Cities in National Decarbonization Pathways
National Projections – Thailand 2050

Through stakeholder engagement and capacity building, this **U.S.-ASEAN Smart Cities Partnership** program advances urban sustainability in a net-zero context using the **Global Change Analysis Model (GCAM)**. Developed by PNNL, GCAM is a global integrated model that shapes climate and energy policies worldwide and is used by IPCC in all its reports. In collaboration with partners at Thammasat University, PNNL has produced preliminary national GCAM projections from Thailand, one of two pilot projects in addition to Malaysia. City-scale GCAM analyses for Bangkok and Kuala Lumpur are also in progress. In the future, GCAM can be applied to additional cities in ASEAN member states and worldwide. This analysis helps inform city leaders in long term decision-making as they outline future climate and energy system goals, and define the role of cities in meeting national targets.

KEY BENEFITS OF USING GCAM

- Fully **open-source**
- Comes with **pre-loaded data** for initial baseline
- Provides **integrated-holistic** view of sectors (energy, water, land, climate, socio-economic)
- Provides **global, national and sub-national** analysis in a single integrated model.

POLICY IMPACTS BY 2050

Buildings

- *Enhance AC and building envelope efficiency*

  25% ↓ in electricity consumption for residential cooling & ventilation;
  72% ↓ for commercial

- *Phase-out of non-LED lighting technologies*

  68% ↓ in electricity consumption for residential lighting

Electricity

- *Expansion of wind to 15% and solar to 48% of electricity generation; phase-out of coal*

  84% ↓ in CO2 emissions from electricity generation
  -90 MTCO2 equivalent

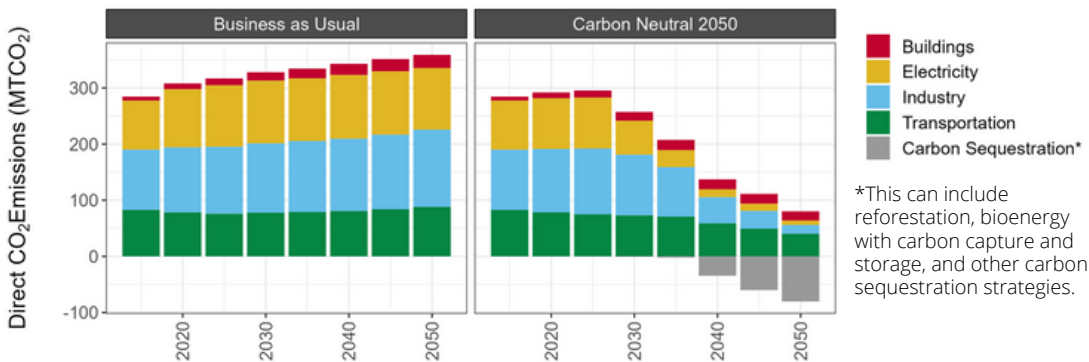- *Seek further wind and solar, BECCS, coal with CCS development*

Transport

- *Decrease in passenger & freight EV costs; phase-out of passenger internal combustion engine vehicles*

  560% ↑ in passenger EV use
  108% ↑ in freight EV use

  13.4 MTCO2 equivalent

- *Seek further increase in EV use for these purposes, expand to electric buses*
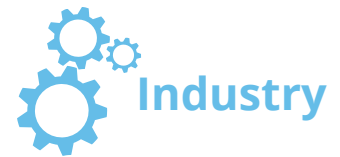
Industry

- *Increase in industrial energy efficiency (1% annually)*

  27% ↓ in electricity consumption

  -25 MTCO2 equivalent

- *Seek electrification and further increase in energy efficiency*

  77.7 MTCO2 equivalent

EXAMPLE DECARBONIZATION PATHWAY

This can include reforestation, bioenergy with carbon capture and storage, and other carbon sequestration strategies.

ACCOMPLISHMENTS

- Presented at COP27 and American Geophysical Union (**>25,000 attendees**)
- Trained **over 80 partners and stakeholders;** informed real-world planning
- Trained local utilities in **cybersecurity**

POTENTIAL FUTURE PLANS

- Work with **Thailand** and **Malaysia** to refine scenarios and develop plans beyond 2050

U.S. DEPARTMENT OF ENERGY

BATTELLE