Pacific Northwest NATIONAL LABORATORY

PNNL-Thammasat August 2022

August 2/3, 2022

SE Asia Digitalization Project

U.S. DEPARTMENT OF ENERGY BATTELLE

PNNL is operated by Battelle for the U.S. Department of Energy

Agenda

- Upcoming Deliverables
- Workshop 1
- Scenario Design
- Example Diagnostic Figures
- Next Steps

Upcoming Deliverables

Project Time Period: 02 May 2022 to 30 June 2023

Objective: Explore policy and technology pathways to carbon neutrality (2050) and net-zero emission (2065) in Bangkok through technical analysis and engagement with local stakeholders and experts.

GCAM Training Session	Timeline
GCAM training	Jun 29 2022
GCAM training	Sep 2022
GCAM training	Dec 2022

Workshops	Timeline
Workshop 1 with local institutions	Sep 2022
Workshop 2 with local institutions	Jan 2023
Workshop 3: ASEAN Best Practices workshop	Jun 2023

Deliverables	Timeline	Milestones
Memo 1: 1 Page memo with list of official Thammasat team members and roles	May 2022	Milestone 1
Workshop 1 Plan: 1 Page Agenda and Participant list for Workshop 1	Jul 2022	
Memo 2: 2-3 Page Memo with Feedback on Input Data, Scenario 1 and Scenario 2	Aug 2022	Milestone 2
Workshop 2 Plan: 1 Page Agenda and Participant list for Workshop 2	Nov 2022	
Memo 3: 2-3 Page Memo with Feedback on Scenarios 3, 4, 5	Feb 2023	Milestone 3
Workshop 3 Plan: 1 Page Agenda and Participant list for Workshop 3	Apr 2023	Milestone 4

Workshop 1

- Agenda GCAM WS1 EN-1st update.docx received 2 August 2022

The 1st Workshop on "Modelling Bangkok's Grid Modernization and Digitalization"

Background

Urbanization is driving rapid socioeconomic growth in Thailand, especially in Bangkok and vicinity, posing challenges for power grids as power demand increases. Growth in power demand will require significant evolution in grid planning. The U.S. Department of Energy's Pacific Northwest National Laboratory (PNNL) is partnering with Thammasat University (TU) and the Metropolitan Electricity Authority (MEA) of Thailand to supplement Bangkok's existing Smart City roadmap plans by providing integrated modeling and assessment capabilities. Global Change Analysis Model (GCAM), an integrated assessment model, will be used to assess the trajectories and outcomes of Smart City pathways for Bangkok and focus on the implications for the energy system. The model results will be used to demonstrate MEA's role in their Smart City planning and implementation towards a Bangkok Smart City in 2050 as well as Thailand's long-term national low-emissions development strategy and carbon neutrality goals.

Outline of the 1st workshop

In the upcoming 1st workshop, the PNNL and TU will introduce the objectives of this project to participants and notify how to deal with the issues on smart city planning for Bangkok using the GCAM. Timeline of this project and the expected outcomes proposed in MEA's smart grid plan towards Bangkok Smart City in 2030 and carbon neutrality in 2050 will be presented.

Period: Fri, 16 Sep 2022, 8.00 to 10.30 am (BKK Time)

Schedule

8.00 – 8.15	Opening session and introduction between the participants by TU
8.15 – 8.30	Presentation by MEA on MEA smart grid plan
8.30 – 8.45	Presentation by BMA on Carbon free Bangkok
8.45 – 9.15	An introduction and description of the project by PNNL
9.15 – 9.45	An introduction of GCAM and development of a set of scenarios for MEA's smart grid plan by PNNL and TU
9.45 – 10.30	Q&A and discussion

Participant lists

1. MEA, Khun Sompong (Smart grid director), Nattanont, Kanokpol and Amoltheeras
2. EPPO, Khun Supit
3. EGAT, Khun Siripan
4. BMA, Khun Narongsak, Nijkal, Parinda and Manusavee
5. Thammasat team
6. PNNL Team
7. U.S. State Department

Scenario Design

New Approach to Scenarios

Levers for Analysis		Ranges	
		Low	High
Electricity	RE Integration		
	Building PV		
	Smart Metering		
Transport	EV Costs (shareweights?)		
	Combustion Phase-out		
Buildings	Shell Conductance		
	AC Efficiency		
	Lighting Efficiency		
Industry	Energy efficiency		
	Tech Efficiency		

Other Levers to Consider			
AGLU	Biomass		
	Forests		
Carbon Removal and Alternate Fuels	Hydrogen		
	CCUS		
	BECCS		

Possible Scenarios
- Low Bangkok + Low Rest of Thailand
- High Bangkok + High Rest of Thailand
- High Bangkok + Low Rest of Thailand

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Other Considerations

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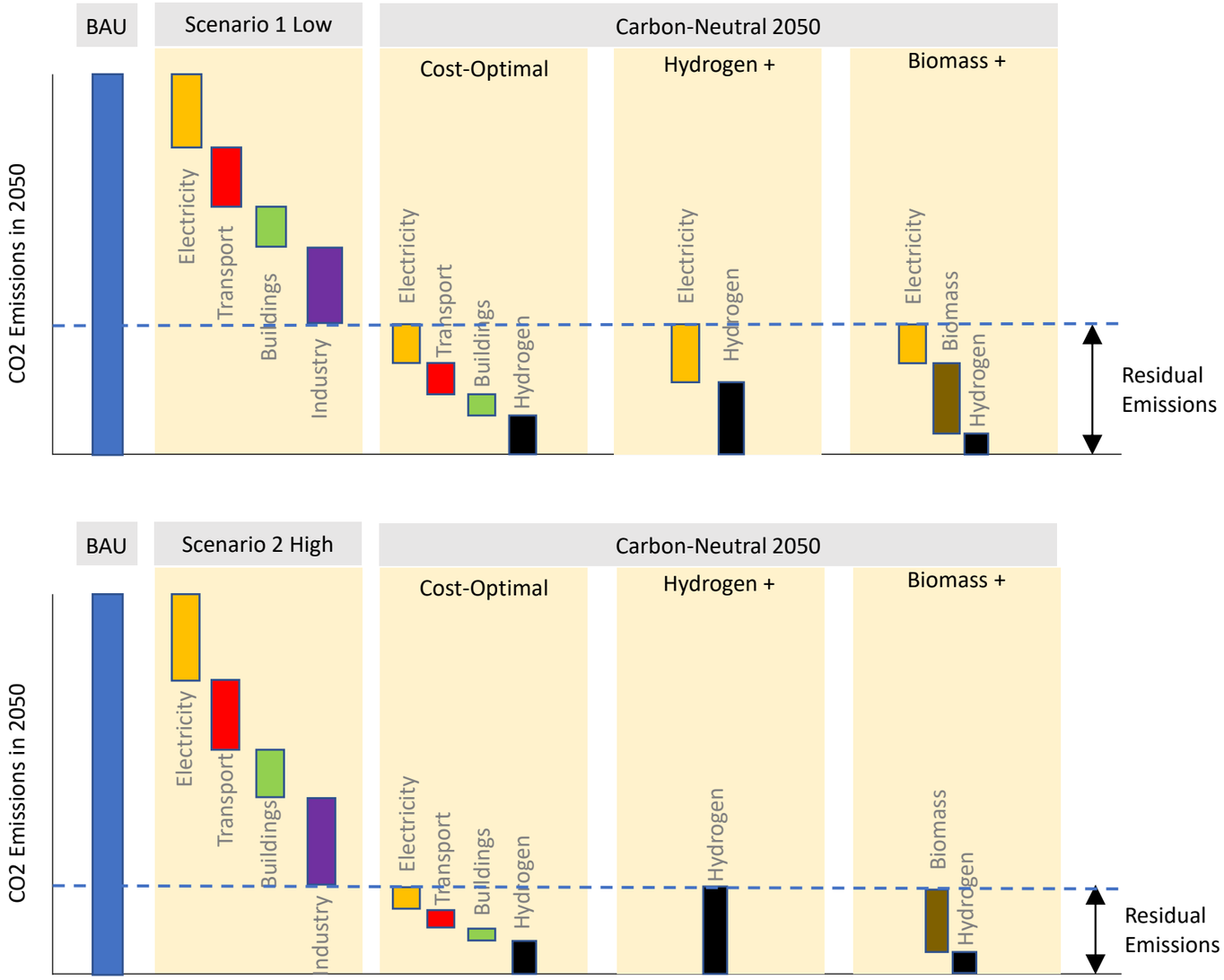
Top-down constraints
- 2050: Net-zero CO2 emissions (carbon neutral)
- 2065: Net-zero GHG emissions

Conceptual Figure to Analyze Scenarios



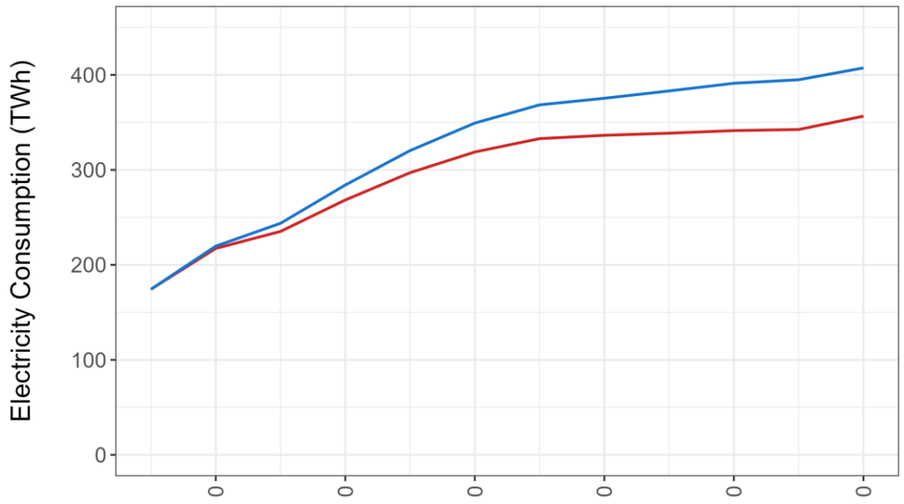
Thailand National Policies: Example diagnostic figures

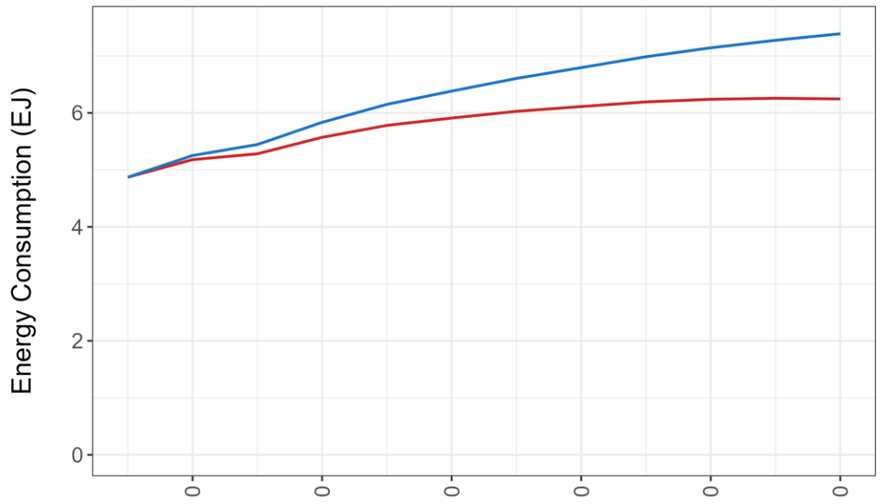
Thailand National Policies: Example Diagnostic Figures

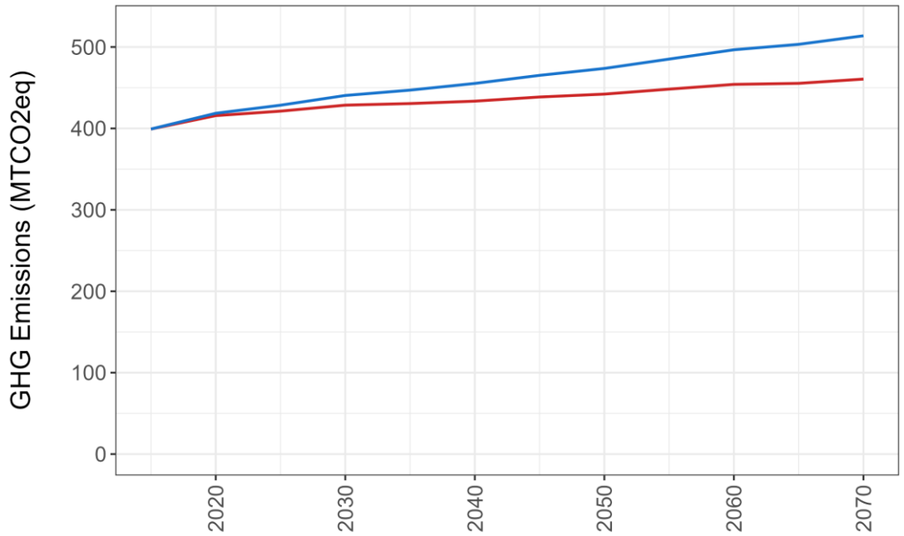
Policies included in example:

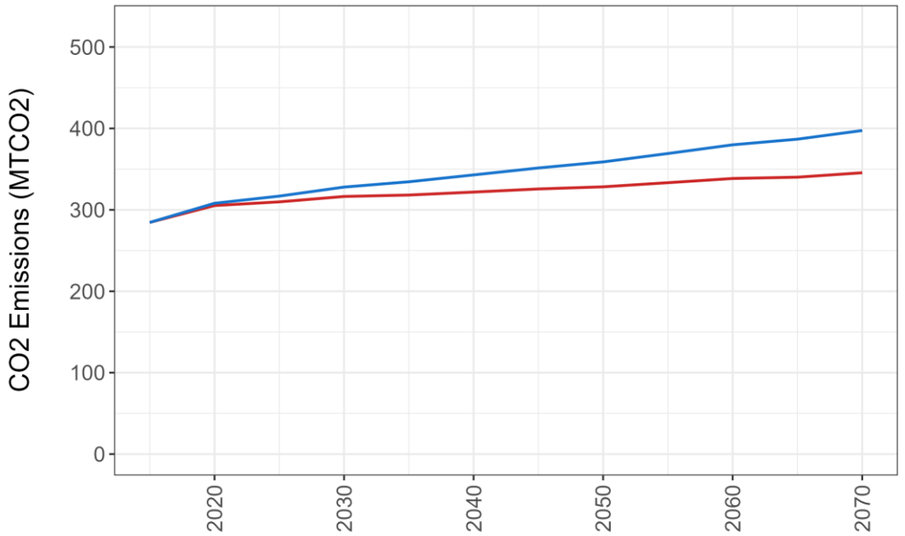
- **Industry**: Autonomous Energy Efficiency Improvement (AEEI): 0.005 from 2020 to 2040
- **Transportation**: Decrease EV cost to reach cost parity with traditional liquids vehicles by 2060 (passenger)/ 2070 (freight)
- **Buildings**: Increase building envelope efficiency from 2020 to 2070 with a compound annual growth rate of 2% (commercial)/ 2.4% (residential)

Thailand National Policies: Example diagnostic figures



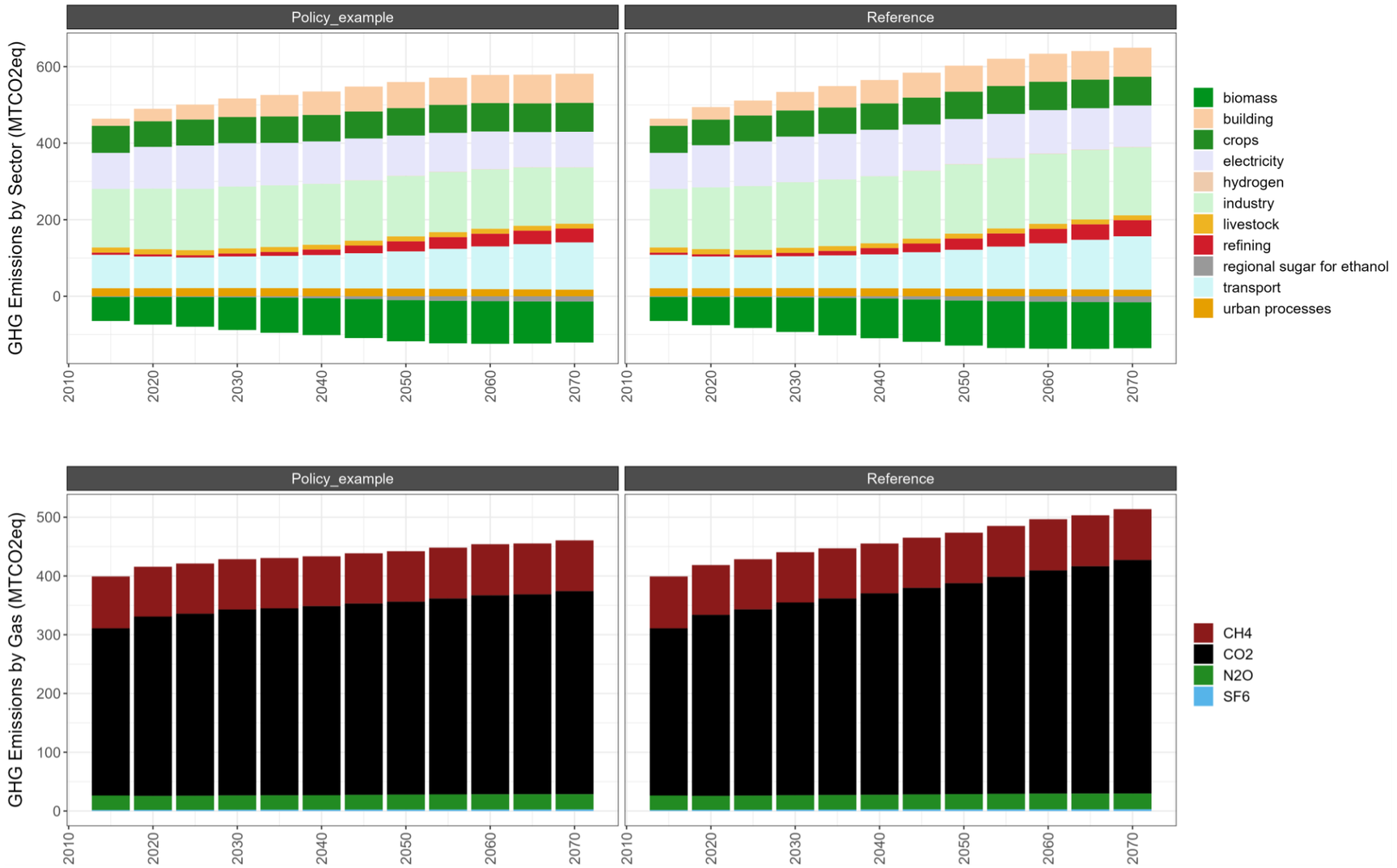






Policy_example
Reference

Thailand National Policies: Example diagnostic figures



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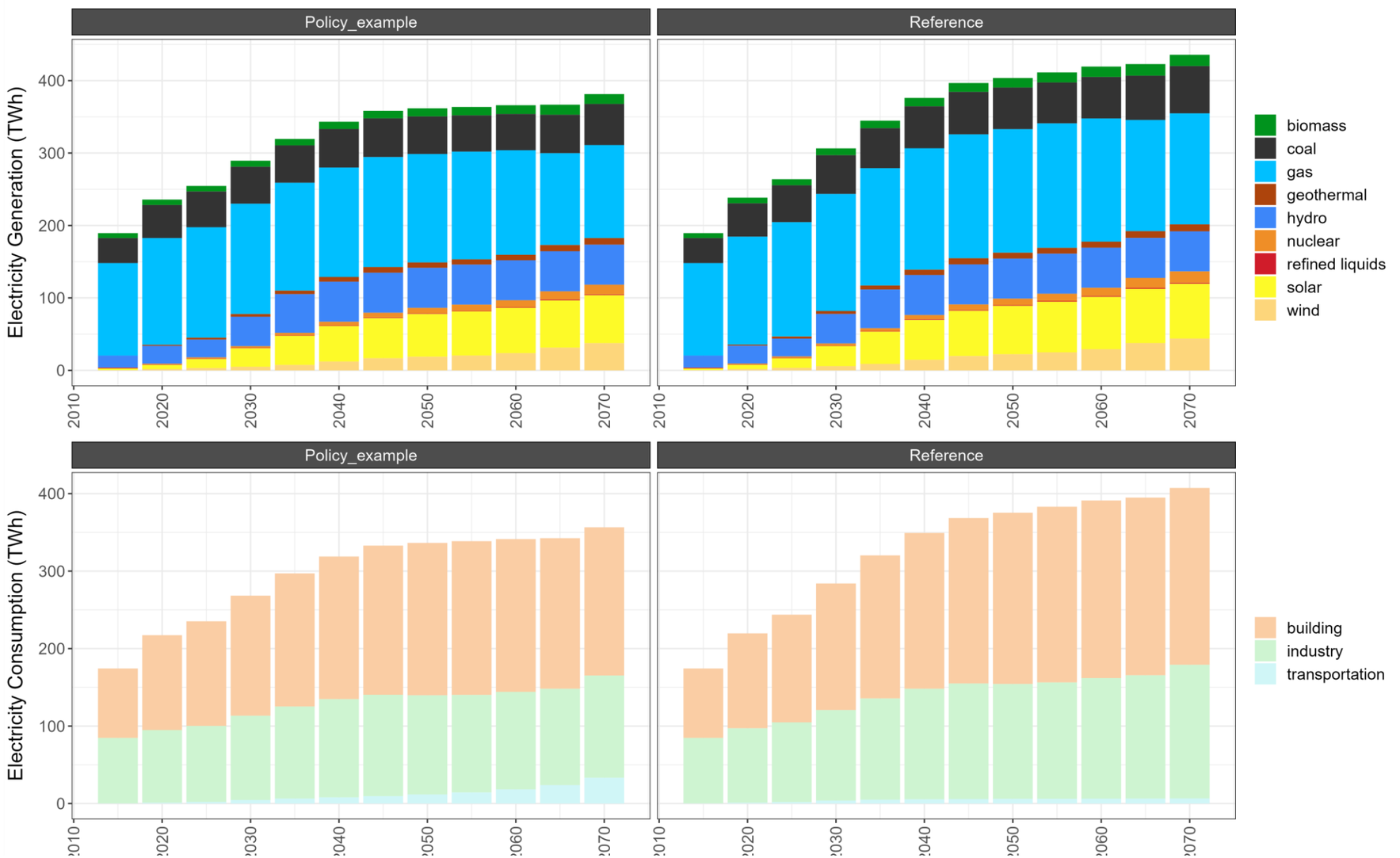

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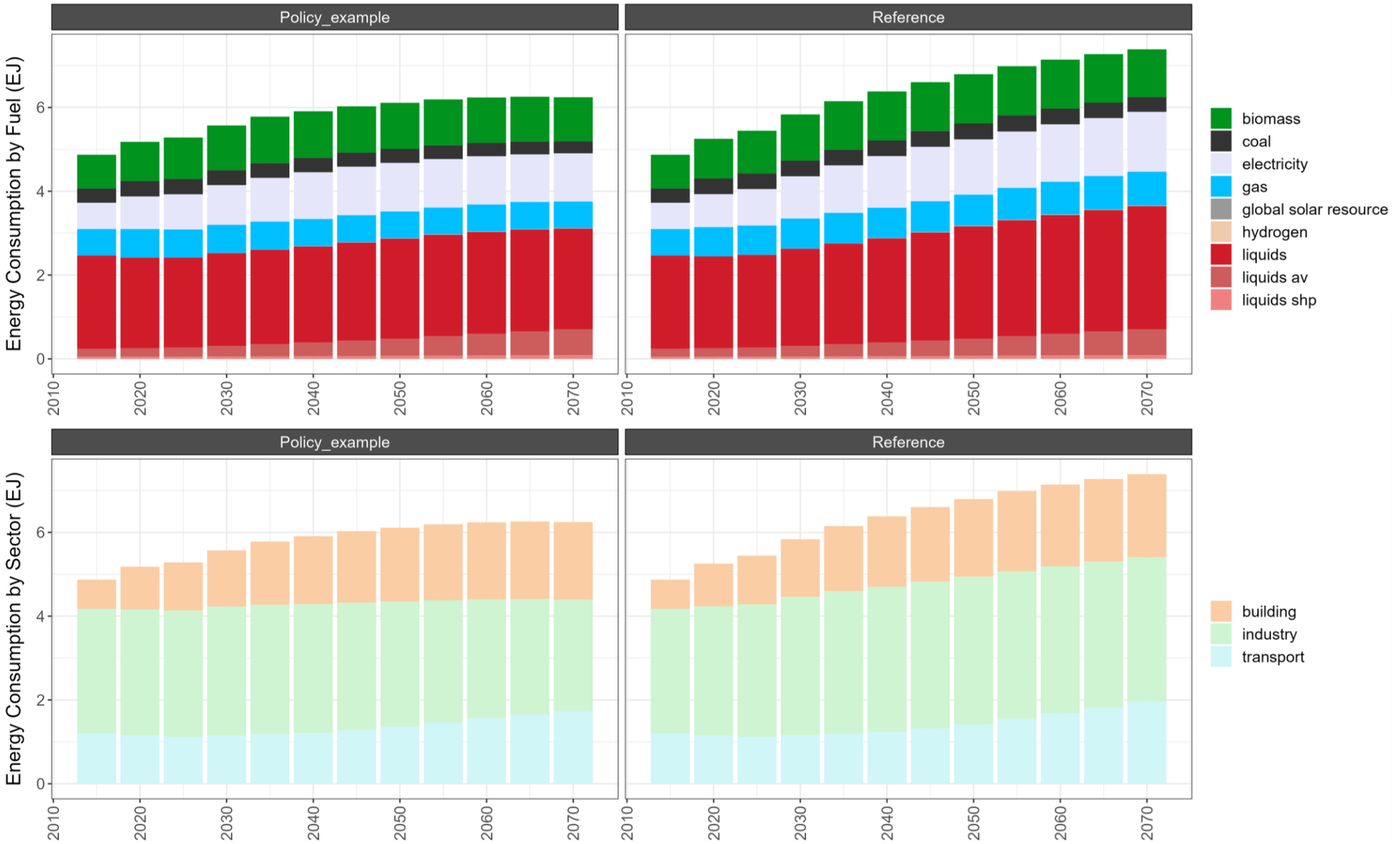

Next Steps

- PNNL
  - Provide first draft of parameter ranges (high/low) for scenarios
  - Send dates of potential Travel – December

- Thammasat
  - Review parameter ranges
  - Finalize Workshop1 Date (Fri 16 Sep)
  - Share slides on 18 July Public Hearing of LTS update

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Thank you