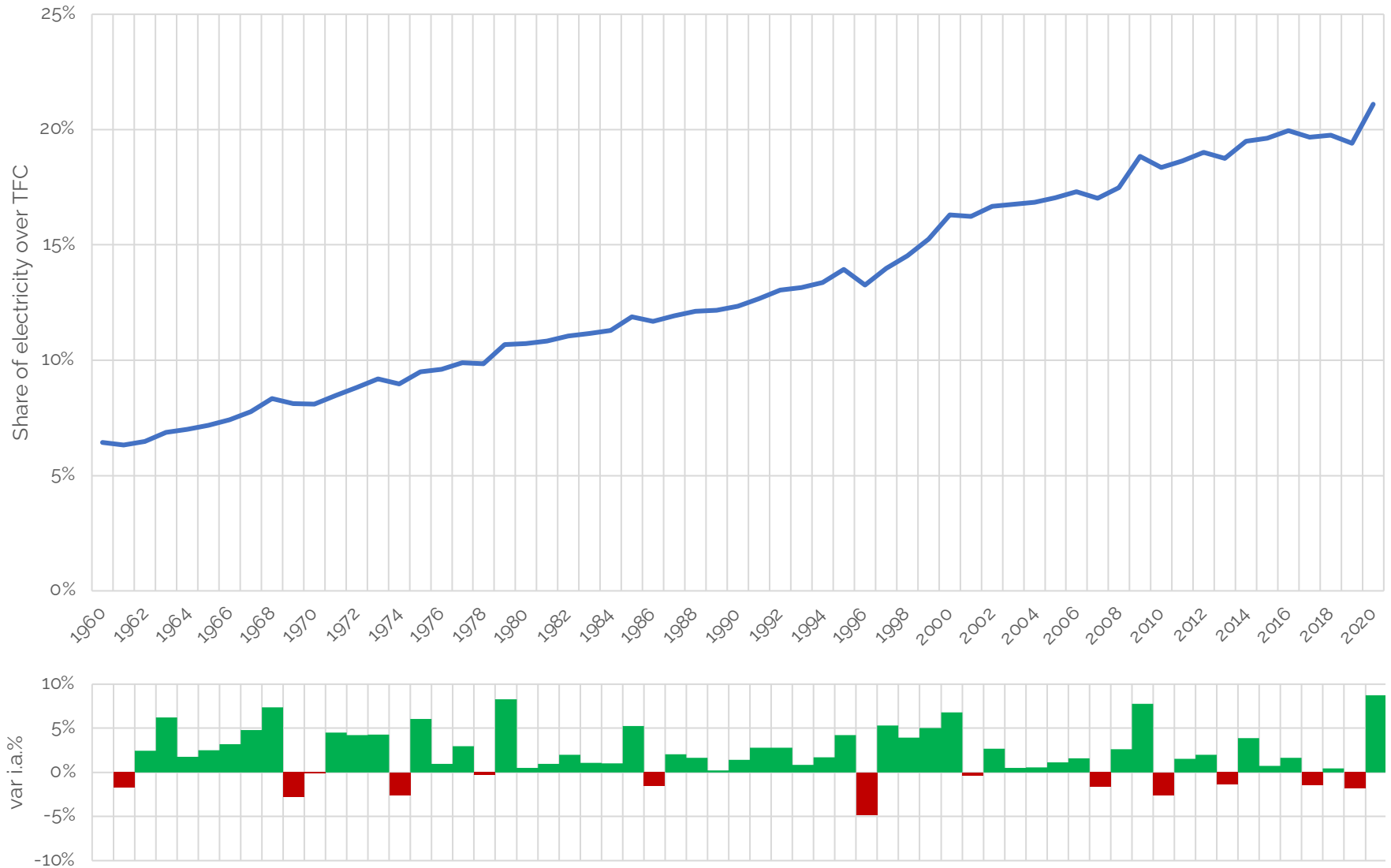
Reduce

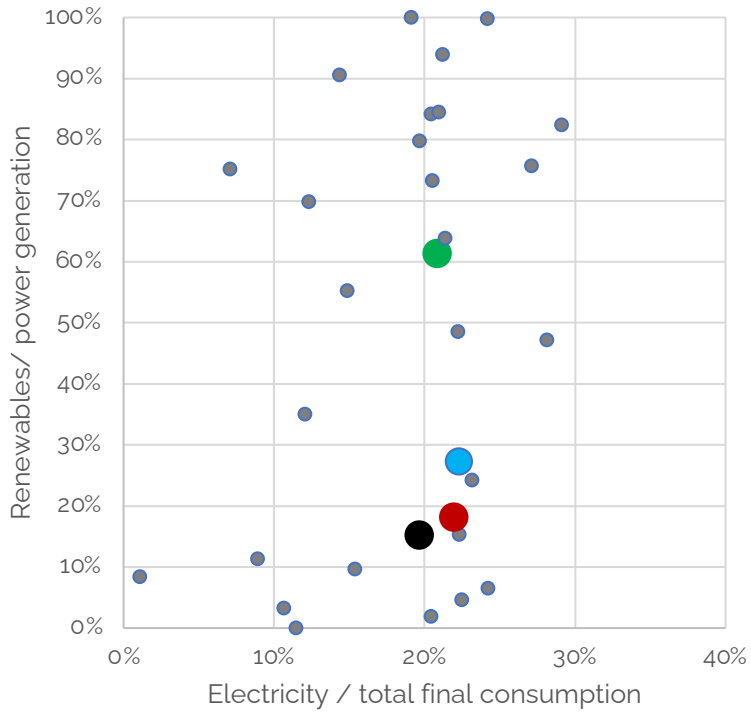
- *Energy intensity in terms of GDP should be -20% relative to a baseline demand scenario:*
  - *energy efficiency measures*
  - *modal shifts*

Substitute

- *Replace the residual (non-electrified) final energy consumption:*
  - *liquid and gaseous biofuels*
  - *solar thermal*
  - *low carbon hydrogen & Power-to-X*

Electrify: Share of electricity over total Final Energy Consumption in Argentina





FTDT/DECARBOOST, based on data from Energy Balances, Secretariat of Energy, OLADE and IEA.

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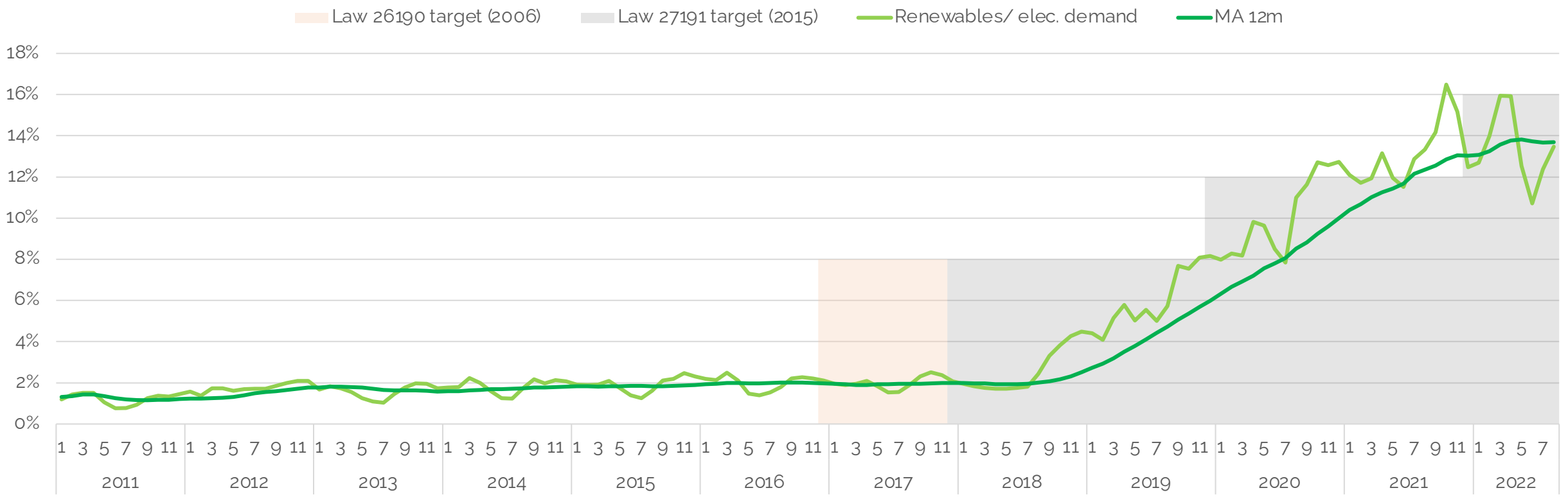
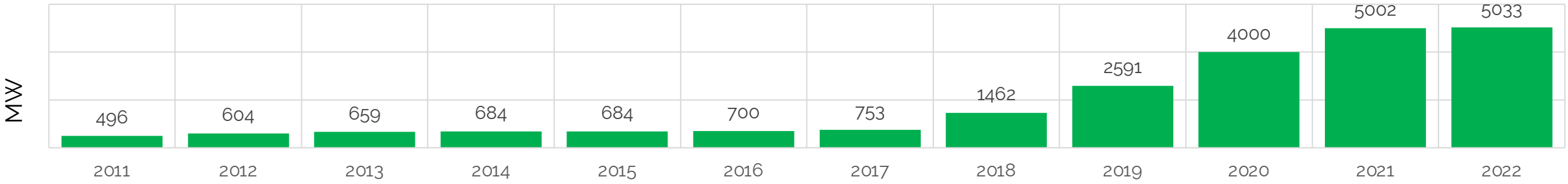
Decarbonize: Renewable (exc. large hydro) power generation over electricity consumption





FTDT/DECARBOOST, based on data from CAMMESA and national legislation..

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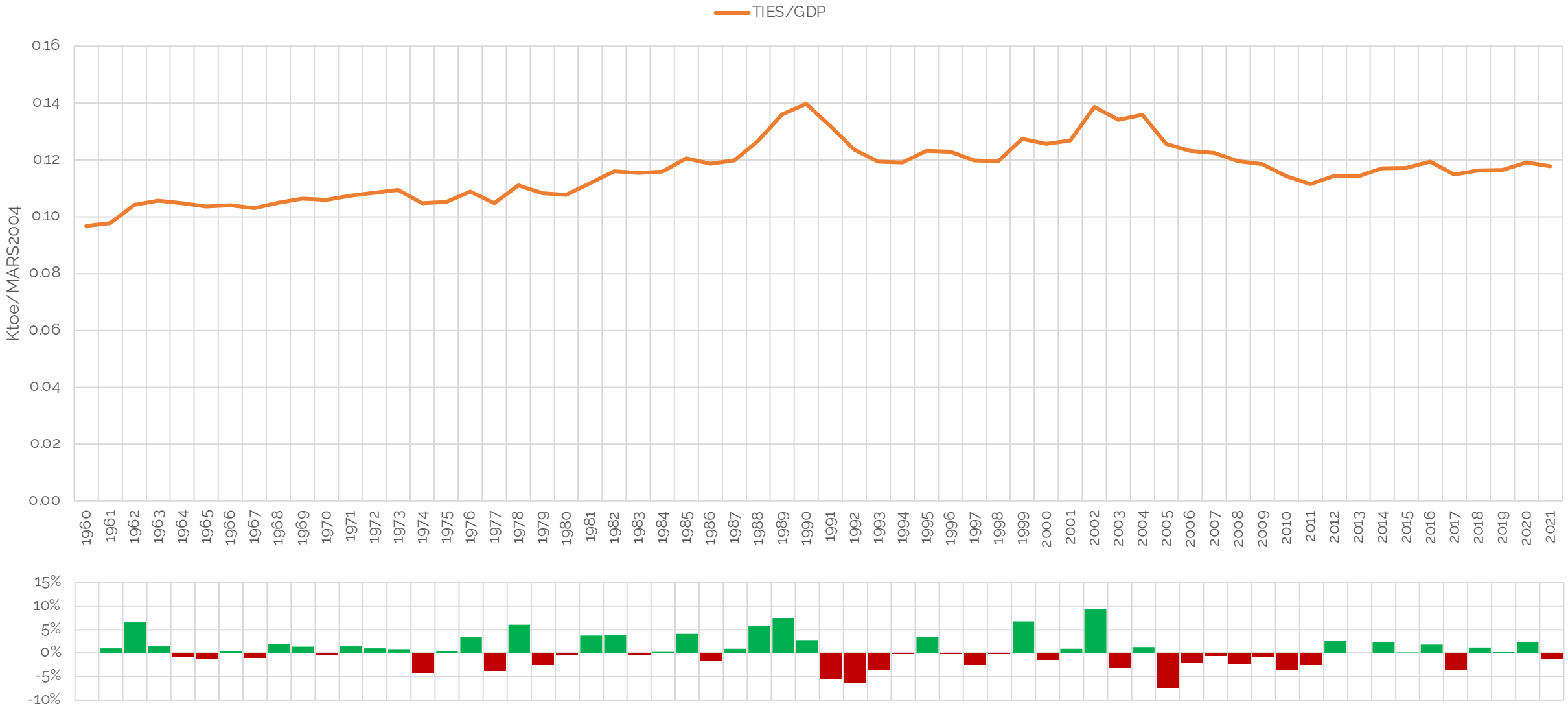
Reduce: Energy intensity in terms of Total Internal Energy Supply (TIES) over GDP



FTDT/DECARBOOST, based on data from Energy Balances, Secretariat of Energy, and National Statistics and Census Institute (INDEC).

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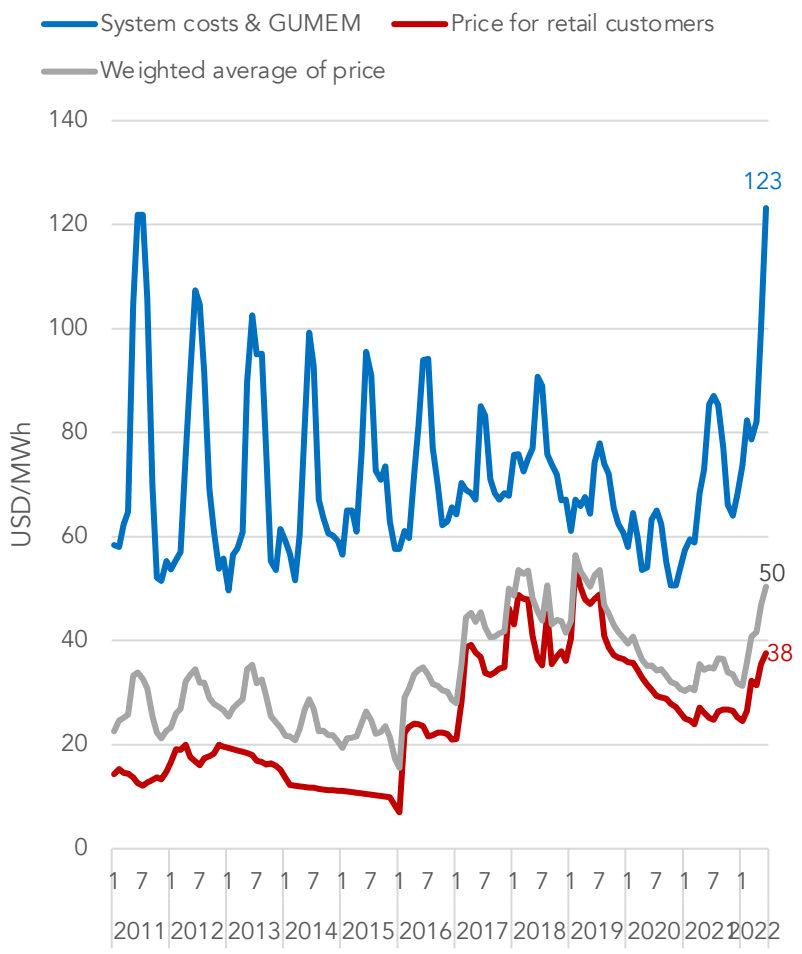
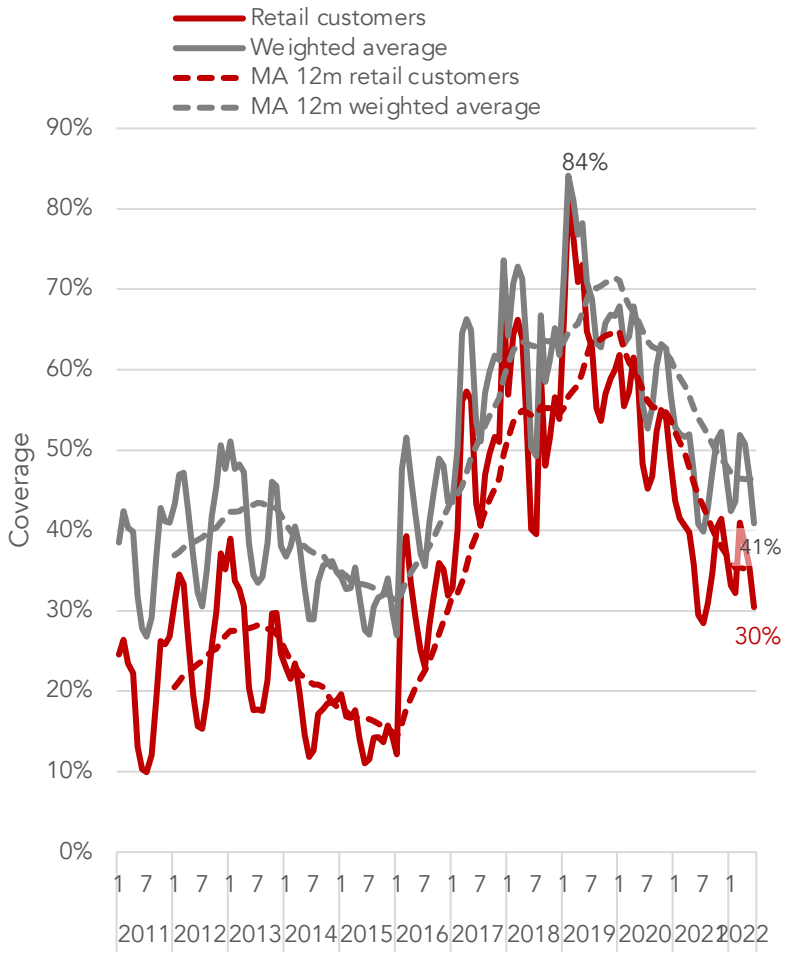
Reduce: System costs, industrial prices (GUMEM) and retail customers' prices

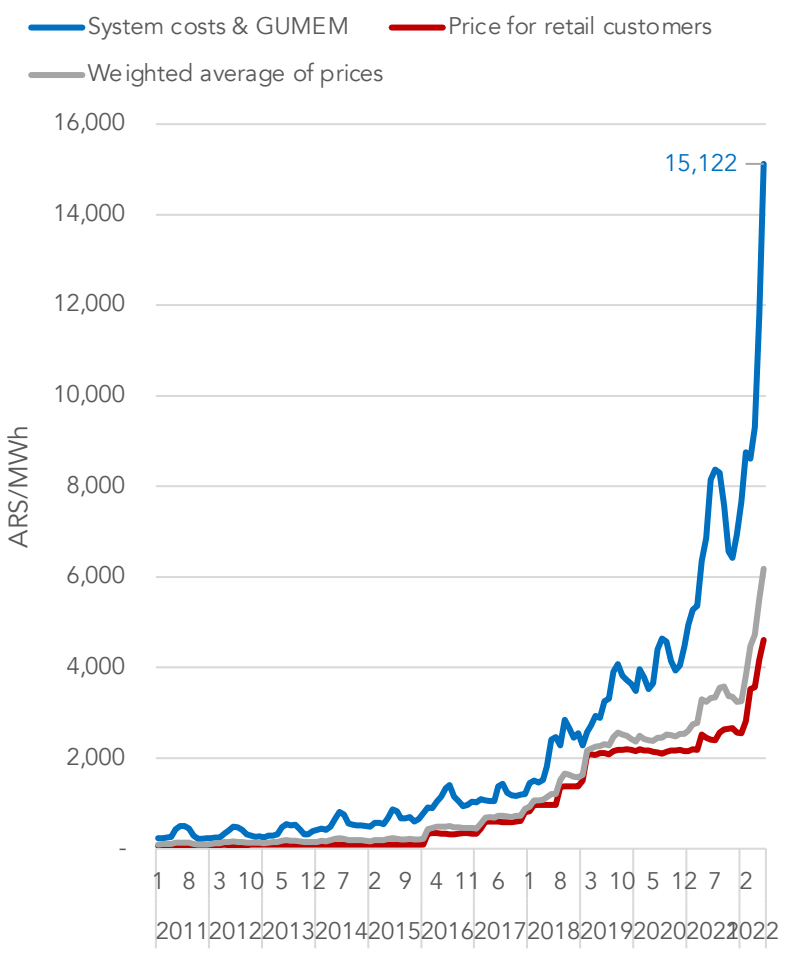
System costs* and prices, in current USD



Coverage of system costs



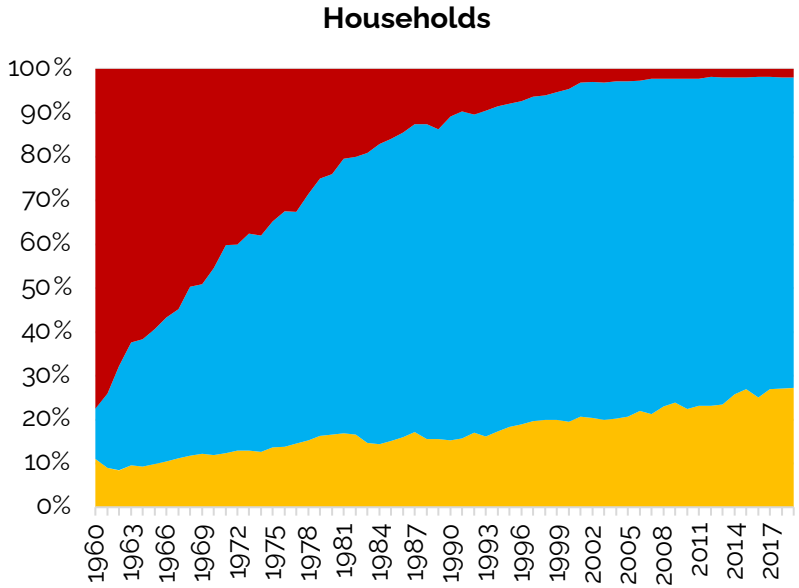
System costs and prices, in current ARS

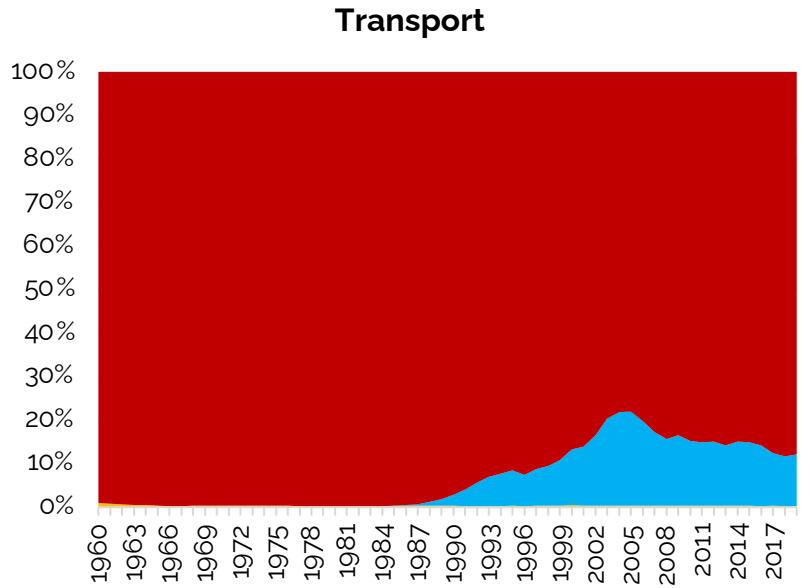


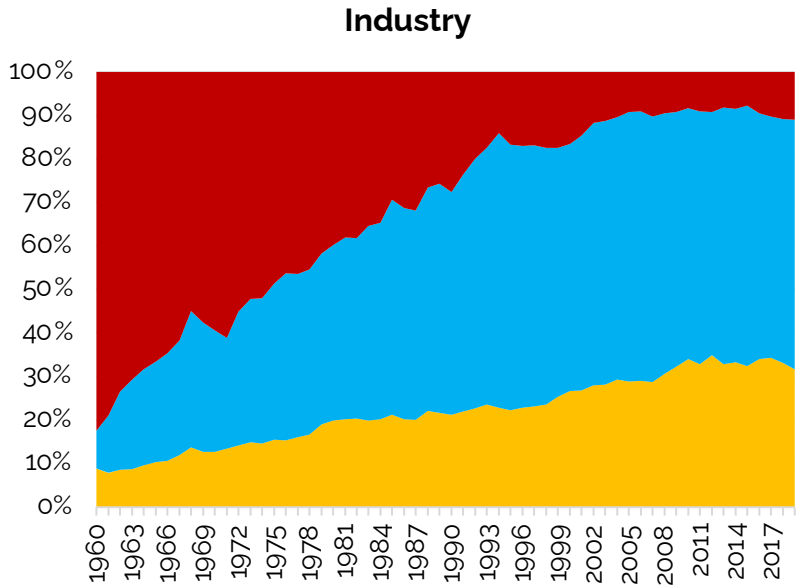
Roitman, M & Caratori, L. Preview of Energy Scenarios Q4 2022. August 2022 (in press). Based on data from CAMMESA and BCRA. (*) Excludes transmission

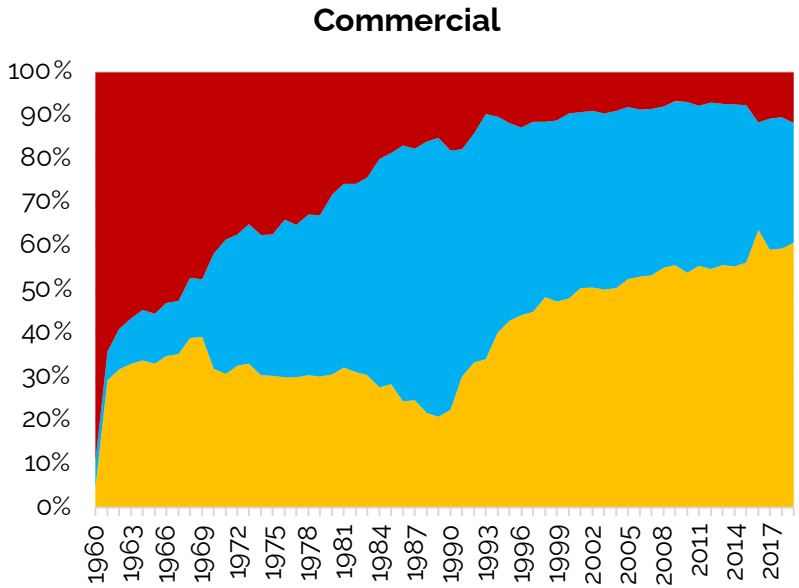
Increasing system costs converge with lower tariffs for distribution users. Industrial costs growing fast. Political decision to reduce subsidies for upper income and commercial retail customers.

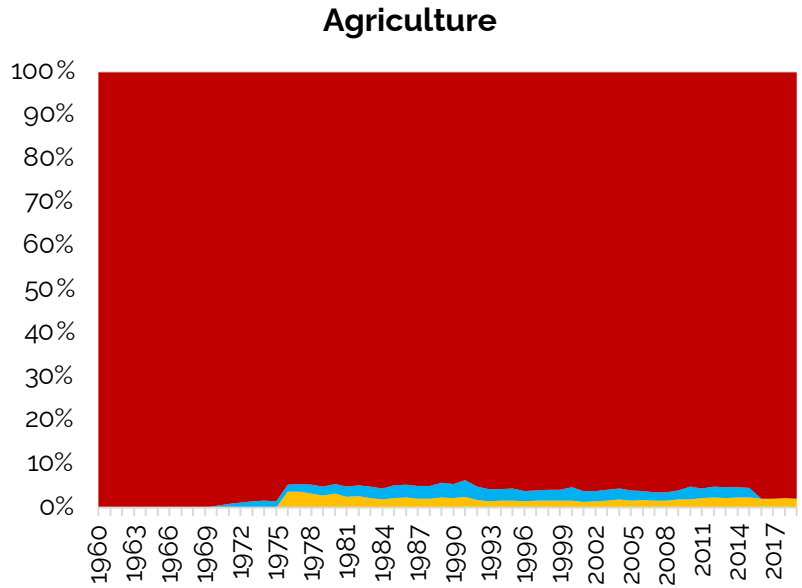
Substitute: Penetration by fuel type over final energy consumption by sector

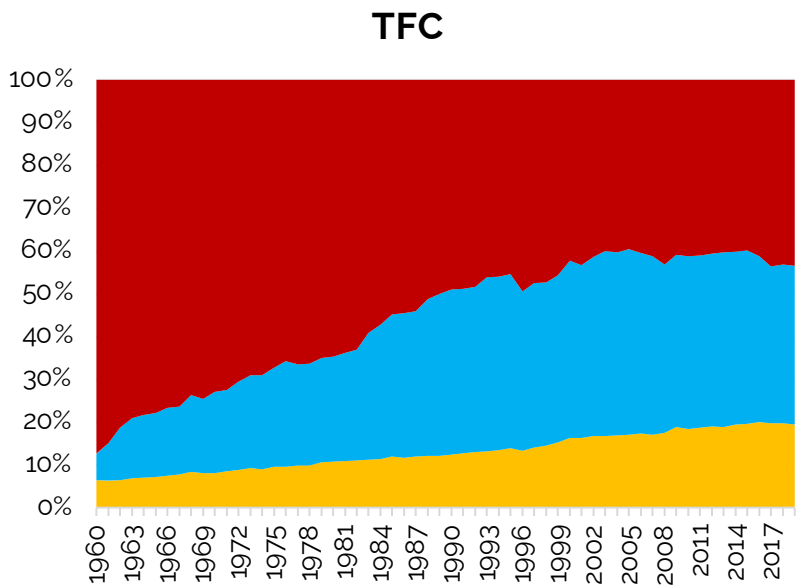












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Electricity

Gases (nat. gas and LPG)

Liquids

FTDT/DECARBOOST, based on data from Energy Balances, Secretariat of Energy

Challenges for Energy Policy in Argentina and for deploying decarbonization pillars in the short-to medium- and long-terms

	Electrify	Decarbonize	Reduce	Substitute
Short- term	D: Carbon lock-in and existing stocks of end-use equipment (including cars).	D: Lack of financing for the development of renewable energy projects	P: Unsustainable energy subsidies and hiking wholesale system costs driven by imported fuel	P: Last-mile natural gas T&D infrastructure is too expensive for unconnected households
Medium- term	P/D: Severe transmission capacity constraints and (budget) competition with new public-funded natural gas infrastructure		P: Existing stocks of inefficient end-use equipment. P: Costly manufacture logistics.	P: Lack of refining capacity in the oil downstream sector, increasing imports above ≈ 500 kbbl/d
Long- term	D: Conflicting long-term visions on natural gas vs. renewables development	D: System stability issues under high penetration of renewable power generation	D: Carbon intensive energy use for manufacturing and logistics.	D: Overwhelming share of liquid fossil fuels over transport and agriculture sectors challenges future *environmental competitiveness*.

P: (general) Energy Policy D: Decarbonization-specific

'Aikido' short-to medium- and long-term investment opportunities for the decarbonization of Argentina's Energy and Transport sectors. Decarbonization synergies with energy policy

<table>
<tr><th></th><th>Electrify</th><th>Decarbonize</th><th>Reduce</th><th>Substitute</th></tr>
<tr><td>Short- term</td><td>Nascent demand for electric vehicles, including domestic production and assembly creates first-mover business opportunities for household and public charging stations.</td><td>Excess liquidity, restrictions to transfer FX abroad and increasing system costs have increased appetite for developing and contracting long-term private renewable PPAs (MaTER). Increasing adoption of distributed energy bill by provinces (+151% MW YoY).</td><td>Individual and commercial demand for efficient appliances and building enhancements are likely to increase, aligned with government incentives. Opportunity for aggregation (ESCOs).</td><td>Solar-thermal energy penetration (as well as distributed solar PV) are likely to accelerate their penetration over public and private housing projects.</td></tr>
<tr><td>Medium- term</td><td colspan="2">Impending saturation of transmission capacity calls for additional transmission lines for over 21 GW and 14 BUSD before 2030, as well as above 20 GW of power generation for around 35 BUSD.

Domestic ongoing discussions regarding lithium production and industrialization.</td><td rowspan="2">Modal shifts to generate investment opportunities in public transport and long-haul freight transportation alternatives.</td><td>Incremental liquid fuels demand (short- to medium-) and substitution due to manufacturers and agriculture producers commercial/environmental concerns to be met by current and next-gen biofuels.</td></tr>
<tr><td>Long- term</td><td>Long-term electrification of end-use sector includes the substitution of natural gas appliances for space & water heating and cooking in 80% of Argentina's households, as well as a current baseline of >20 Mtoe (>25 Mtoe/y TFC in 2050).</td><td>Ancillary services, such as storage, system protection and frequency control, as well as demand-response and smart measurement technology will be key to accommodating the required share of VRE.</td><td>Global energy security quests have catalyzed assessment and procurement processes for high full-load hours renewable energy potential and sustainable carbon sources leading to competitive H_2 and PtX production with domestic use synergies.</td></tr>
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Thank you

Luciano Caratori
Luciano@caratori.com.ar

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