PNNL-Thammasat June 2022

June 15/16, 2022

SE Asia Digitalization Project

Agenda

- Upcoming Deliverables:
- Workshop 1
- Population & GDP data Update
- National Policies GCAM Implementation (Energy, transport, industry, buildings)
- 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.docx received 15 June 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.

Period: Fri, 15 July 2022, 8.00 to 9.30 am (BKK Time)

Schedule

8.00 – 8.15   Opening session and introduction between the participants by TU

8.15 – 8.45   An introduction and description of the project by PNNL

8.45 – 9.15   An introduction of GCAM and development of a set of scenarios for MEA's smart grid plan by PNNL

9.15 – 9.30   Q&A

Participant lists

1. MEA, Khun Nuttanont
2. EPPO, Khun Supit
3. EGAT, Khun Siripan
4. BMA, Khun Akkarapol & Sermsook
5. Thammasat team

Population & GDP data Update
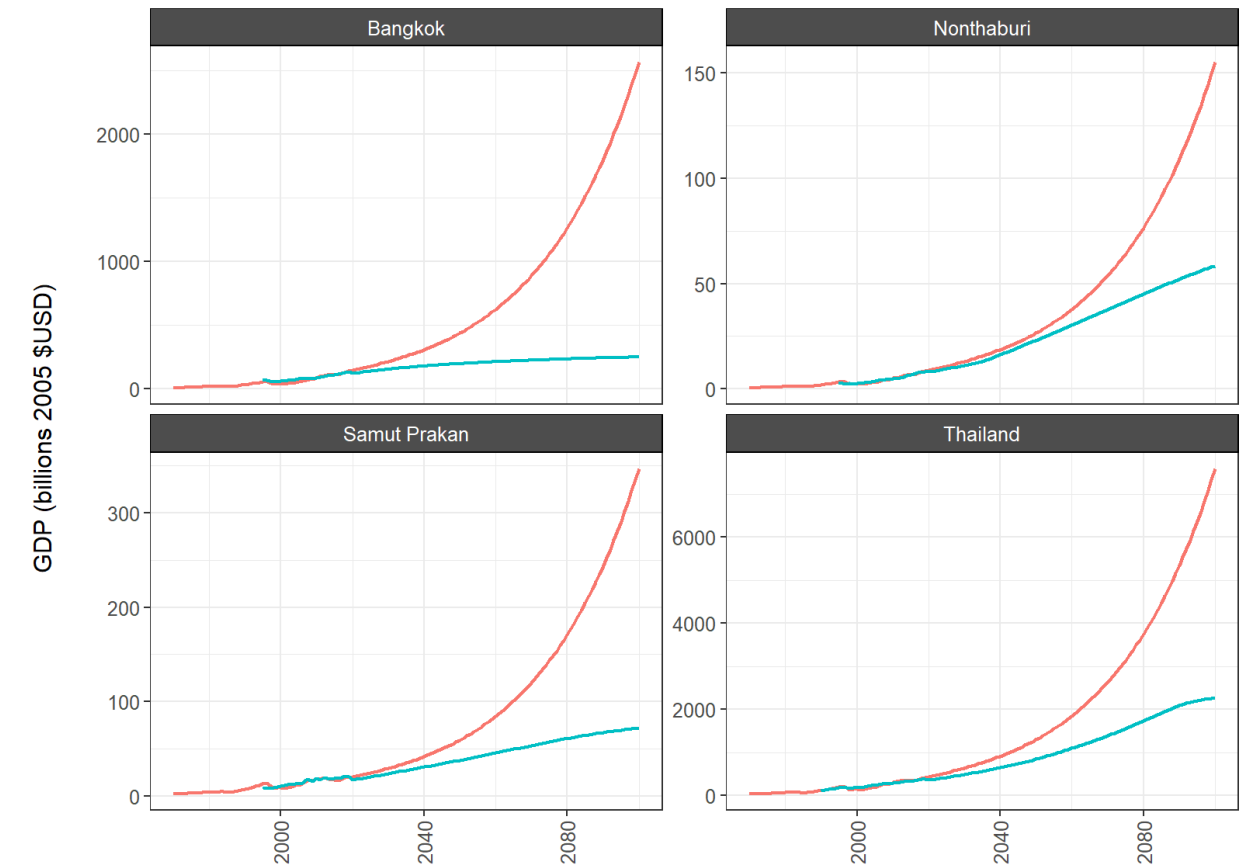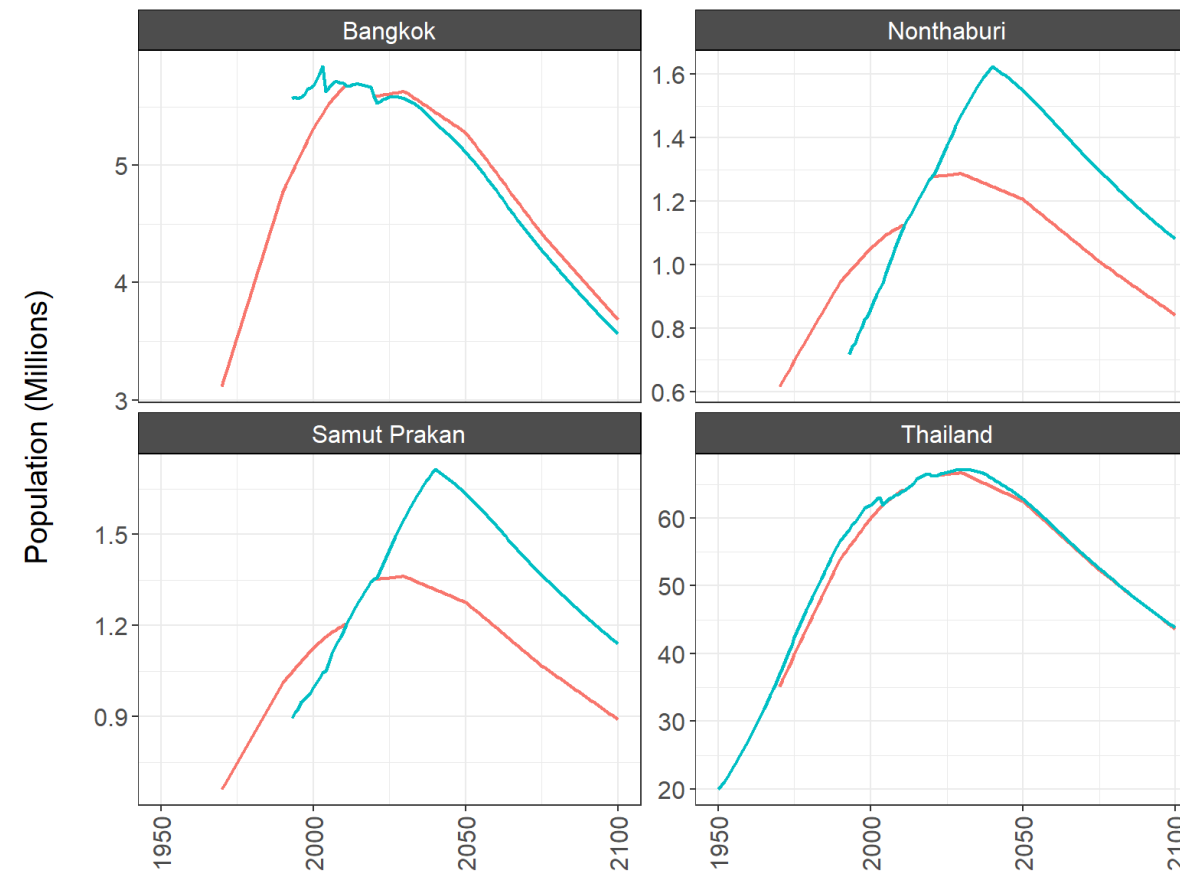
Thailand National Policies: GCAM implementation

National Policies GCAM Implementation

| Sector	Policies	GCAM implementation
Power	Power Development Plan 2018	Generation floors for each fuel
Transportation	Transportation System Development Plan 2018	Adjust share-weights for passenger and freight transport modes to reflect infrastructure development (rail and shipping)
	EV promotion & emissions-based excise tax structure	Decrease EV input costs to reach cost parity with non-EVs by 2060 (passenger)/ 2070 (freight)
Buildings	Building Energy Codes enforcement	Increase shell efficiency
	Appliance/ equipment standards	Increase technology efficiencies
Industry	Energy Efficiency Plan 2018	Use Autonomous Energy Efficiency Improvement (AEEI) to match industrial energy consumption savings goals

Power: Generation floors
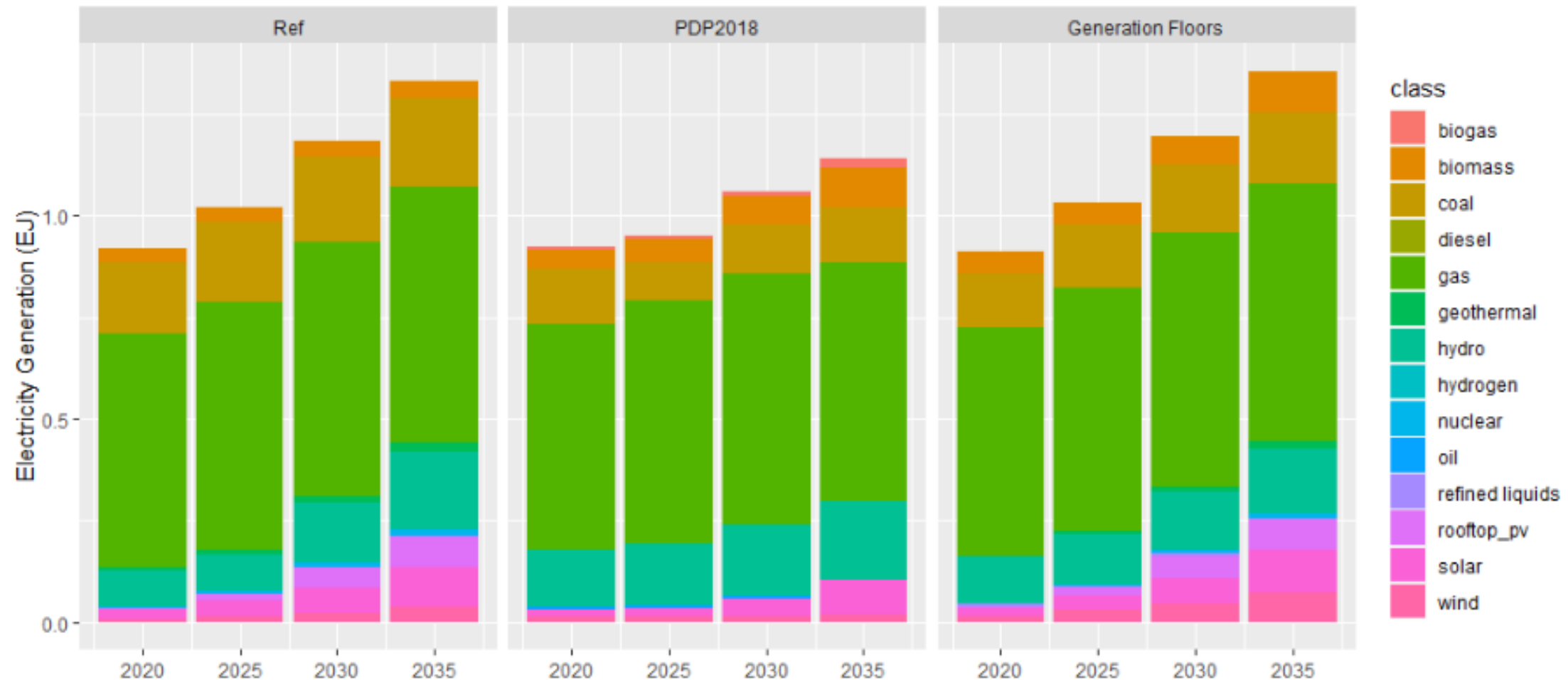
Power generation shares by fuel is estimated from the planned power capacity reported in PDP2018. With the floor approach, in GCAM generation from each technology will at minimum reach these shares. Shares of additional generation needed to fulfill demand are determined by GCAM's markets.

Transportation: shareweight adjustments

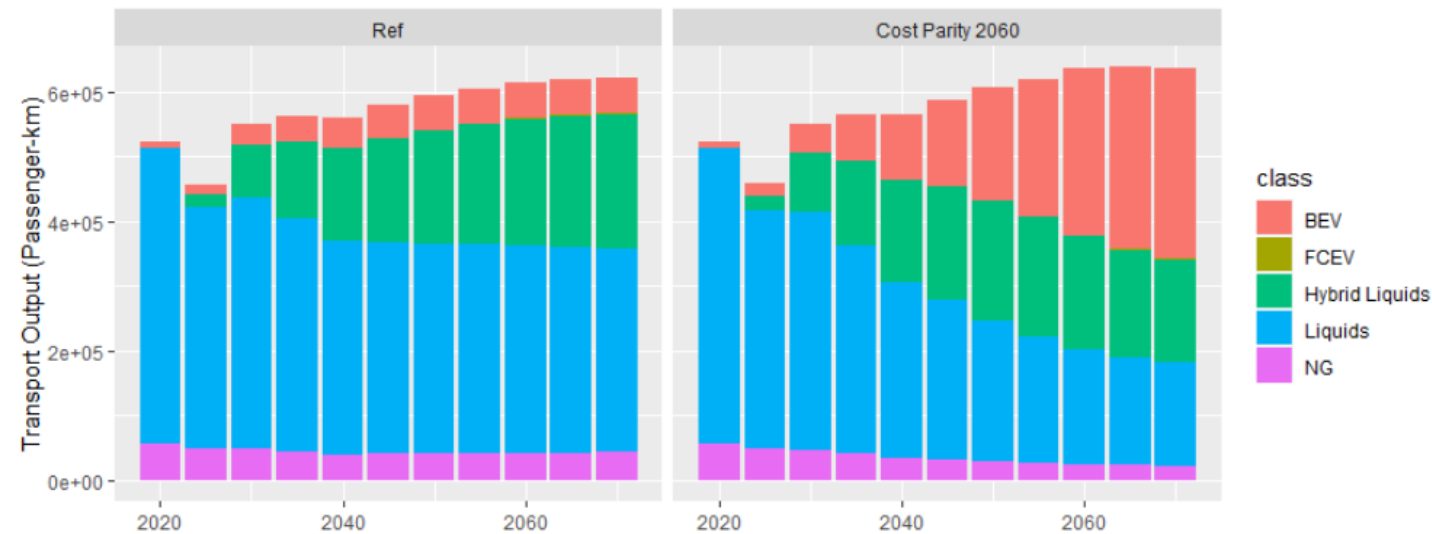Shareweights are used to represent non-cost impacts on shares (e.g., infrastructure development)

Transportation System Development Plan
- Freight transport 2040 shares: 19% by ship, 10% by rail
- Passenger transport: increase rail infrastructure (no specific targets given)
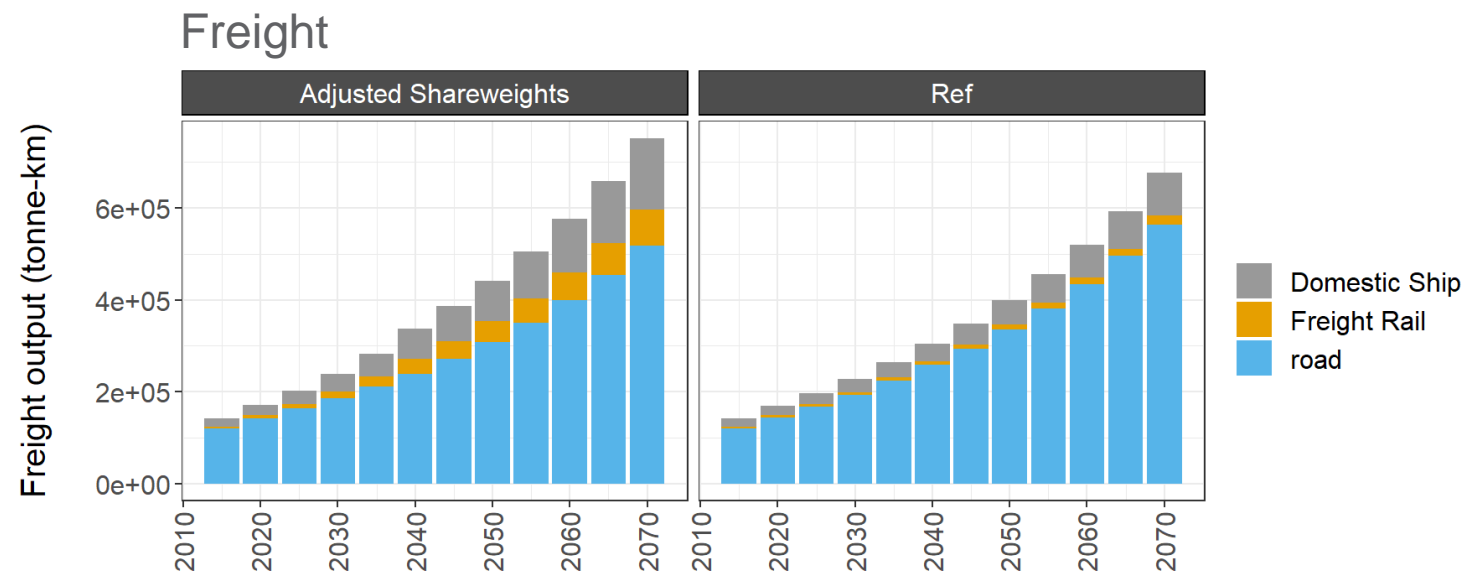
Freight

Passenger

Transportation: EV cost parity

Passenger

Freight

Input costs can be adjusted to represent changing costs of different transportation technologies.

Here, we reduce BEV input costs gradually up to a "cost parity" year in which BEV input cost is equal to Liquids input cost. This adjustment represents the following policies:

- Emissions-based excise tax structure
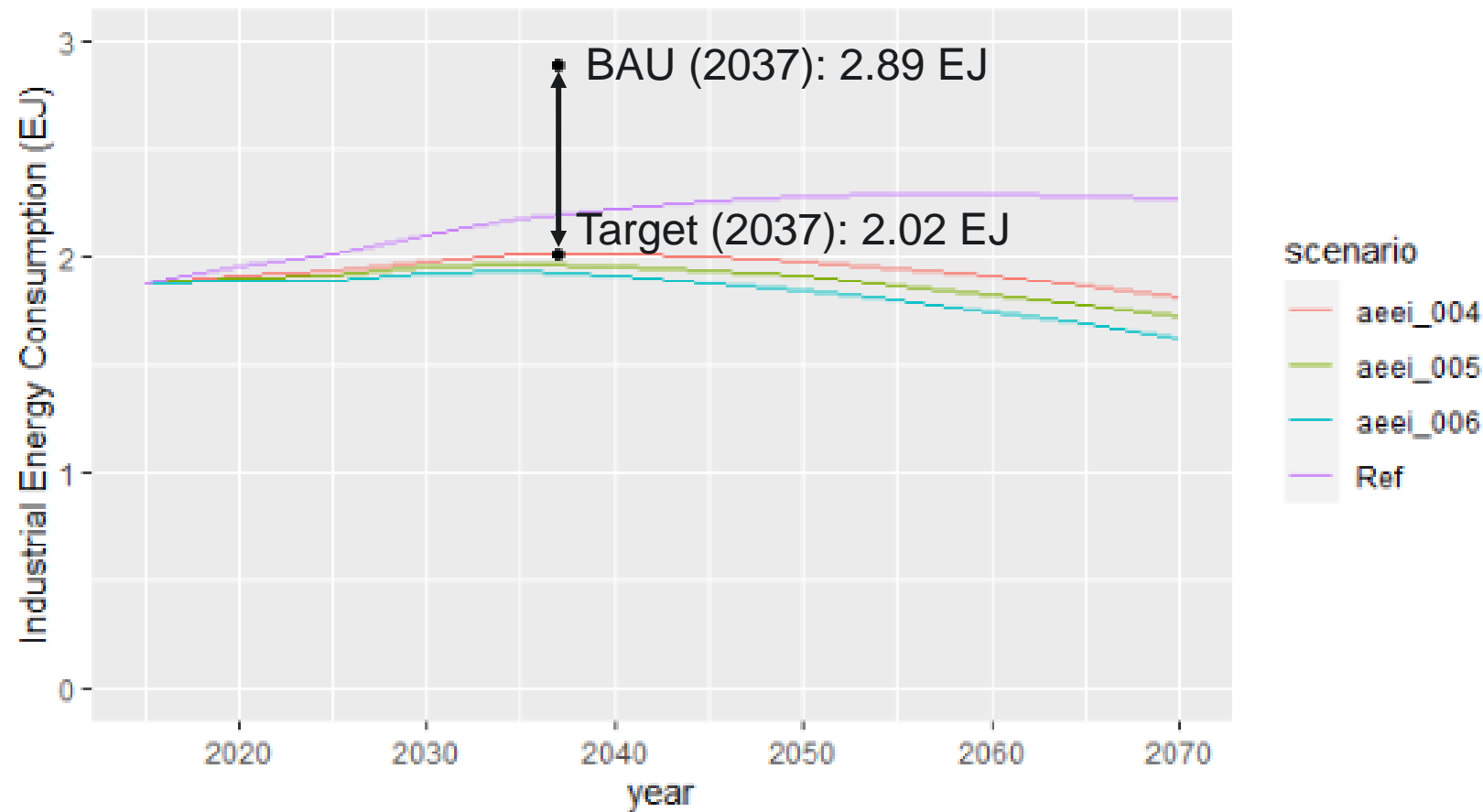- Measures to promote EV use

Transportation: Emissions
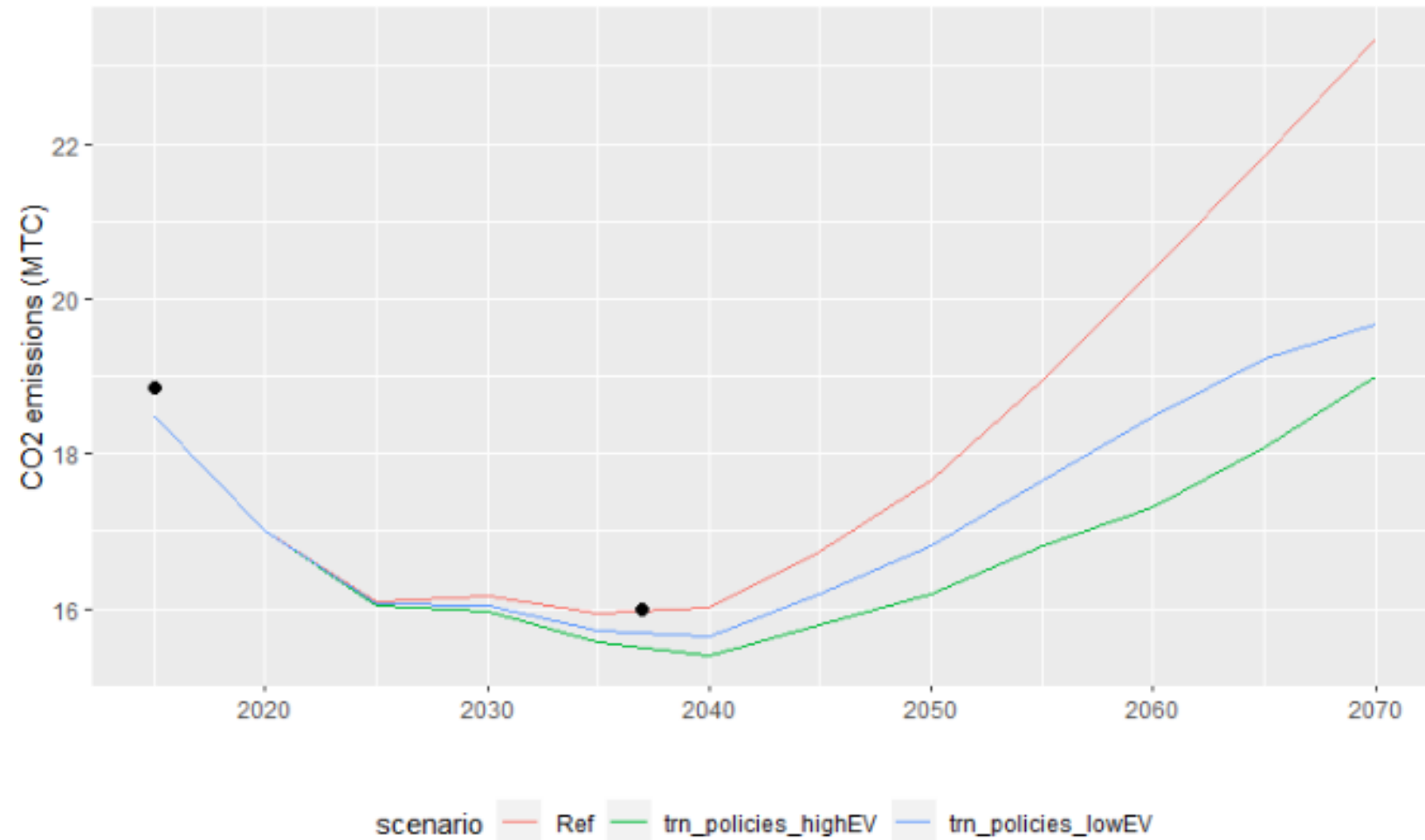
Scenario	Cost parity year	
	Passenger	Freight
trn_policies_lowEV	2060	2070
trn_policies_highEV	2050	2060

2070 rail share-weight (both scenarios): 0.02

# Industry: Autonomous Energy Efficiency Improvement (AEEI)

The autonomous energy efficiency improvement (AEEI) represents an increase in efficiency of industrial processes over time.

EEP2018 industrial energy efficiency improvement goal: 0.89 EJ energy savings in 2037 compared to business as usual (7.6 EJ total consumption in all sectors)

- Assumed industry accounts for 38% in BAU as in 2017

Buildings: shell efficiency improvement

EEP2018 buildings energy efficiency improvement goal: 0.41 EJ energy savings in 2037 compared to business as usual (7.6 EJ total consumption in all sectors)

- Assuming industry accounts for 21% in BAU as in 2017
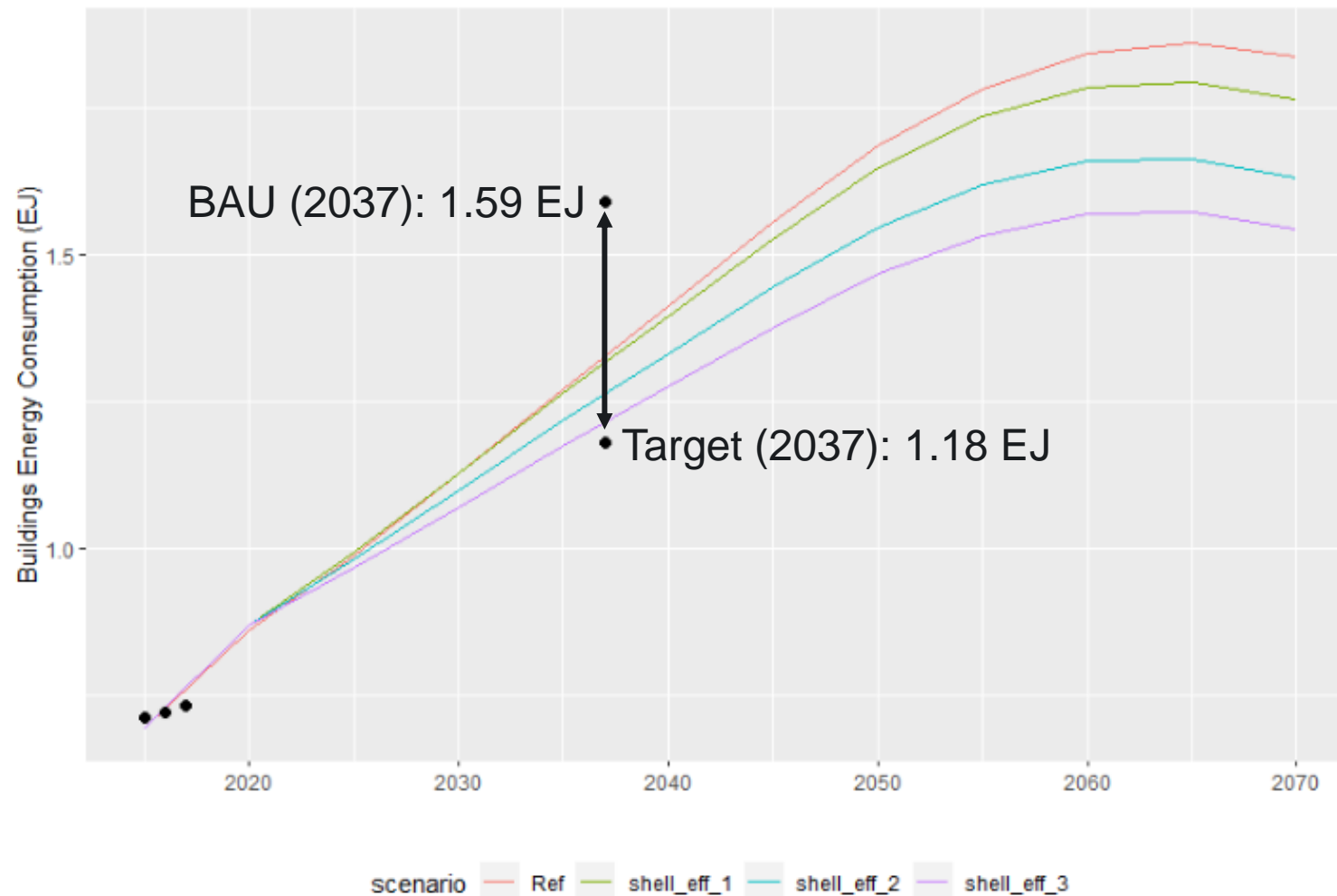
Shell conductance in GCAM (inverse of efficiency) is used to represent increasing stringency of/ compliance with building energy codes. However, it does not encompass technology efficiencies (e.g., lighting & air conditioners)– we will need to implement this as well.

Scenario	Shell conductance compound annual growth rate (CAGR)	
	residential	commercial
Ref	-0.006 to -0.008	
shell_eff_1	-0.011	-0.013
shell_eff_2	-0.02	-0.024
shell_eff_3	-0.03	-0.036

Next Steps

- PNNL
  - Share data for National Scenarios energy, industry, transport, buildings with Thammasat for review
  - Share SE Asia GCAM model with Thammasat team before GCAM training sessions
  - Review Draft Agenda for workshop and give feedback
  - Arrange next meeting with Thammasat for next month

- Thammasat
  - Review data for National Scenarios energy, industry, transport, buildings once received
  - Should we invite MEA/Khun Nattanont for a meeting before the workshop?

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Thank you