

Antigua and Barbuda: NDC Revision and Just Transition Jobs Analysis

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Background NDC Context

The NDC Context for A&B

- Power sector: Fossil-fuel phase-down by 2030 (86% RE)
- Transportation sector: Fossil-fuel engine sales phase-out by 2030
- Explore potential for emissions reductions in the waste sector
- Explore potential for emissions reductions in AFOLU

Four stages toward the NDC targets

STAGE ONE

Short-term replacement of aging fossil-fuel generation by 2025

Modernization of the grid for higher RE Penetration

Solar pv expansion – Utility and rooftop

STAGE TWO

Inclusion of transport sector from 2020

Coupling of power sector to EVs

No new ICEV sales by 2030

Grid-to-vehicle and vehicle-to-grid communication

STAGE THREE

Final phase-out of centralized fossil-fuel generation by 2030s

Large role of solar pv

Integration of other RE technologies – battery, hydrogen storage

STAGE FOUR

Finalize transition to electric vehicles

Full integration of RE and battery storage into the interactive grid

Potential implementation of dispatchable RE source

RE = Renewable Energy

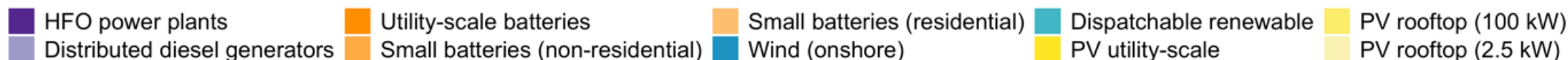
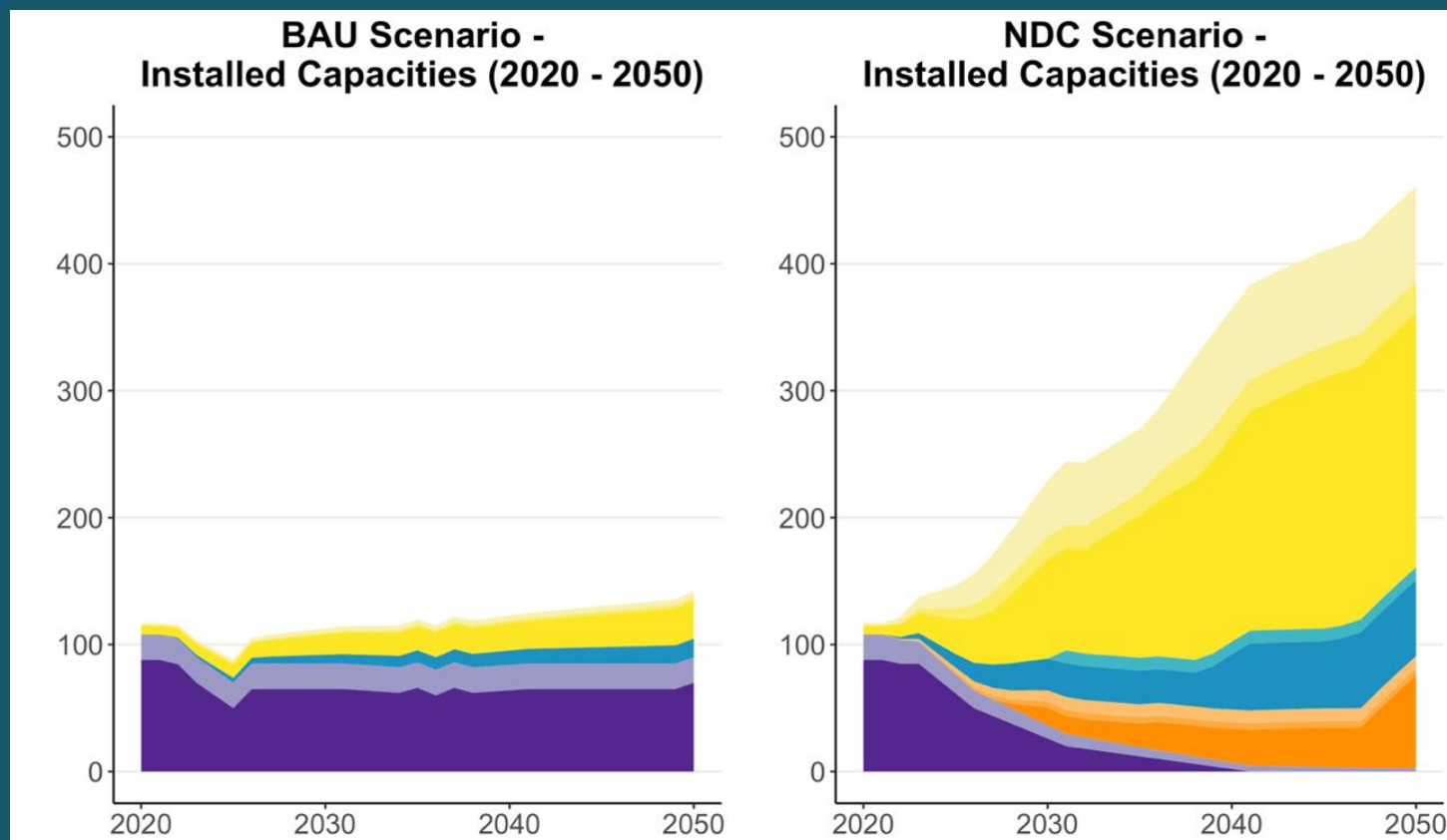
EV = Electric Vehicle

ICEV = Internal Combustion Engine Vehicle

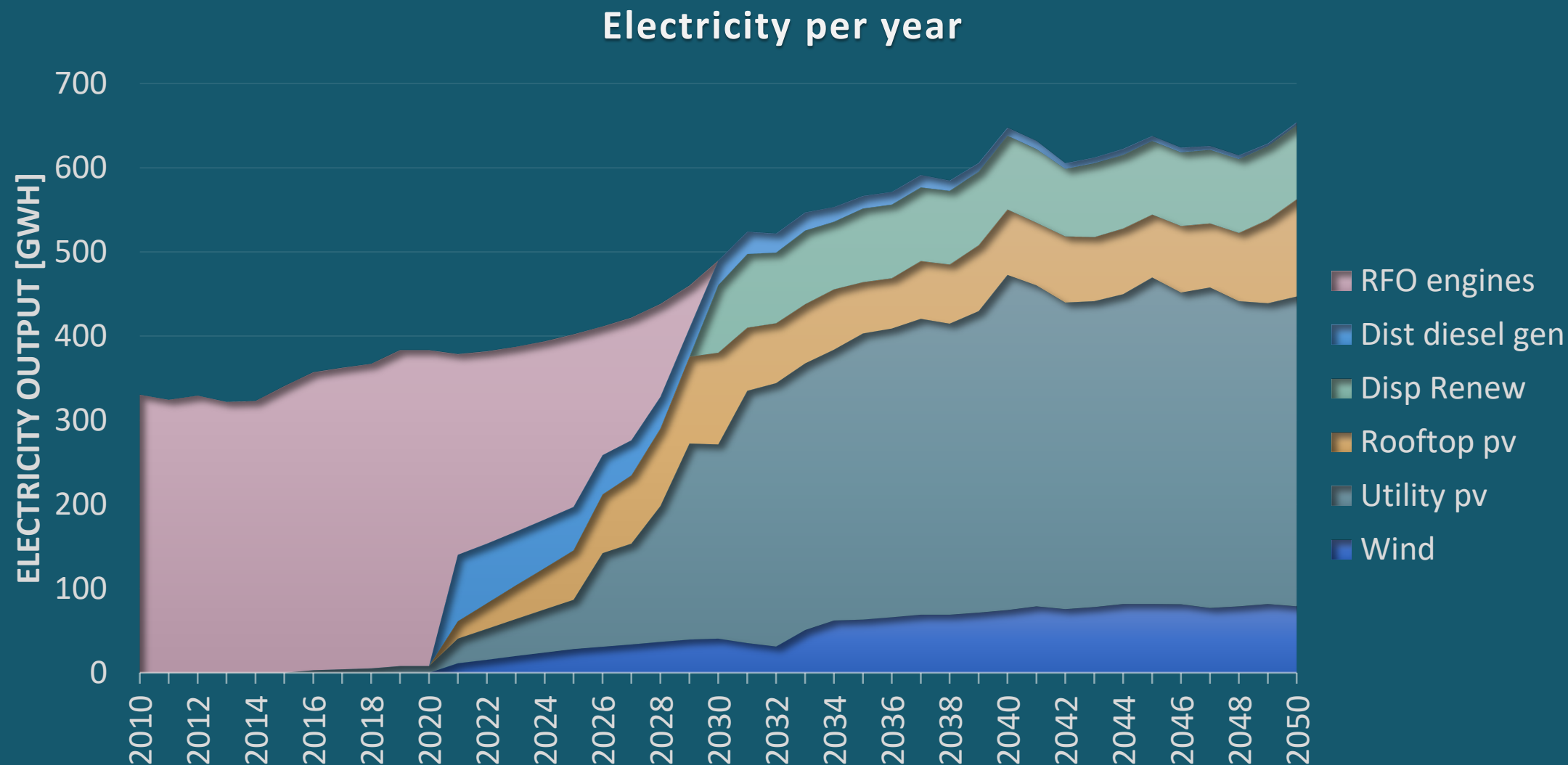


NDC Background Analysis

BAU vs NDC - Capacities

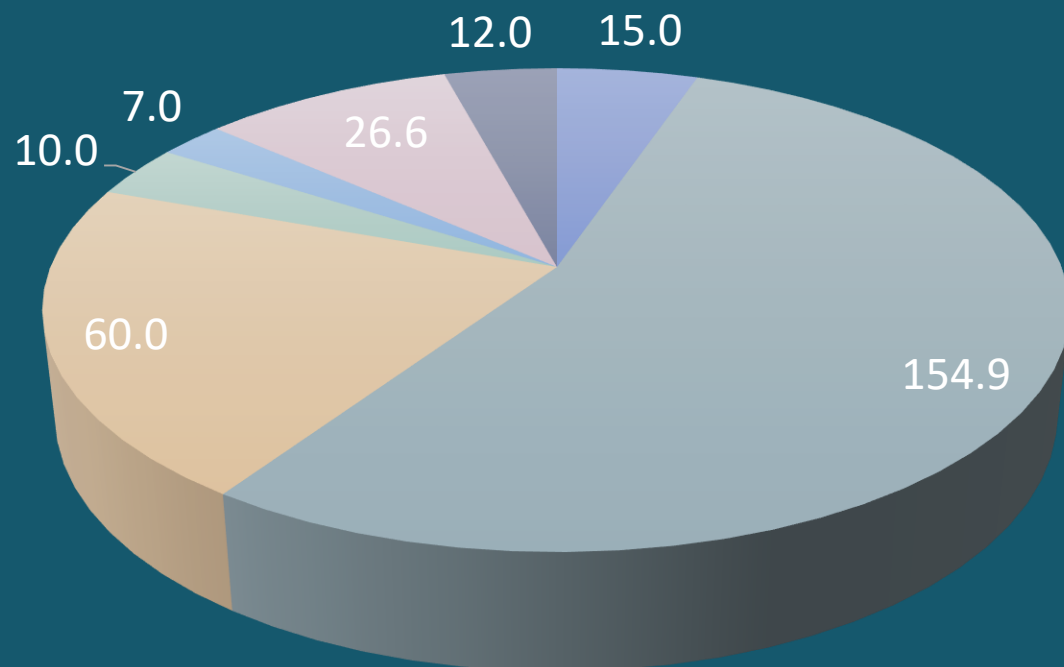


Electricity generation over time



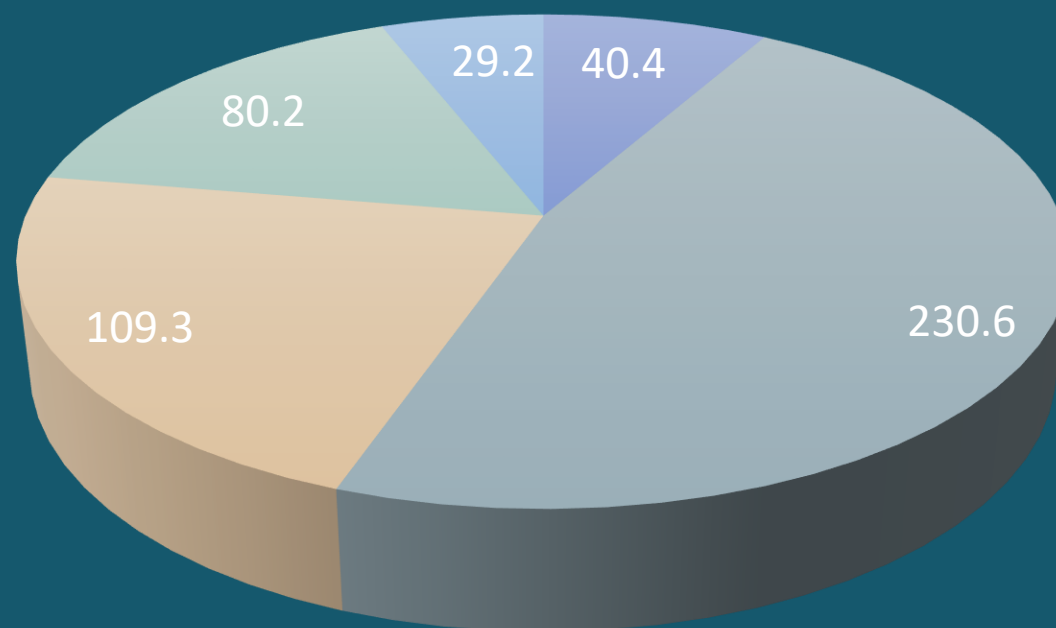
Capacity and Generation in 2030

Capacity in 2030 [MW] (iii)



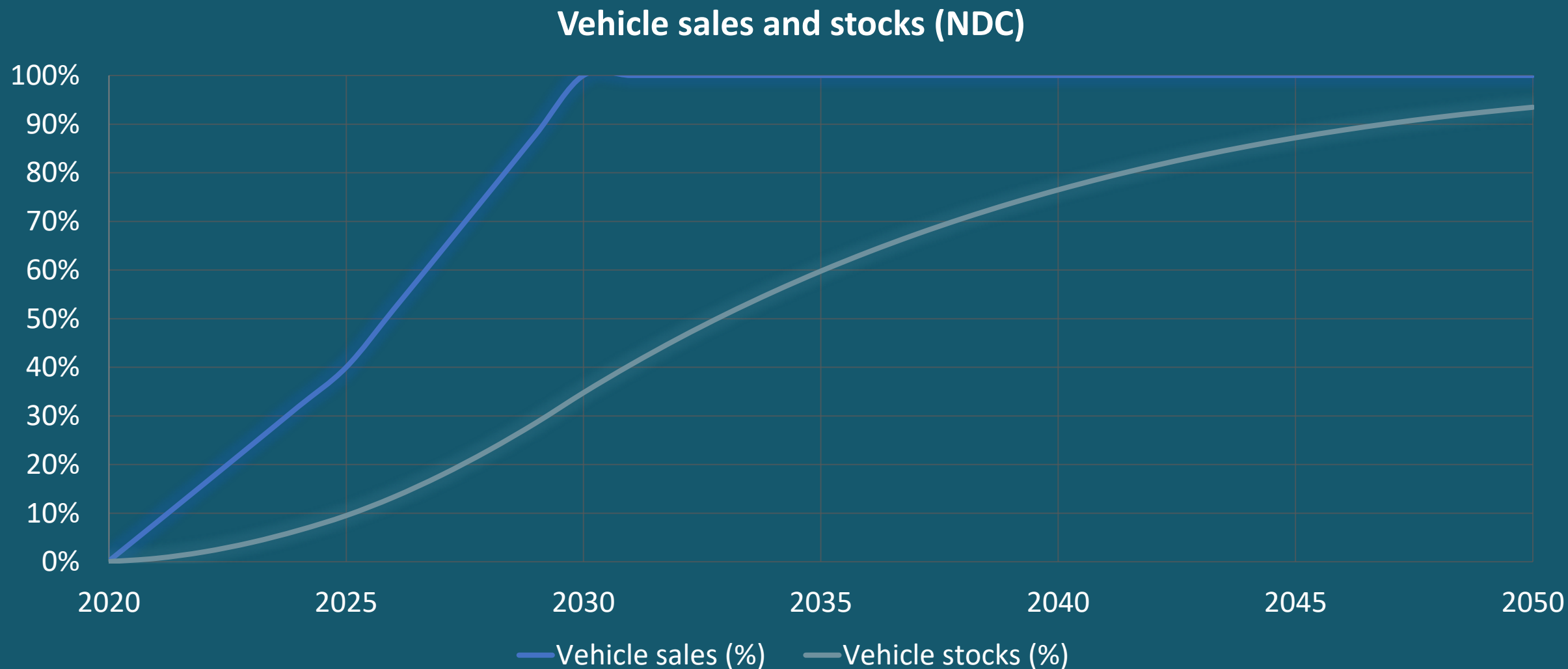
Wind Utility pv Rooftop pv
 Disp Renew Dist diesel gen Utility battery
 EV batteries

Generation in 2030 [GWh] (iii)



Wind Utility pv Rooftop pv
 Disp Renew Dist diesel gen

Sales and stocks of EVs and ICEVs



Pathways to fossil-fuel phase-out

Increasing flexibility

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- The four variants in the pathways considered here are:
 - (i) No dispatchable renewable capacity available, and a maximum of 15 MW of wind capacity by 2030;
 - (ii) No dispatchable renewable and 45 MW of wind maximum;
 - (iii) 10MW of dispatchable renewable and 15 MW of wind by 2030;
 - (iv) 10 MW of dispatchable renewable and 30 MW of wind by 2030.

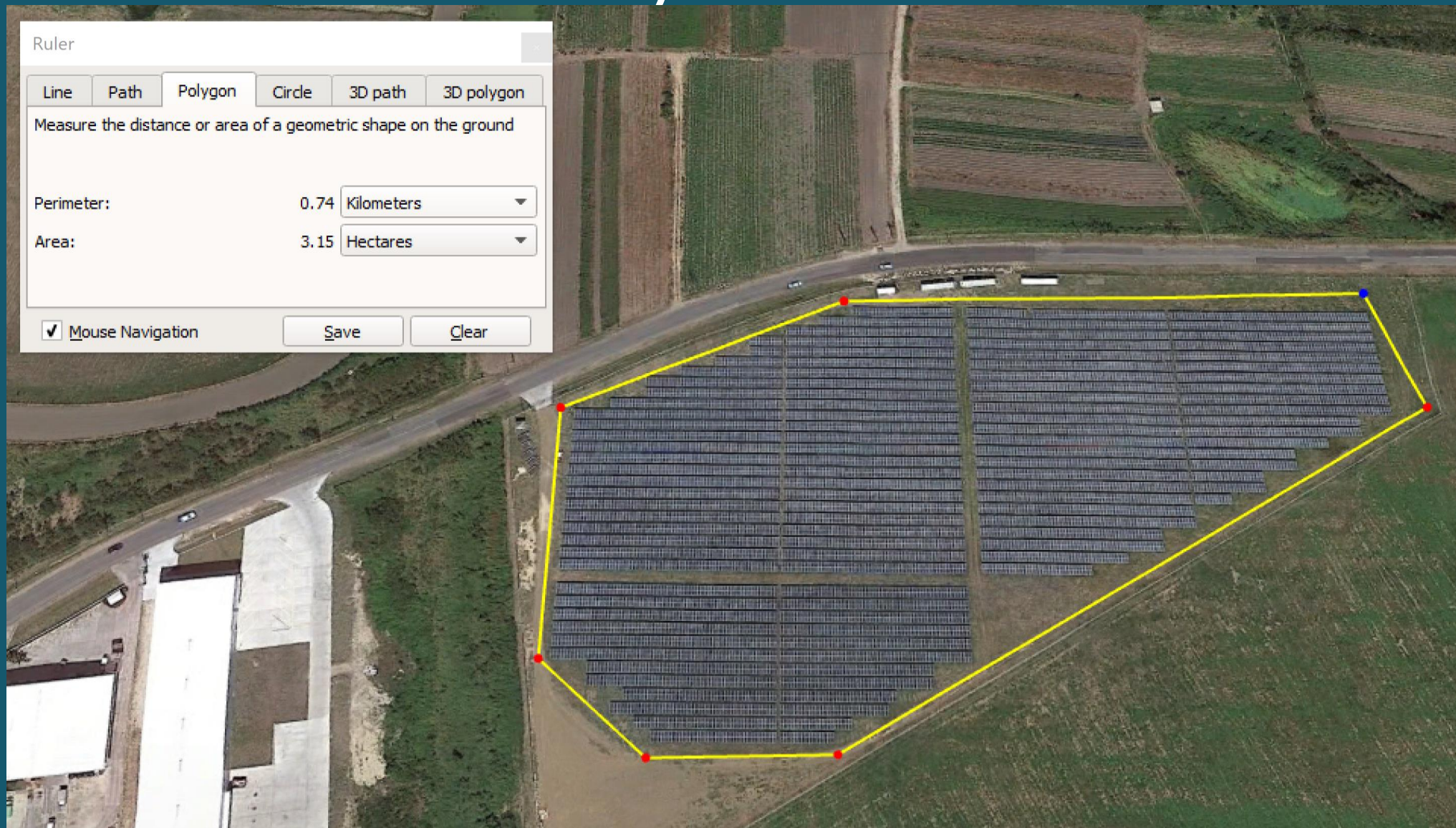
Summary of proposed revised mitigation targets for 2020 NDC

- Power sector: Fossil-fuel phase-down by 2030 (86% RE)
- Transportation sector: Fossil-fuel engine sales phase-out by 2030
- Ambitious, feasible and cutting-edge goals
- Requires a rapid and large build-out of solar pv capacity and of EV sales
- Would be aided by availability of dispatchable renewable source
- Many policy decisions needed – grid integration and interactivity; variable renewable energy management; prosumer model; distributed storage and generation; vehicle import strategy; vehicle scrapping and disposal strategy; etc.

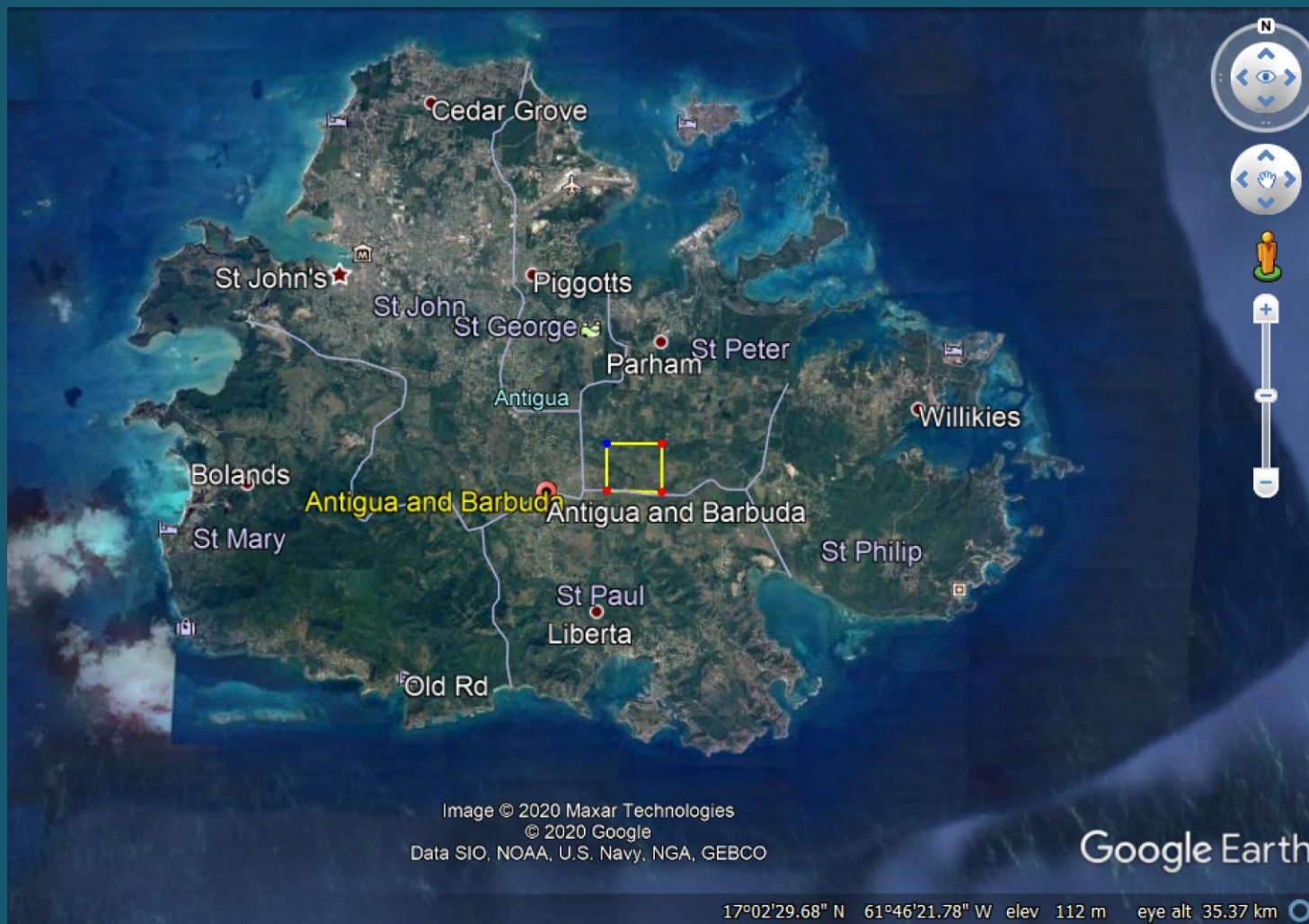


Implications of Findings

Size of a solar array



Area for 200 MW_p of capacity



Investment costs

Estimated investment costs (2019 million USD)					
Scenario	2020-2025	2026-2030	2031-2040	2041-2050	Total
(i)	\$ 126	\$ 432	\$ 298	\$ 44	\$ 894
(ii)	\$ 126	\$ 432	\$ 185	\$ 56	\$ 799
(iii)	\$ 108	\$ 387	\$ 107	\$ 36	\$ 623
(iv)	\$ 108	\$ 375	\$ 106	\$ 23	\$ 613

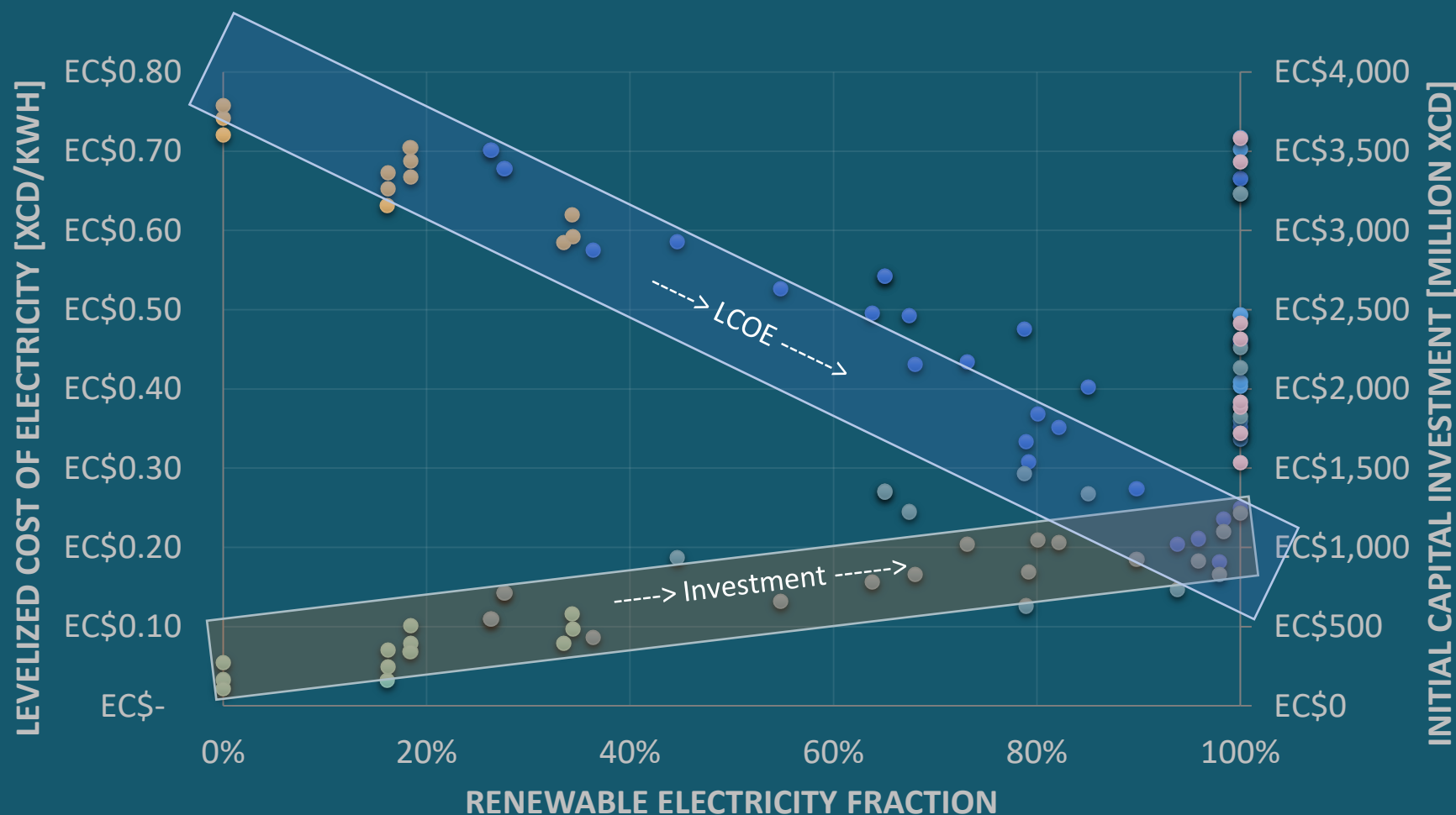
Substitution of fossil fuel costs reduces total net investment to ~\$100 million for entire period 2020-2029

But ... each year of rapidly increasing renewable energy production substitutes costs for imported fuel oil at a rate of about \$170,000/GWh

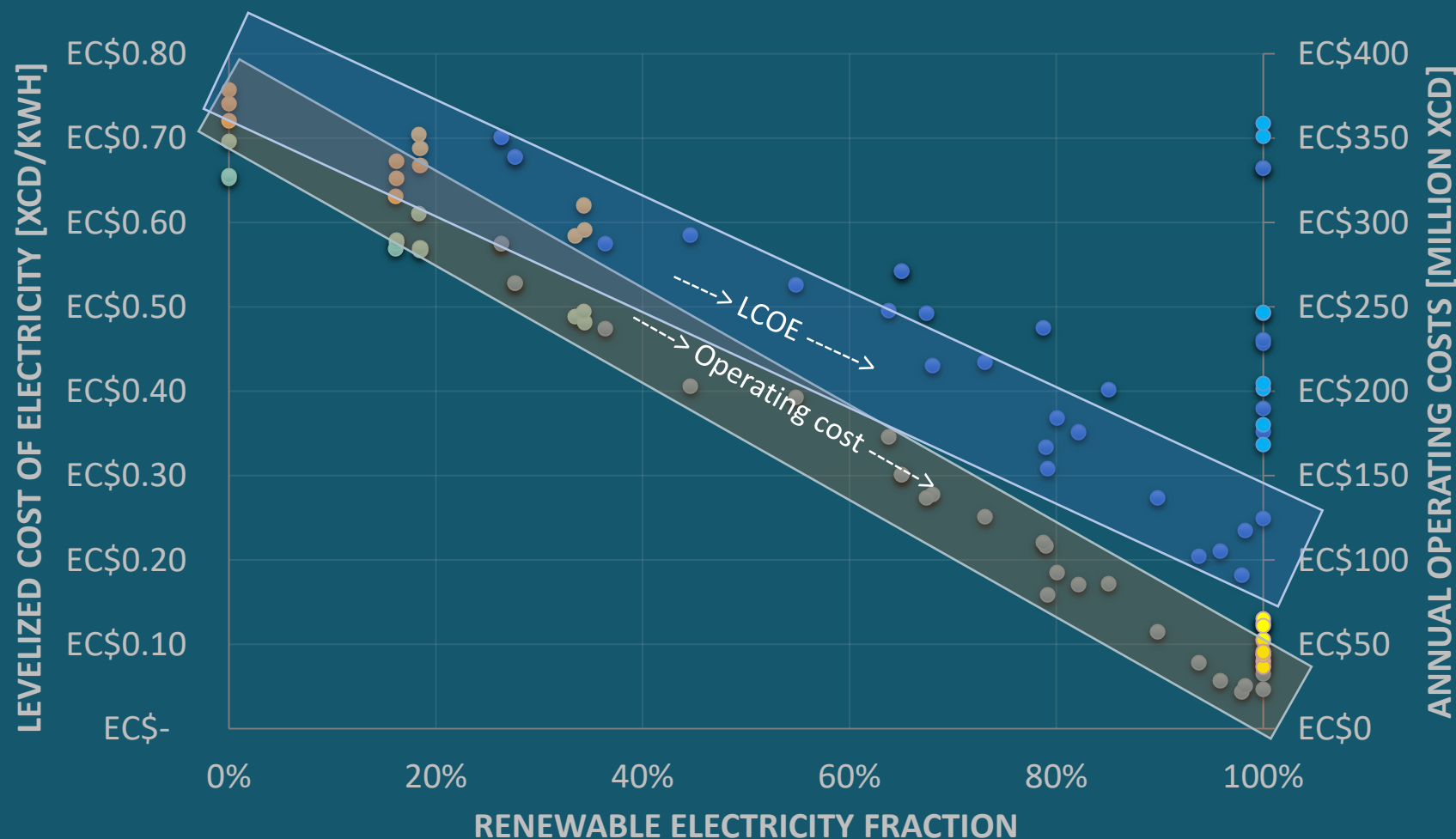
Starting points for modeling choices

- Used HOMER Pro to evaluate different cases of satisfying hourly demand for Antigua
- Three different configurations
 - Combinations of solar, wind, fossil, dispatchable RE (unspecified), battery storage
 - Same as above, but with capability of hydrogen production and fuel cell power
 - Simplified version without hydrogen or large amounts of RE and storage – a BAU case
- Total of 50 cases

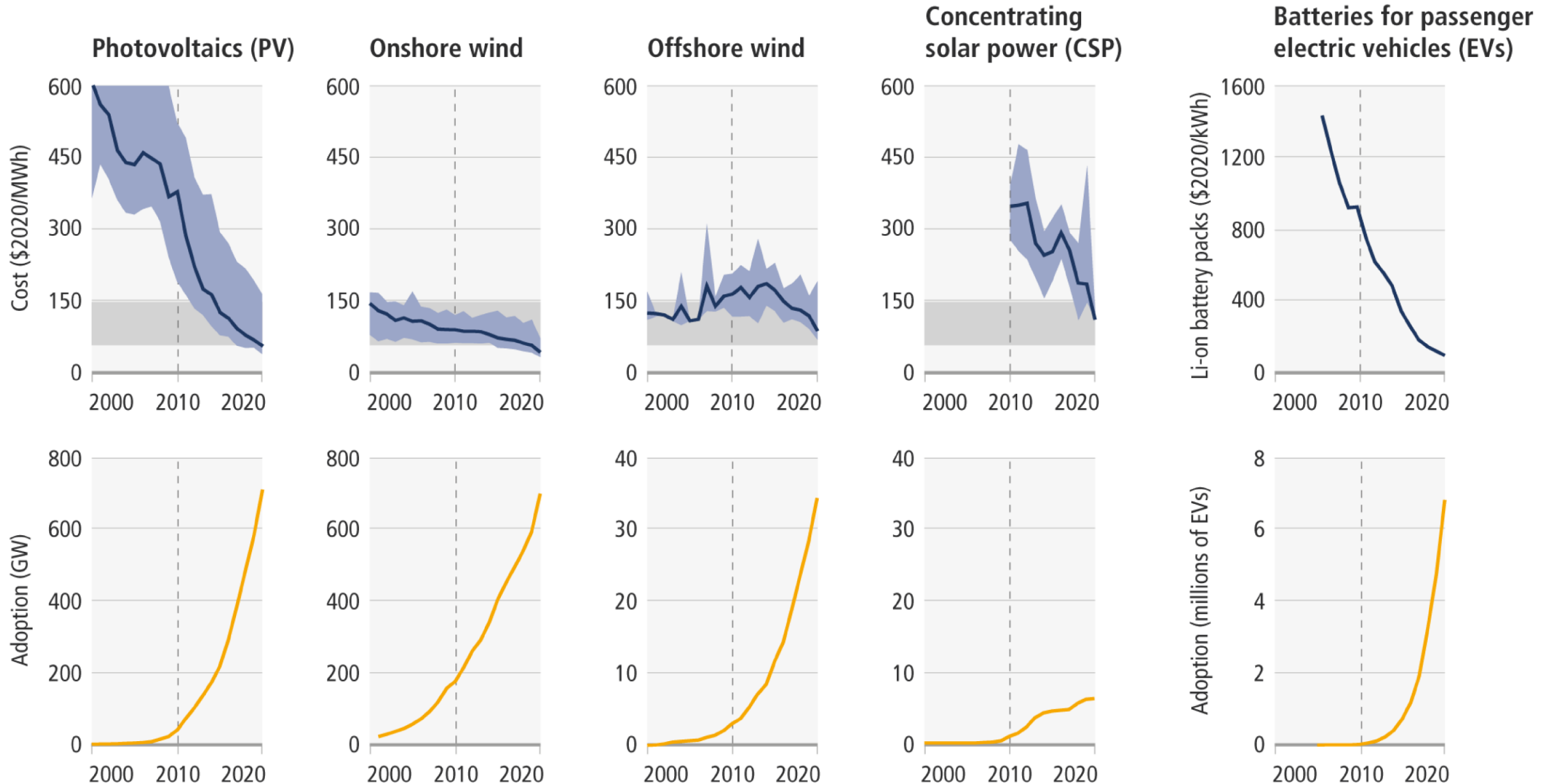
Capital investment and levelized costs



Annual operating and levelized costs

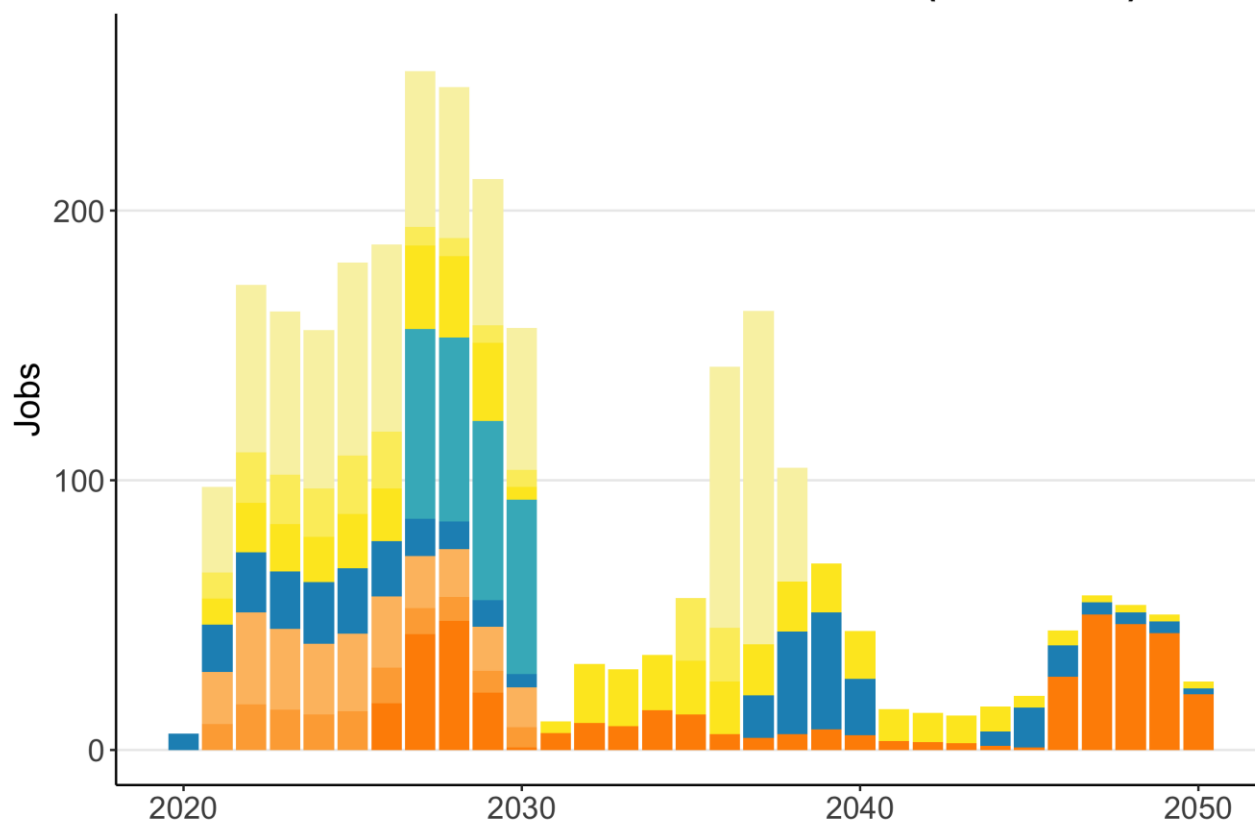


RE costs have fallen dramatically

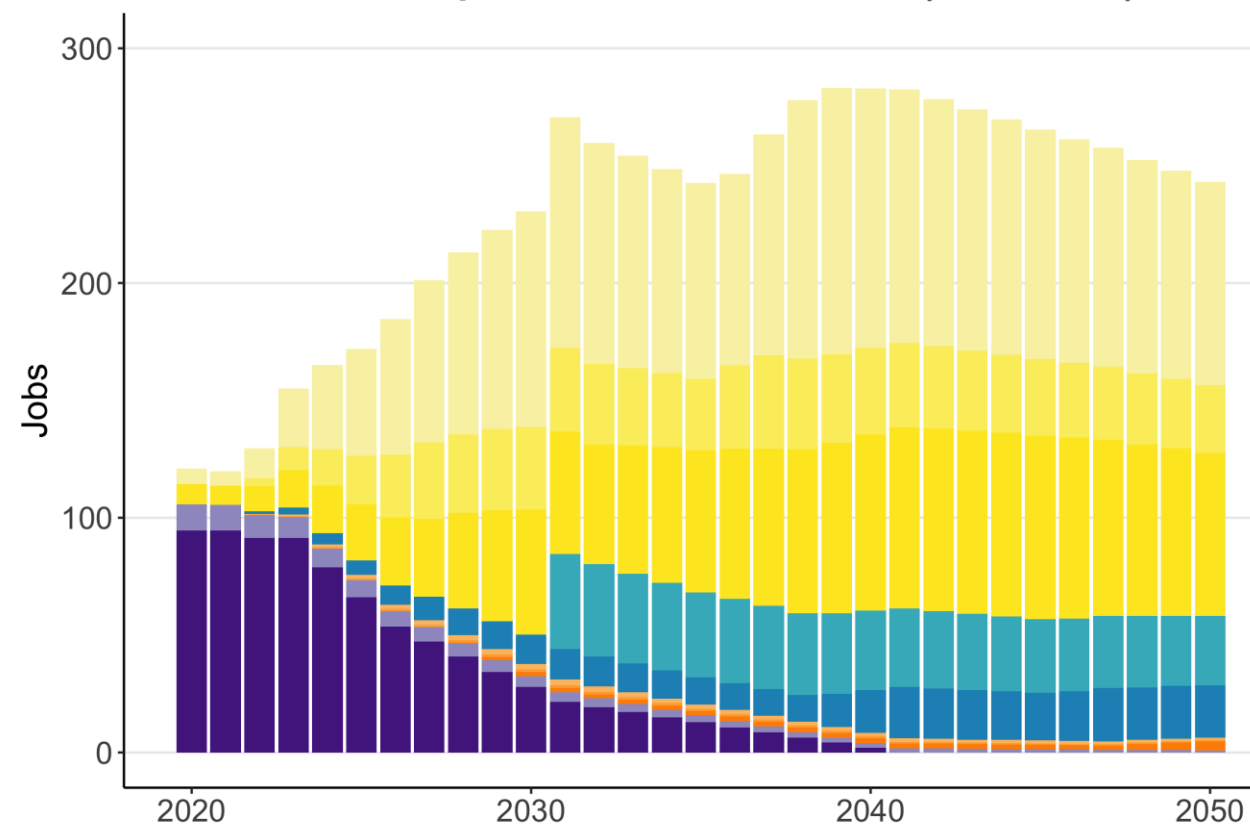


Jobs – NDC Scenario (power sector)

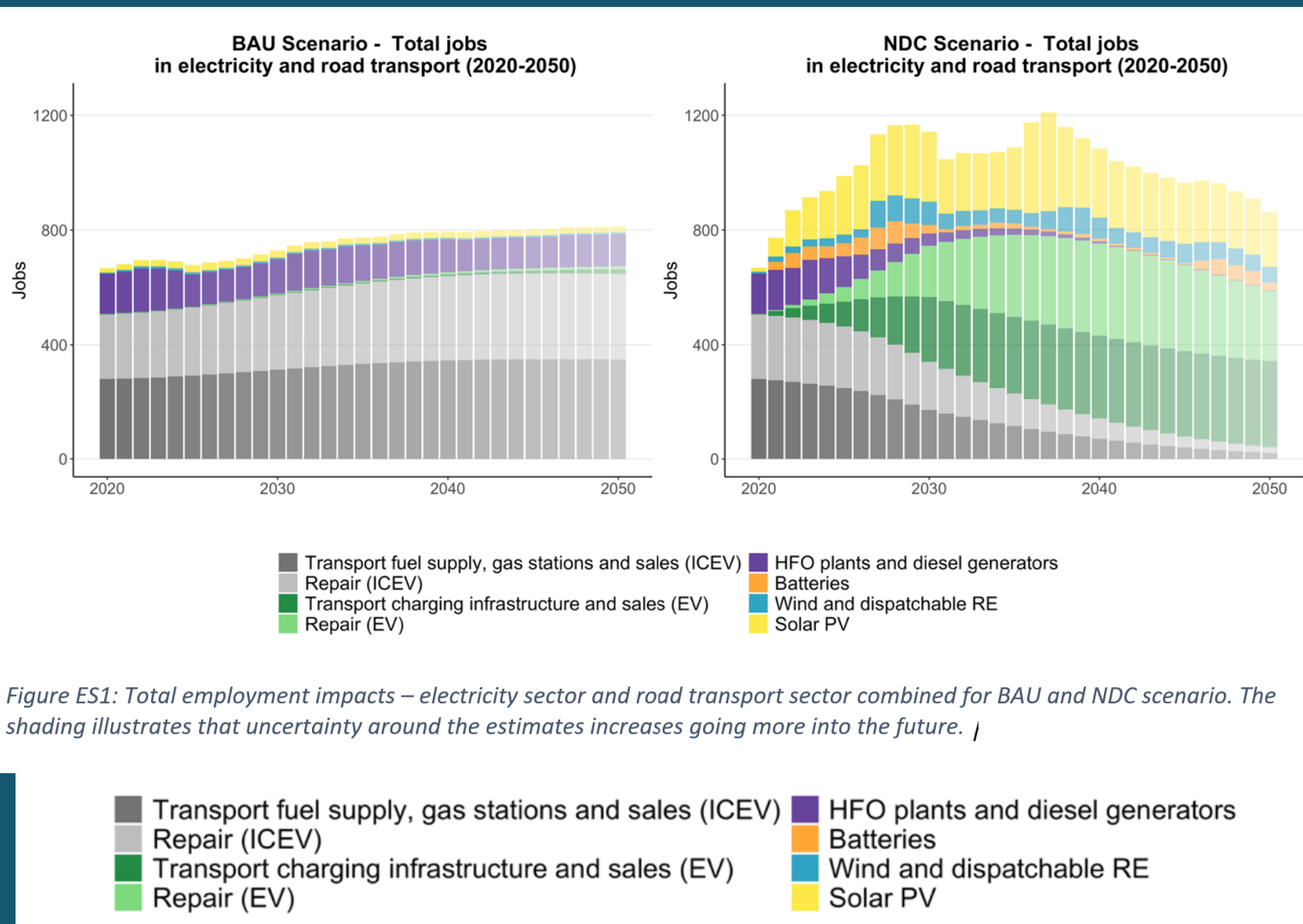
**NDC Scenario -
Jobs in Construction & Installation (2020-2050)**



**NDC Scenario -
Jobs in Operation & Maintenance (2020-2050)**



BAU vs NDC Jobs



General Takeaways and Discussion Points

– No Particular Order

- Beware of modeling results (says the modeler)
- Access to high quality, disaggregated and consistent data is a problem, not only in A&B
- Job additions (and losses) were modeled as a proxy for thinking about the Just Transition – but that is too narrow of a focus
- Power and transport (and other) sectors need to be thought about together
- Transitions take time (see transport sector)
- Trust in institutions will be an important commodity for integrated energy systems
- Funding up-front is important, but yearly capital cost payments should be able to come largely from yearly fuel savings
- Revenue from import duties – how to replace that?



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