IAM COMPACT

Expanding Integrated Assessment Modelling:
Comprehensive and Comprehensible Science
for Sustainable, Co-Created Climate Action

Responsive science in support of climate policymaking
IAM COMPACT Final Conference, Athens, 29 August 2025

Novel nexus modelling in recession-hit Sri Lanka

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Sri Lanka

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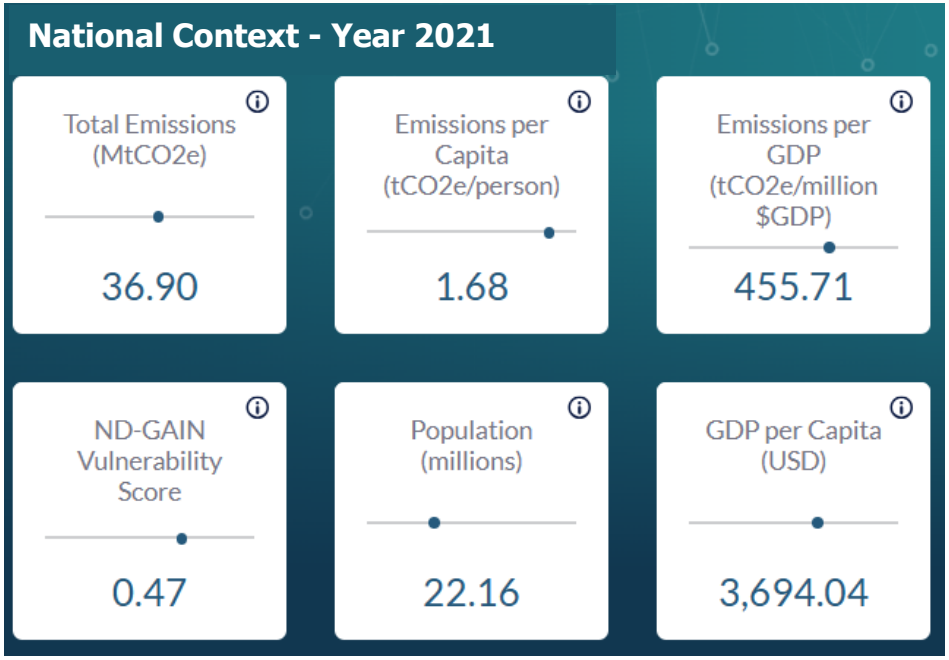

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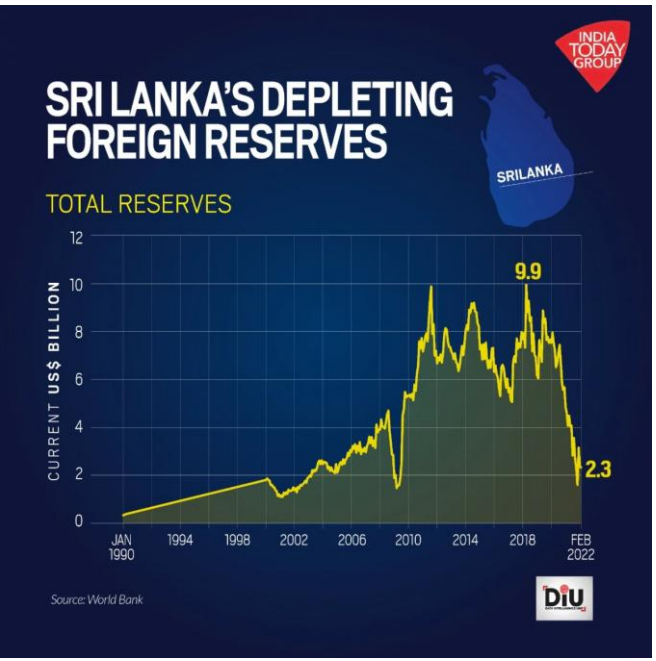
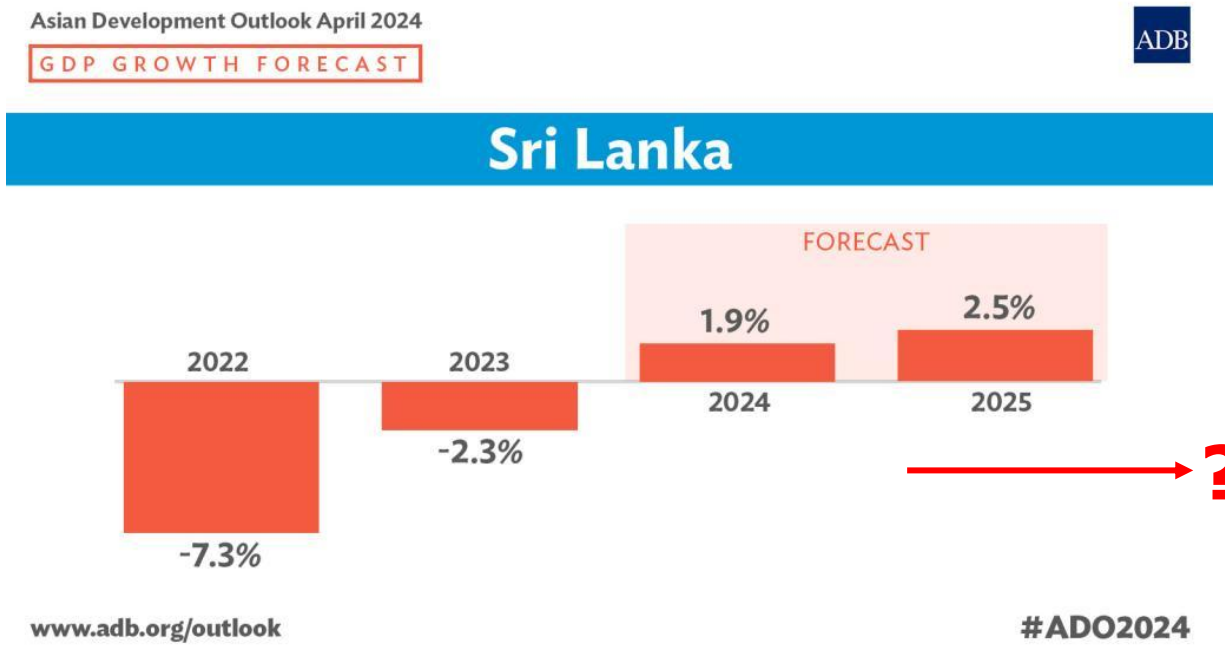
Sri Lanka has a developing economy with unique resource challenges.

- **High climate risks:** extreme events like droughts, floods, and landslides
- **Ambitious Climate Targets**:
  - 14.5% reduction in GHG emissions by 2030
  - Carbon neutrality in the electricity sector by 2050
  - Increase forest cover to 32% by 2030
- **Economic Vulnerability**
  - Heavy reliance on imported petroleum products (43% of primary energy supply).
  - Spent ~4 billion USD on fuel imports in 2018 (33% of non-petroleum export earnings).

Recovery from the Economic Crisis





- There is a clear analytical gap in Sri Lanka for integrated assessments.
- An integrated assessment is required to support a shift to renewables, **reducing import dependence, boosting energy security and economic recovery**.
- Ambitious renewable energy and agriculture targets **compete for limited land and other resources.**

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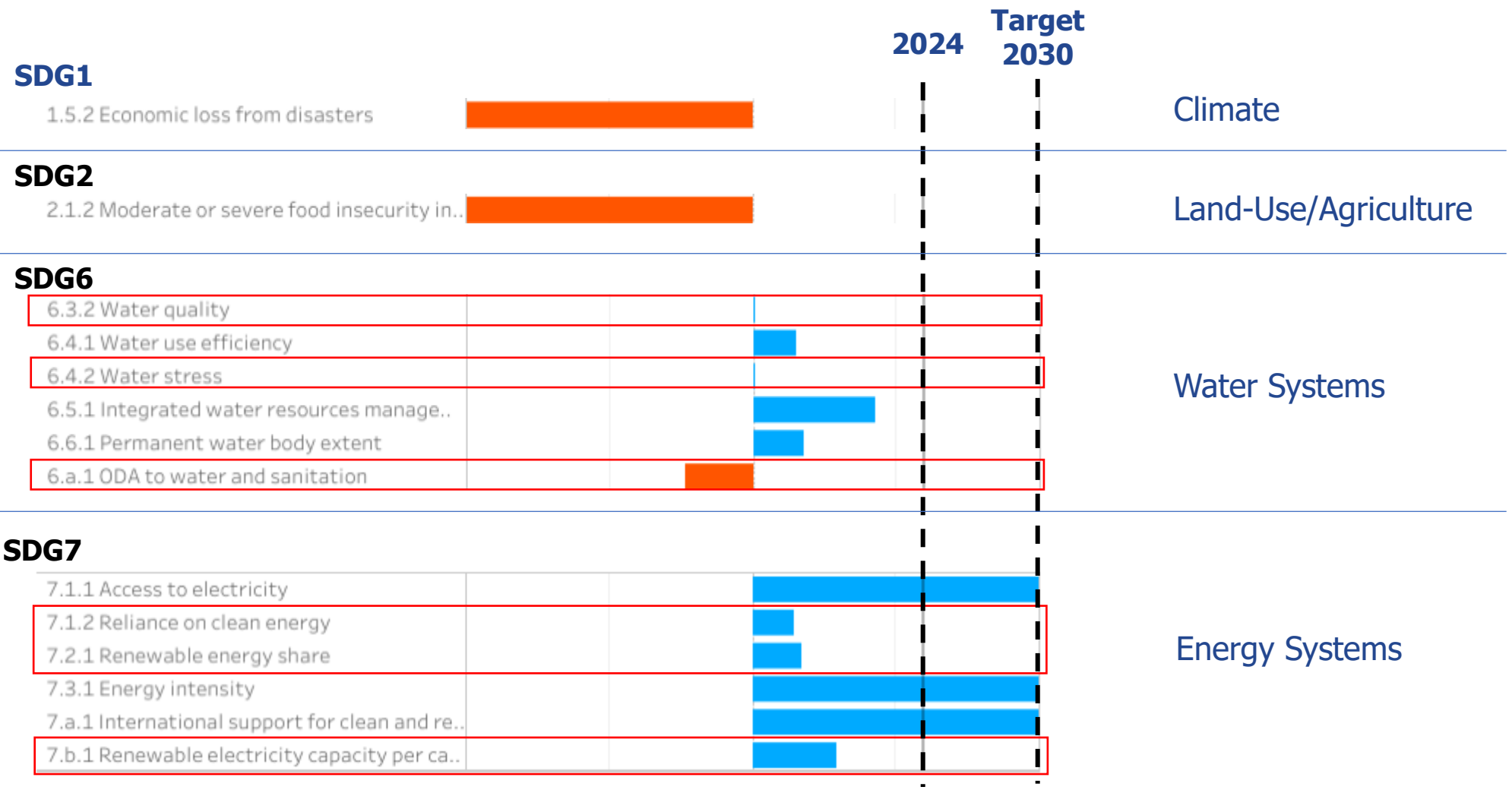
Setbacks in Sri Lanka's Sustainable Development



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Climate, **L**and-use, **E**nergy and **W**ater **S**ystems Modelling for Sri Lanka

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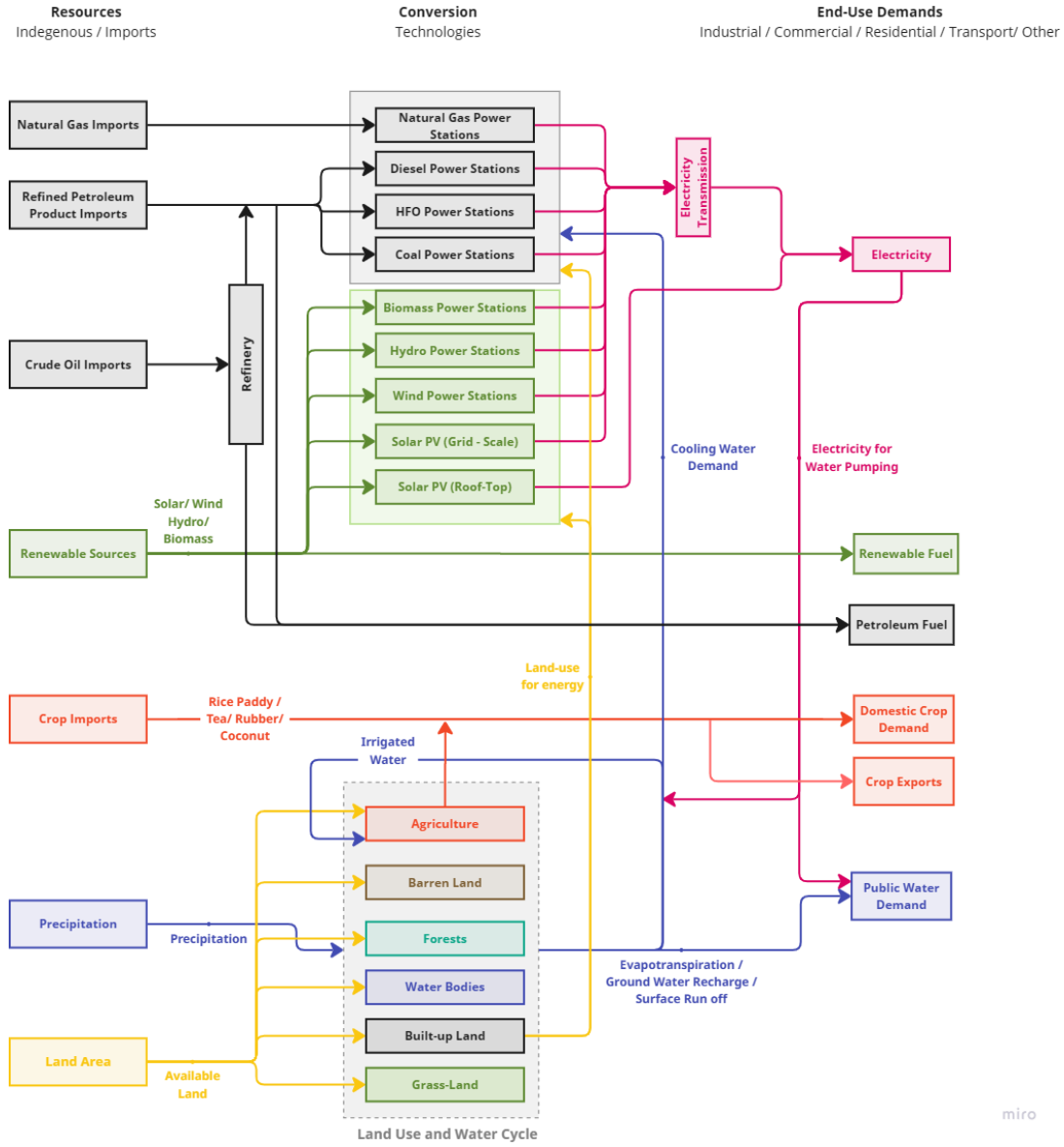
The first national-scale **integrated resource assessment tool for Sri Lanka**.

Captures **resource flow** across energy, land, and water systems in Sri Lanka.

2020 – 2050 modelling horizon.

Developed through the **open-source** modelling tool OSeMOSYS.



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Scenarios analysed using CLEWs-Sri Lanka

Business as Usual **BAU Scenario**	Nationally Determined Contributions **NDC Scenario**	Ambitious Renewable **Ambitious-RE Scenario**
Sri Lanka returns to pre-COVID 19 policies	Sri Lanka recovers with all policies aligned with updated NDCs.	Same as the NDC scenario with **aggressive deployment of renewable energy.**
No policy alignment with updated NDCs.	Energy policies facilitate clean energy development, efficiency, demand-side management, and fuel switching.	Same as NDC Scenario.
The power system envisages the baseline power system expansion plan.	Renewable capacity scaled up **x2 compared to BAU** over 2025-2030 (aiming for 70% RE by 2030)	Aggressive scale-up of BAU capacity by **x3 over 2025-2030 and x2.5 over 2030-2050**.
Limited Transport Decarbonisation	Moderate electrification of transport	Same as NDC Scenario.
Land allocation prioritises agriculture and other infrastructure over RE zones and forest conservation.	Land reforms support RE expansion, **safeguard food security**, and **achieve 32% forest cover by 2030**.	Same as NDC Scenario.

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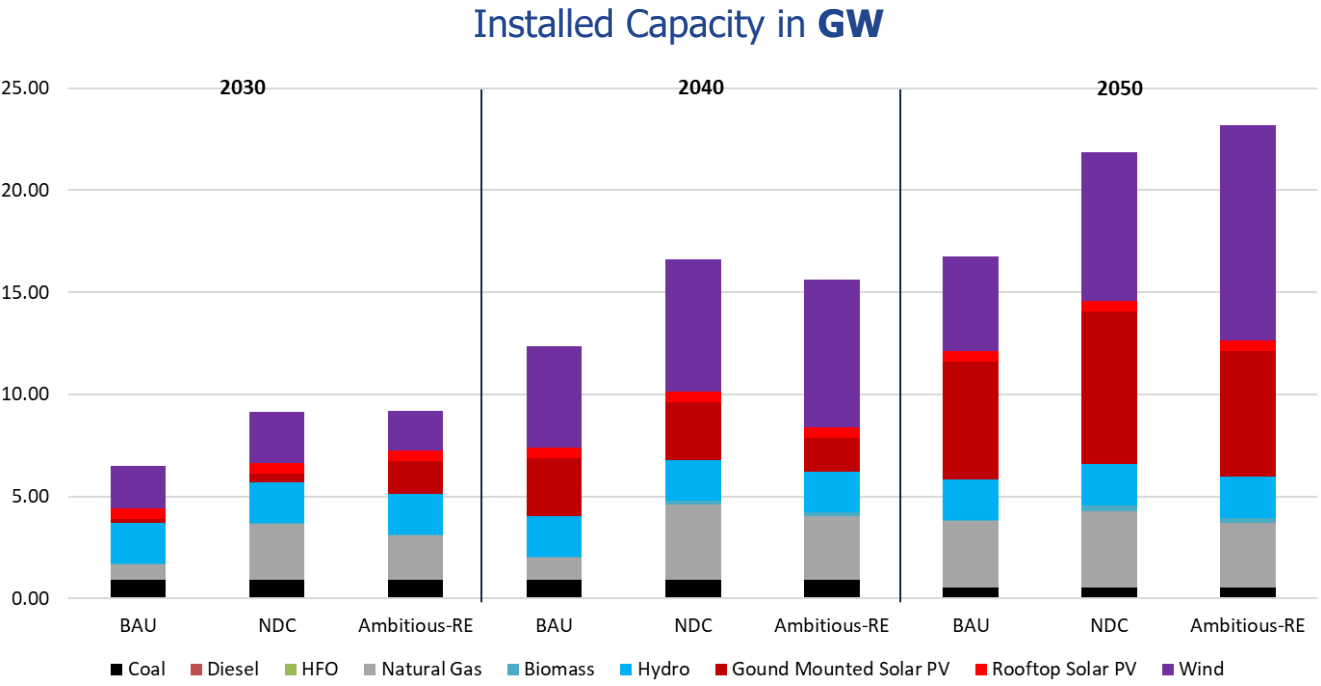
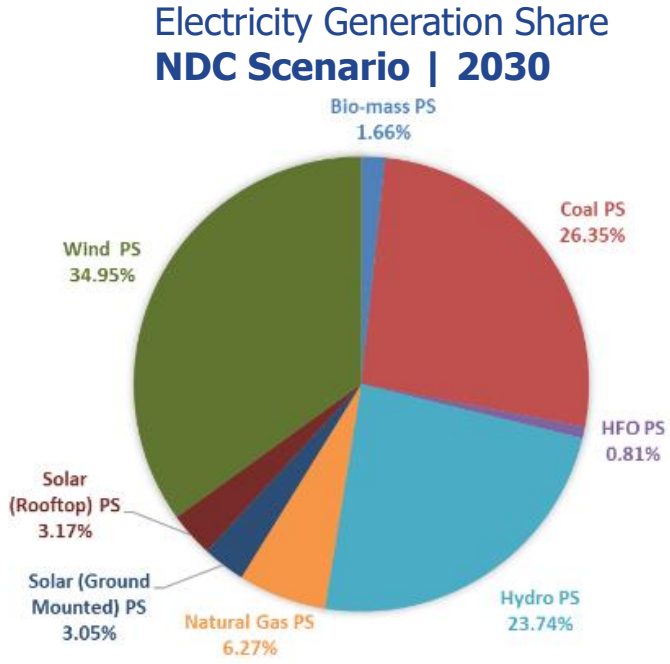
Electricity Generation





- Majority of new capacity comes from solar PV, onshore wind, and natural gas for grid balancing.

(offshore wind and battery storage were not considered in this study)

- BAU capacity grows threefold, where Ambitious-RE almost fivefold.
- NDC scenario **falls short of the 70% renewable generation target in 2030**.

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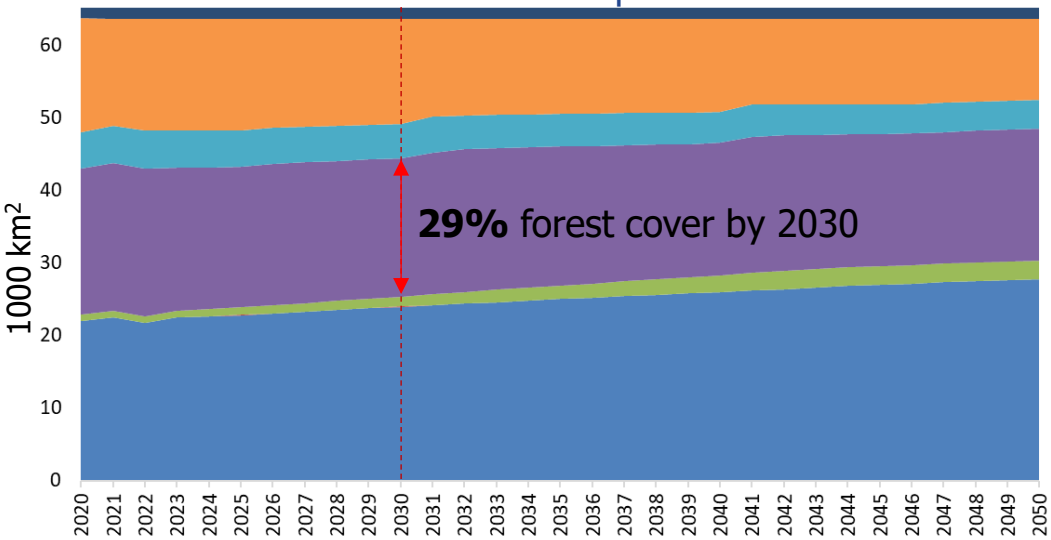
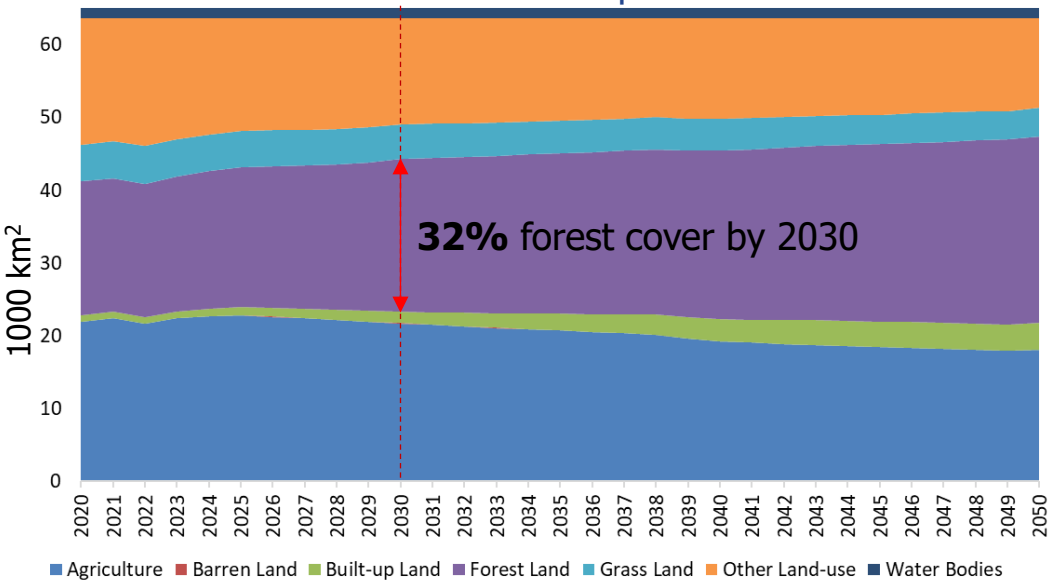
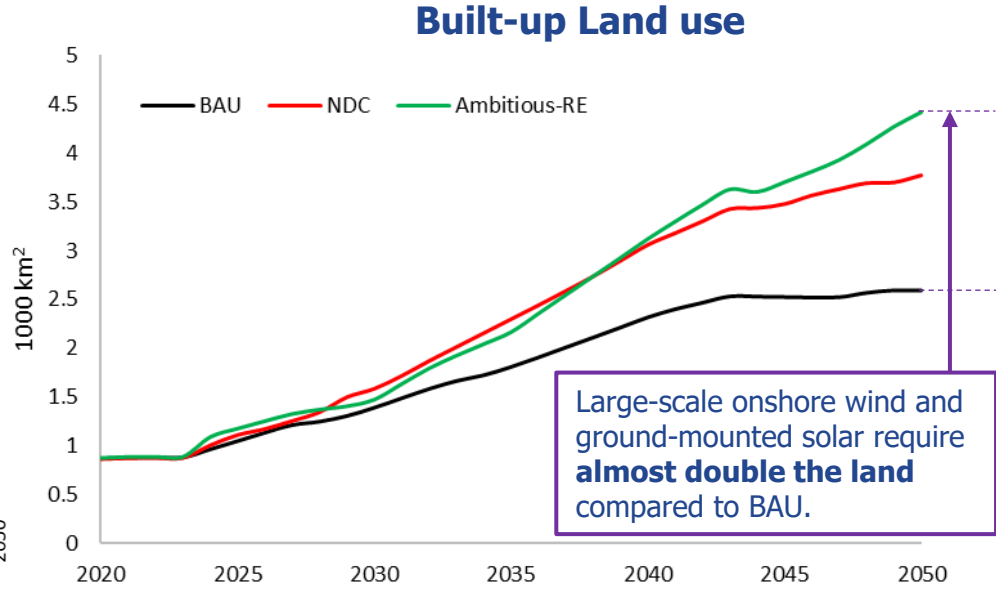
Land-Use Implications



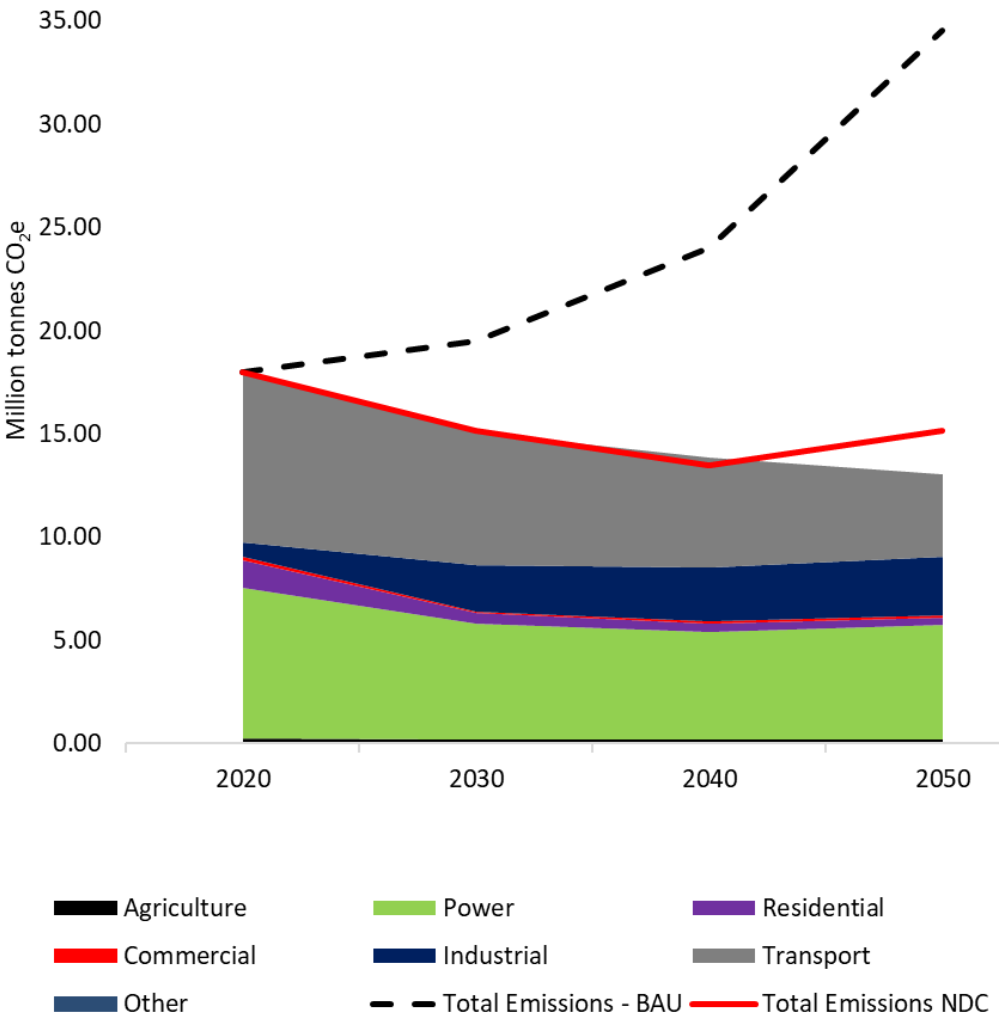
- Forest conservation signifies the land-use conflict.
- There is a possibility for an overall reduction in agricultural land through **intensification and strategic reallocation**.
- **Ensures food security (zero imports)** with a smaller agricultural footprint, freeing land for forests and RE infrastructure.





Emission Reduction Potential

GHG Emissions by Sector for Ambitious RE scenario



- Total GHG emissions **double** from 2020 in BAU.
- Substantial emission reductions are achievable with large-scale RE development combined with transport electrification.
- Large uptake of Natural Gas power stations in the NDC scenario sustains emissions from the power sector, **potentially impacting the net-zero target**.

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- **Accelerate solar & wind capacity addition** compared to current plans to exceed 70% RE by 2030 and achieve deep decarbonization.
- **Use natural gas for short-term flexibility** in the power sector but carefully evaluate its long-term impact on emissions and water demand.
- **Implement energy efficiency and demand reduction** policies to optimise energy use and lower system costs.
- **Plan land use holistically**, promoting agricultural intensification to free up space for forests and renewables (considering wind farm footprints).
- **Make ambitious electrification** and efficiency in the transport sector a top policy priority.

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Thank you!

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