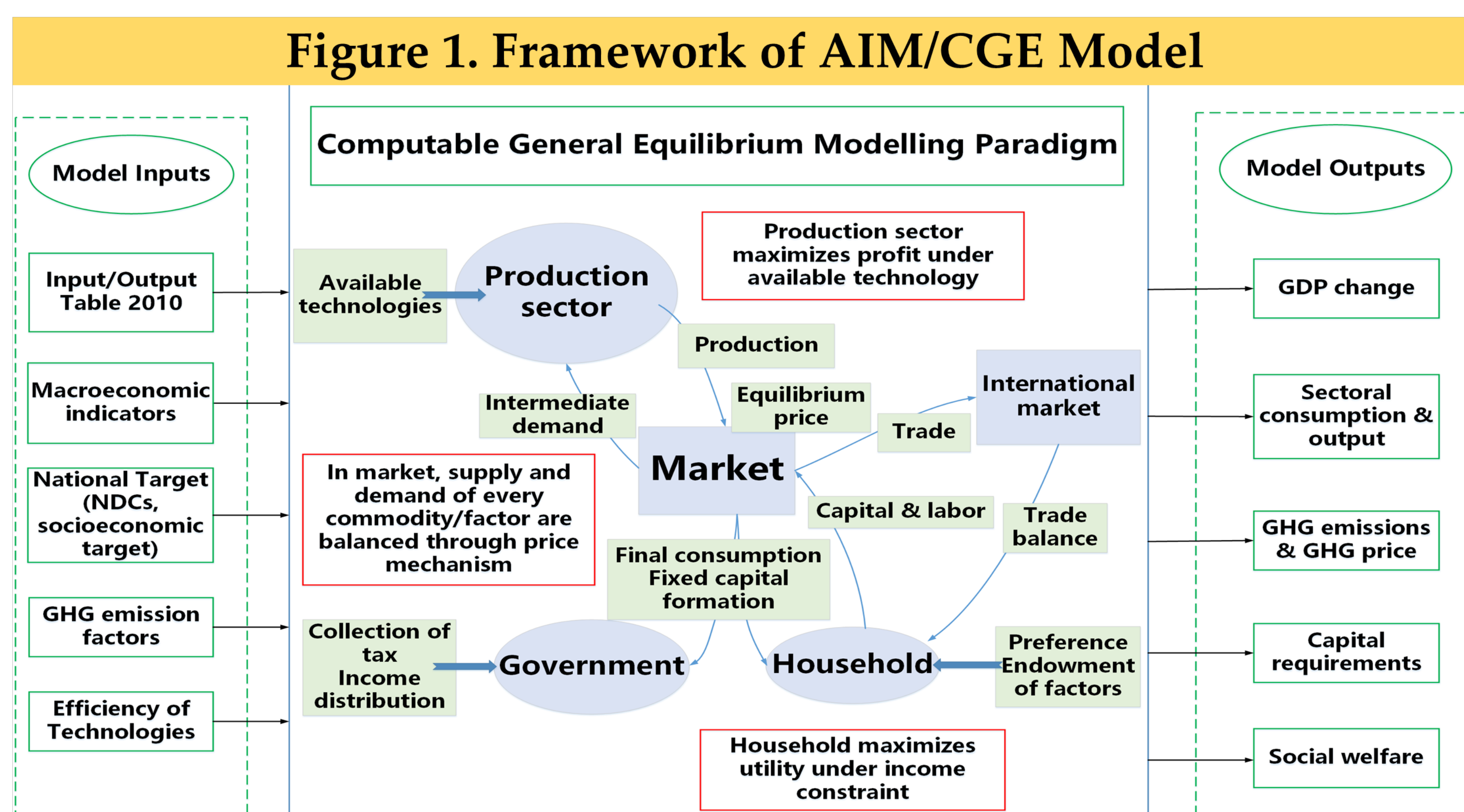


Background and Objective

The Nationally Determined Contribution (NDC) of Thailand intends to reduce its greenhouse gas (GHG) emissions by 20% from the projected business as usual (BAU) level by 2030 in the unconditional case. The GHG reductions are intended to increase up to 25% in the conditional case, subject to adequate and enhanced access to technology development and transfer, financial resources and capacity building support. However, in order to contribute towards meeting the long-term goal of the Paris Agreement to stay well below 2-degree, ambitious mitigation efforts beyond 2030 are needed. It is thus important to assess the effects of imposing more stringent long-term GHG mitigation targets in Thailand beyond the NDC commitments. This study assesses the macroeconomic impacts of Thailand's emission pathways aimed at limiting the temperature rise to 2-degree by 2050.

Methodology

This study has constructed a multi-sector, recursive dynamic Asia-Pacific Integrated Model/Computable General Equilibrium (AIM/CGE) model considering the input-output data of 2010 to analyze the aspects of GHG mitigation targets on the Thai economy during 2010-2050. The AIM/CGE model considered in this study uses the Mathematical Programming System for General Equilibrium Analysis (MPSGE) as the modeling language embedded within the Generalized Algebraic Modeling System (GAMS) interface.



Scenario Description

- **Business as usual (BAU) scenario:** without any climate policy
- **8 low to medium 2-degree scenarios (UNDC-50 to UNDC-80 and CNDC-50 to CNDC-80):** with GHG emission reduction targets of 20-25% in 2030 and 50%-80% in 2050
- **2 below 2-degree scenarios (UNDC-90 and CNDC-90):** with GHG emission reduction targets of 20-25% in 2030 and 90% in 2050

Results and Discussion

- Compared to BAU, the cumulative gross domestic product (GDP) reduction ranges from
 - 5.0%-9.7% in low to medium 2-degree scenarios
 - 5.9% in below 2-degree scenarios
- In 2050, GHG prices would vary from US\$ 91 per tCO₂eq to US\$ 1,901 per tCO₂eq in low to medium 2-degree scenarios.
- In the absence of technological progress, reaching more ambitious emission reduction targets depicted by the below 2-degree scenarios would yield a prohibitively higher economic cost of US\$ 33,805 per tCO₂eq in 2050.
- Increasing the overall energy efficiency of technologies by 40% as compared to BAU, the GHG price could be lowered up to US\$ 6,198 per tCO₂eq in UNDC-90 and US\$ 6,087 per tCO₂eq in CNDC-90 scenarios.

Figure 2. GHG Emission Pathways

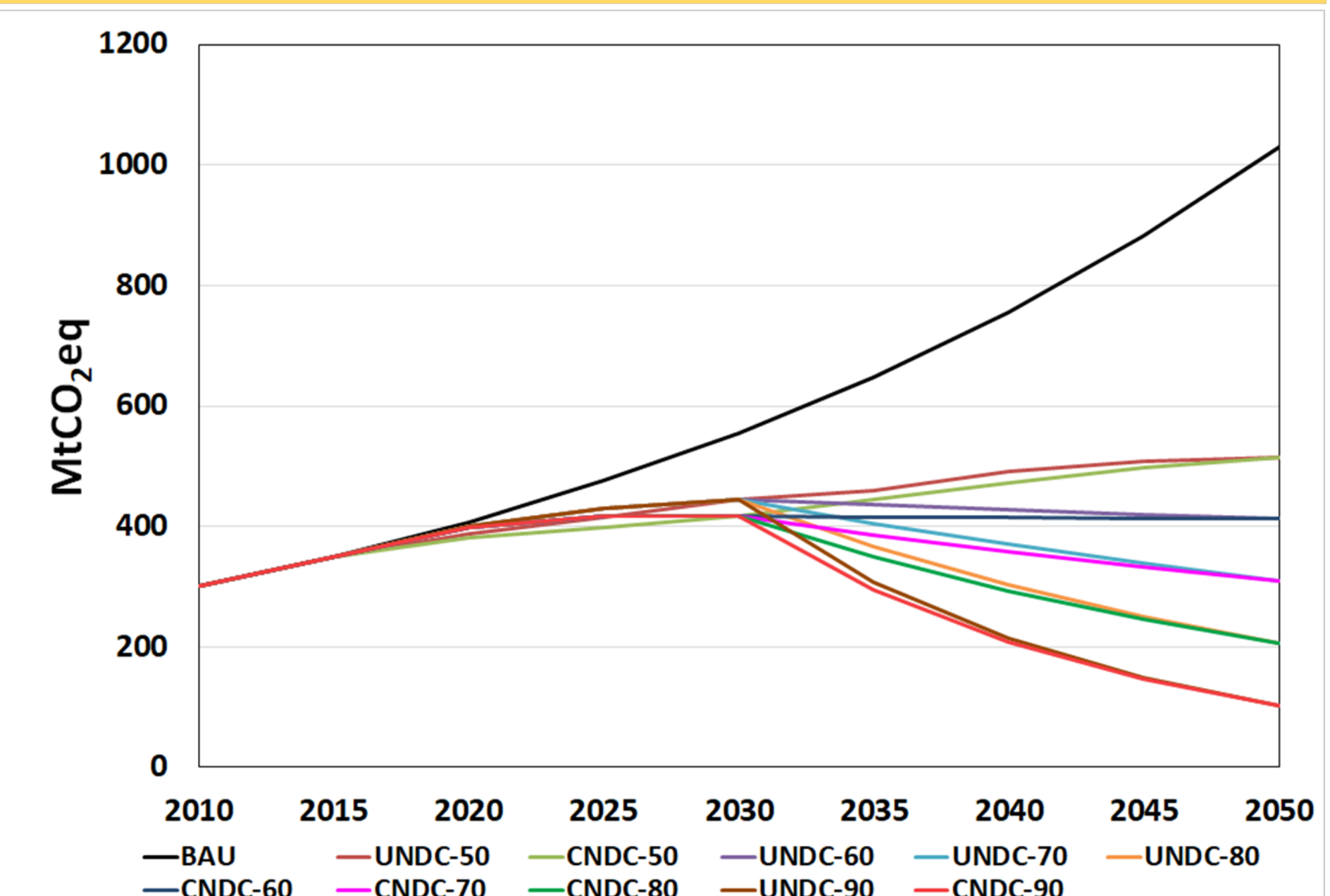


Figure 3. GDP Reduction Compared to BAU

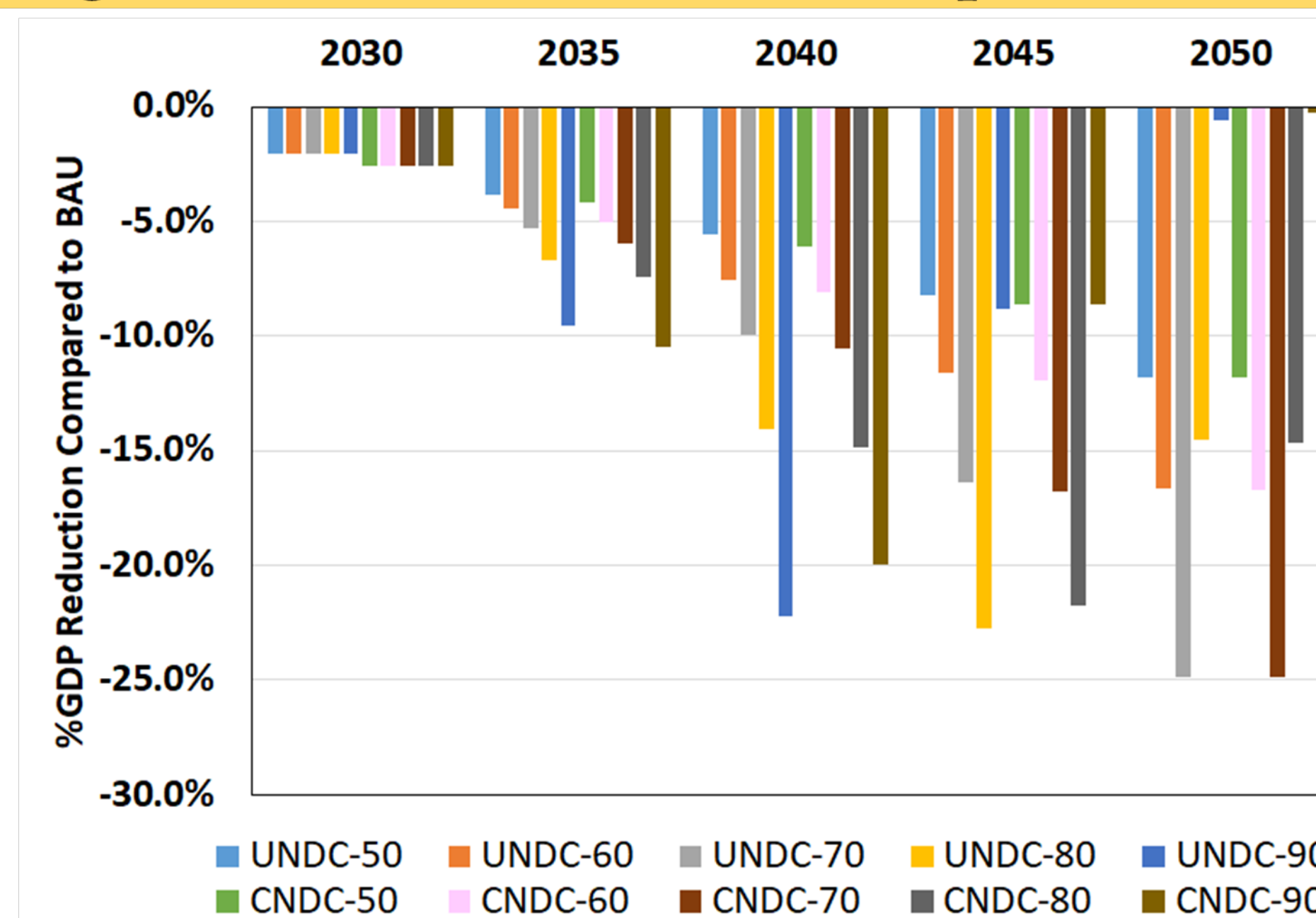
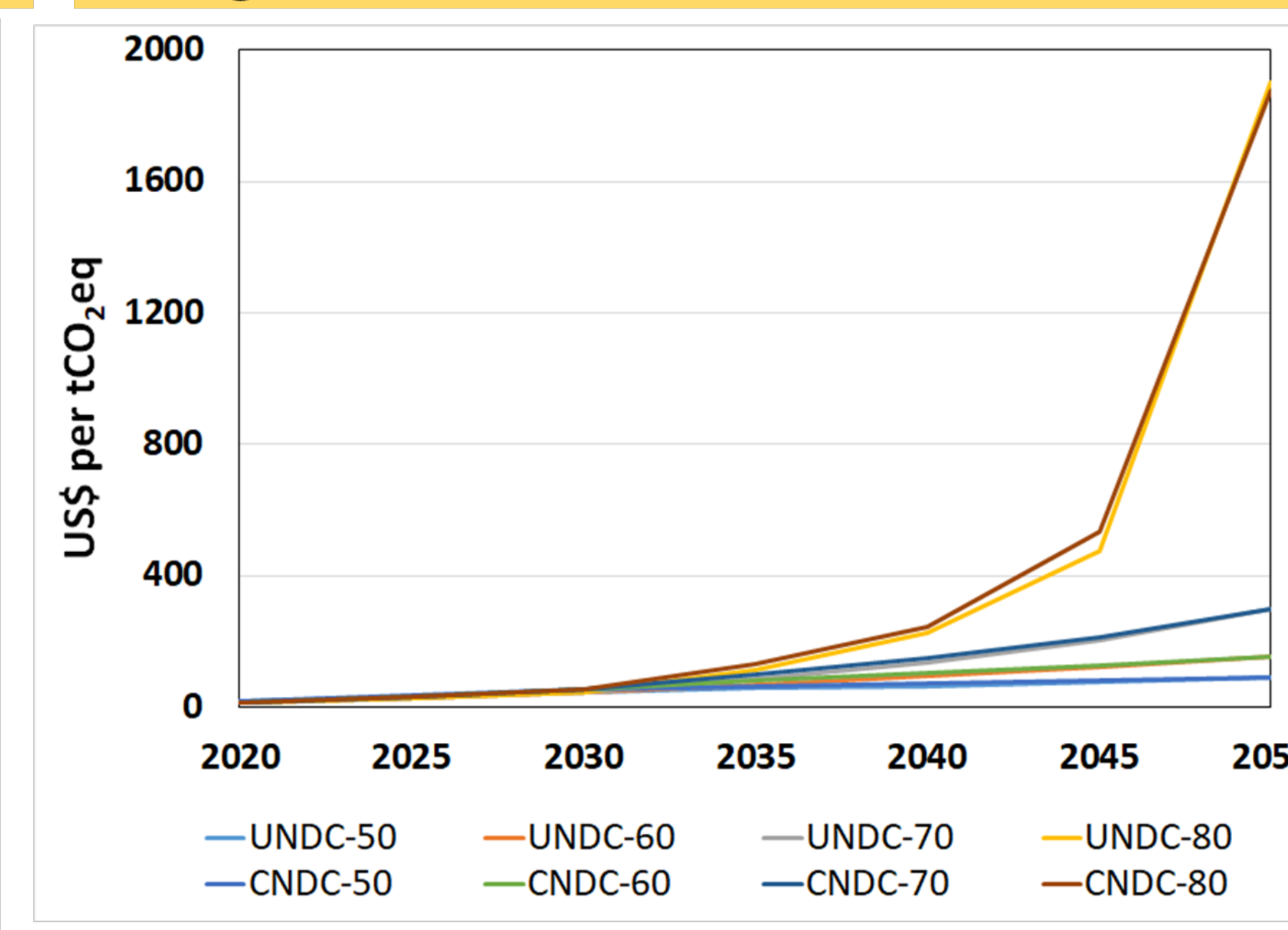


Figure 4. Variations in GHG Prices



Welfare Loss (%)

UNDC-50	-20.4	CNDC-50	-21.4
UNDC-60	-25.9	CNDC-60	-27.0
UNDC-70	-34.5	CNDC-70	-35.9
UNDC-80	-45.1	CNDC-80	-46.5
UNDC-90	-57.2	CNDC-90	-58.4

Conclusions

- Deployment of renewable energy including bioenergy with carbon capture and storage (BECCS) and energy-efficient technologies would play a major role in minimizing both the GHG emissions as well as the macroeconomic loss.
- Without transformative changes in the energy system and economic structure of Thailand, the country would have to face enormous cost in attaining 2-degree targets.