ECRAN Workshop
Module 4
Transformation HAM Scenarios

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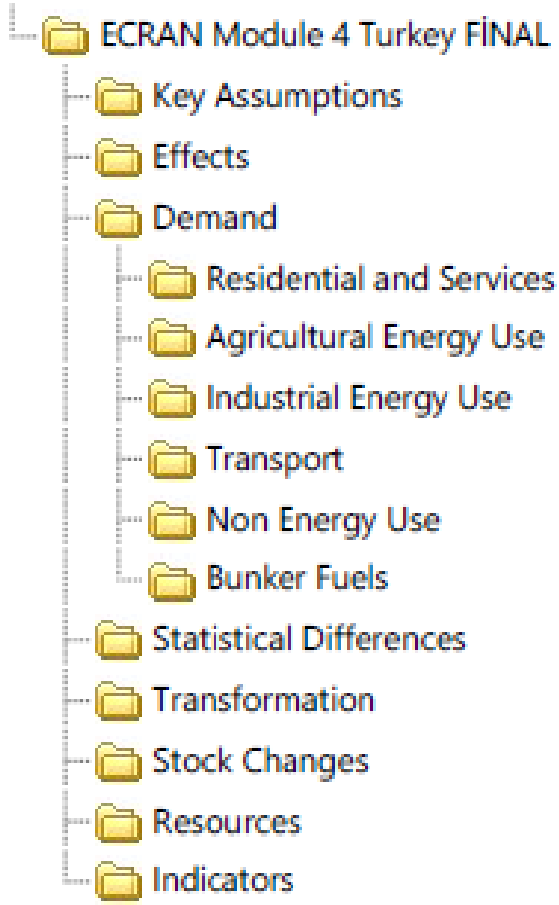
At the first stage, to create a model, demand , transformation data tree was constructed

Tree Structure for ECRAN Module 4 Turkey FİNAL.

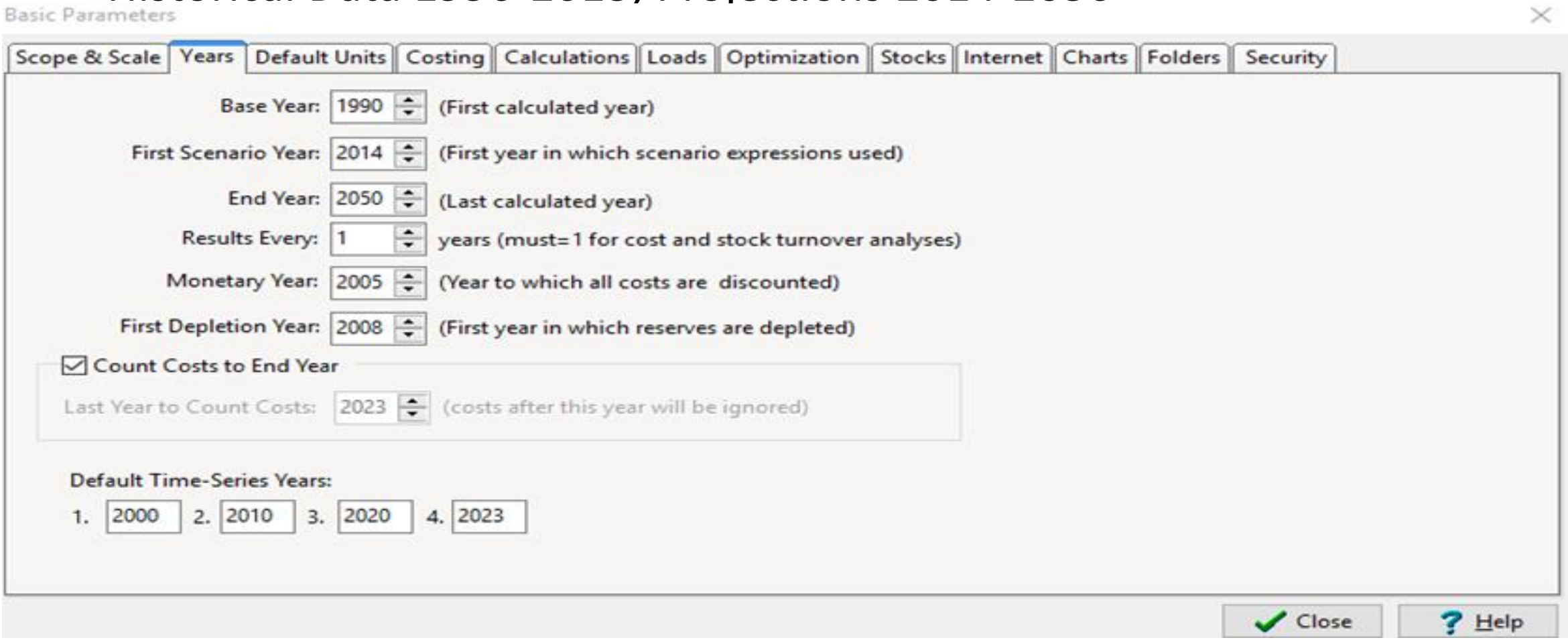


Important Key Assumptions:

- GDP (TurkStat)
- Population (TurkStat)
- Absolute Value Added (TurkStat)

Basic Parameters

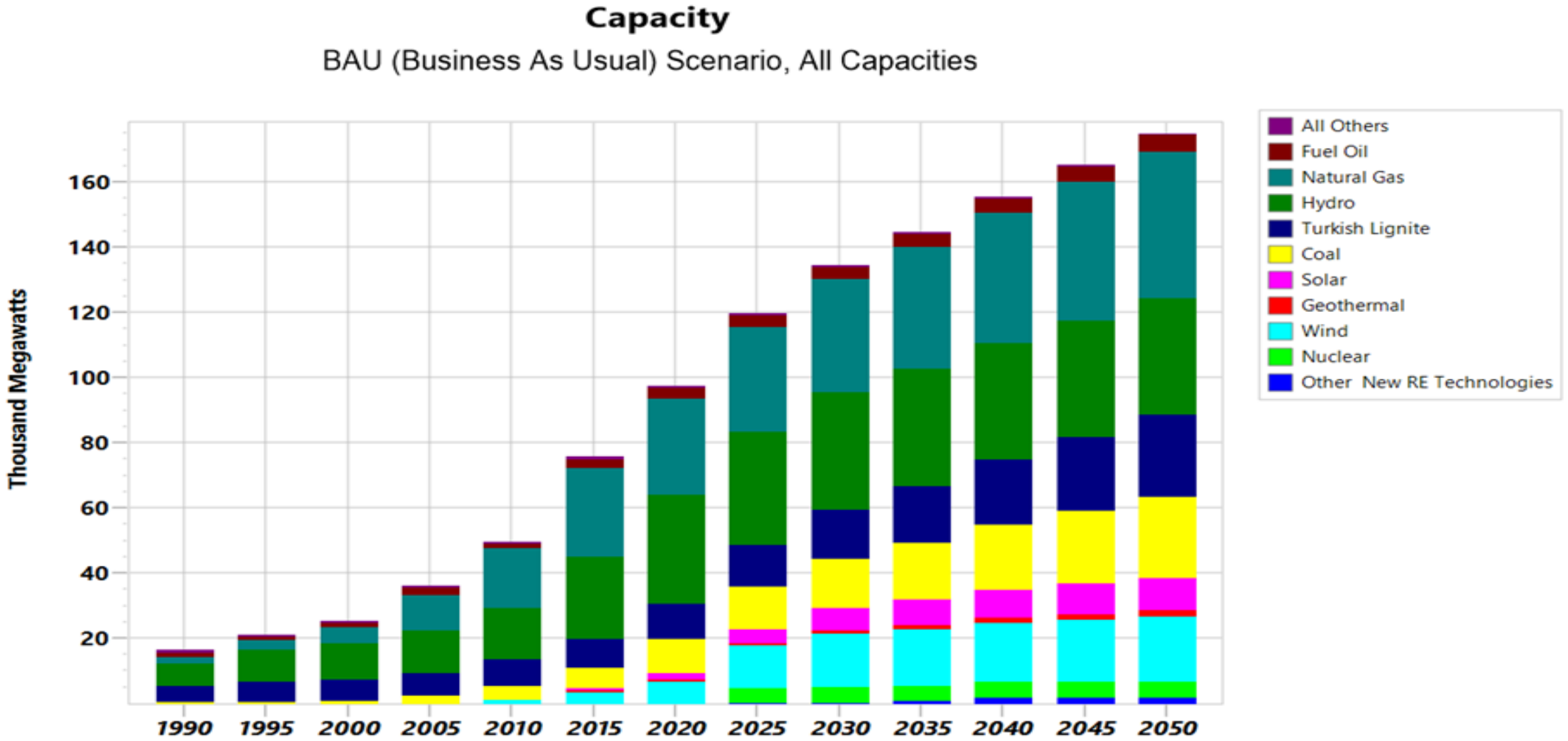
- Historical Data 1990-2013, Projections 2014-2050



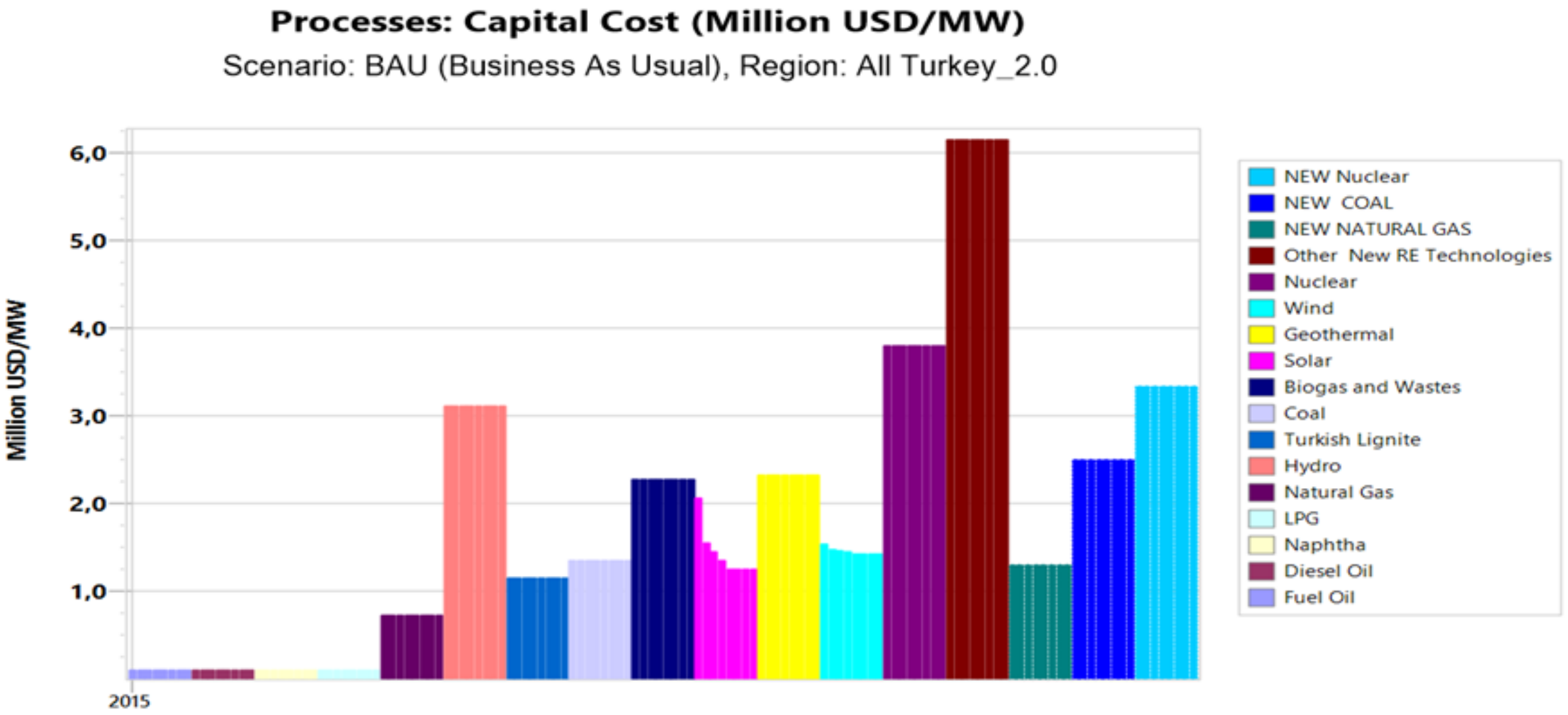
Business As Usual Scenario

- *In BAU scenario there are also investments in RE and low carbon measures.*
- In BAU scenario most of electricity targets and policies were included;
  - ❖ A nuclear power plant up to 2030. (4800 MW)
  - ❖Decreasing the share of NG in power sector down to 30% in 2030.
  - ❖Electricity losses (all losses: Distrubution and Tech) are decreasing to %15 in 2030, then 12% 2050.
  - ❖Wind and solar power have been increased by 2050.
  - ❖Full utilizing of all possible Hydro potantial (considering the important environmental concerns) Appx 36.000 MW in 2050
  - ❖Electricity exports and imports remains constant until 2050

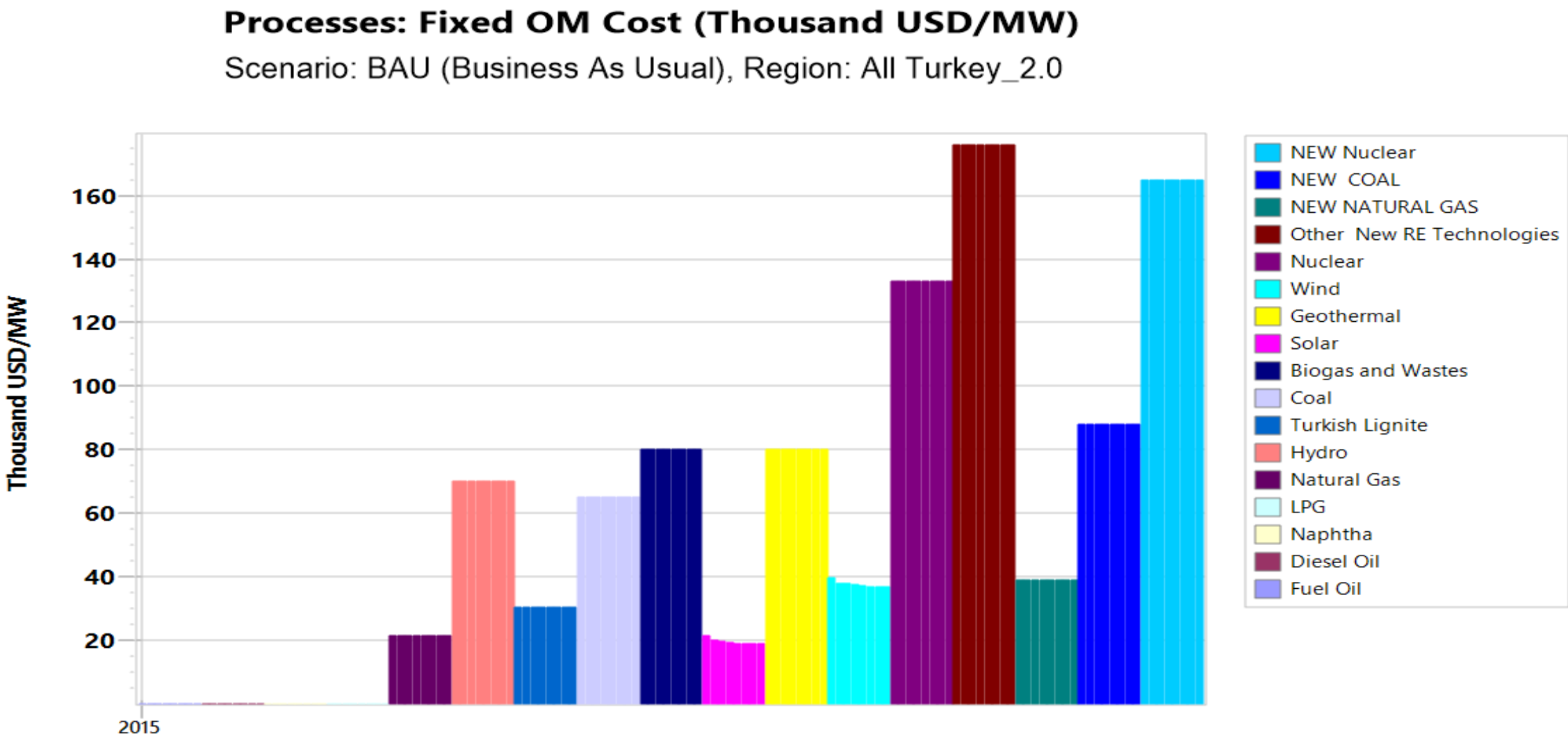
BAU Capacities By Sources



Capital Costs



Fixed O&M costs



Mitigation and HAM Scenarios

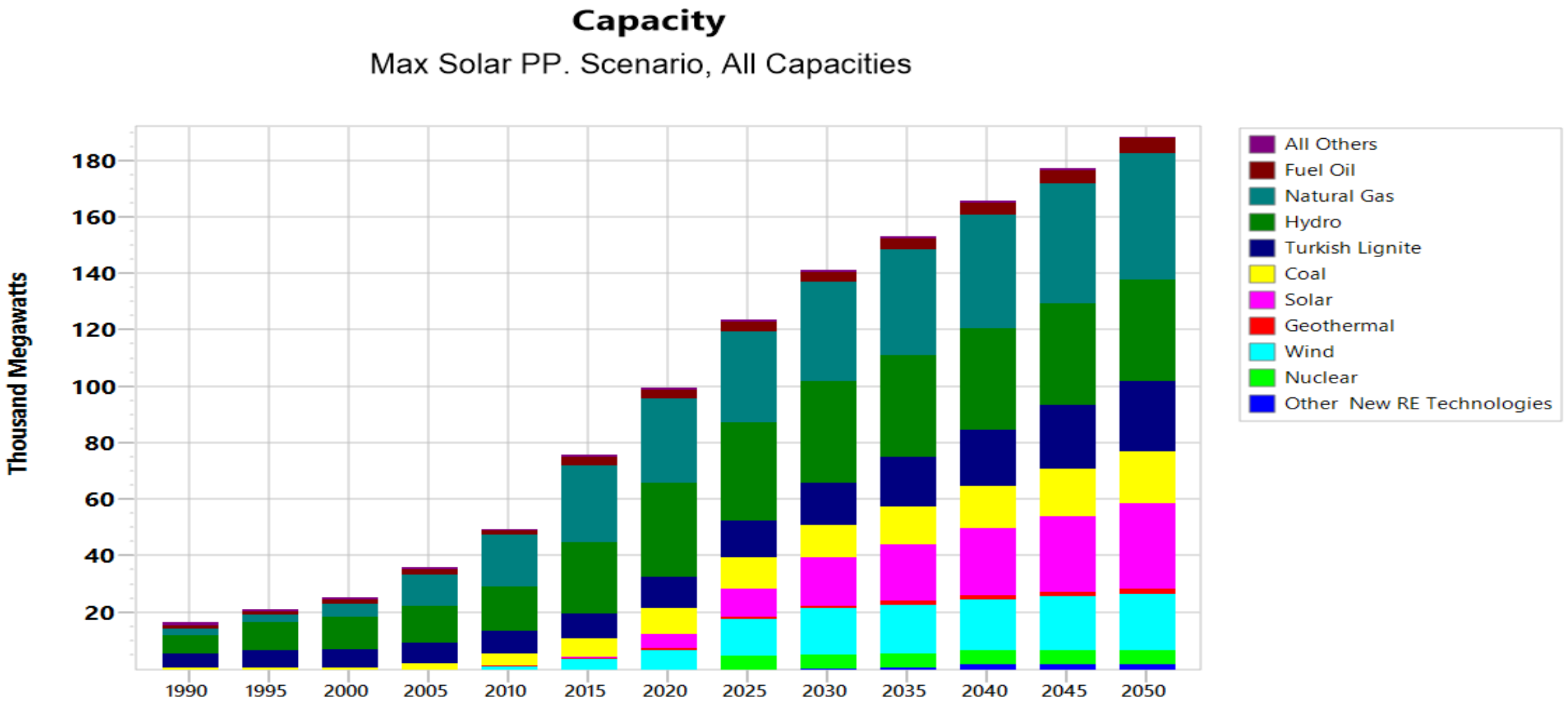
1. Max Solar P.P Scenario
2. Max Wind P.P Scenario
3. Process Efficiency Scenario (Best Available Technology)

    a) High Efficient NG –Avg.Pro. Ef. %84 CCGT-CHP

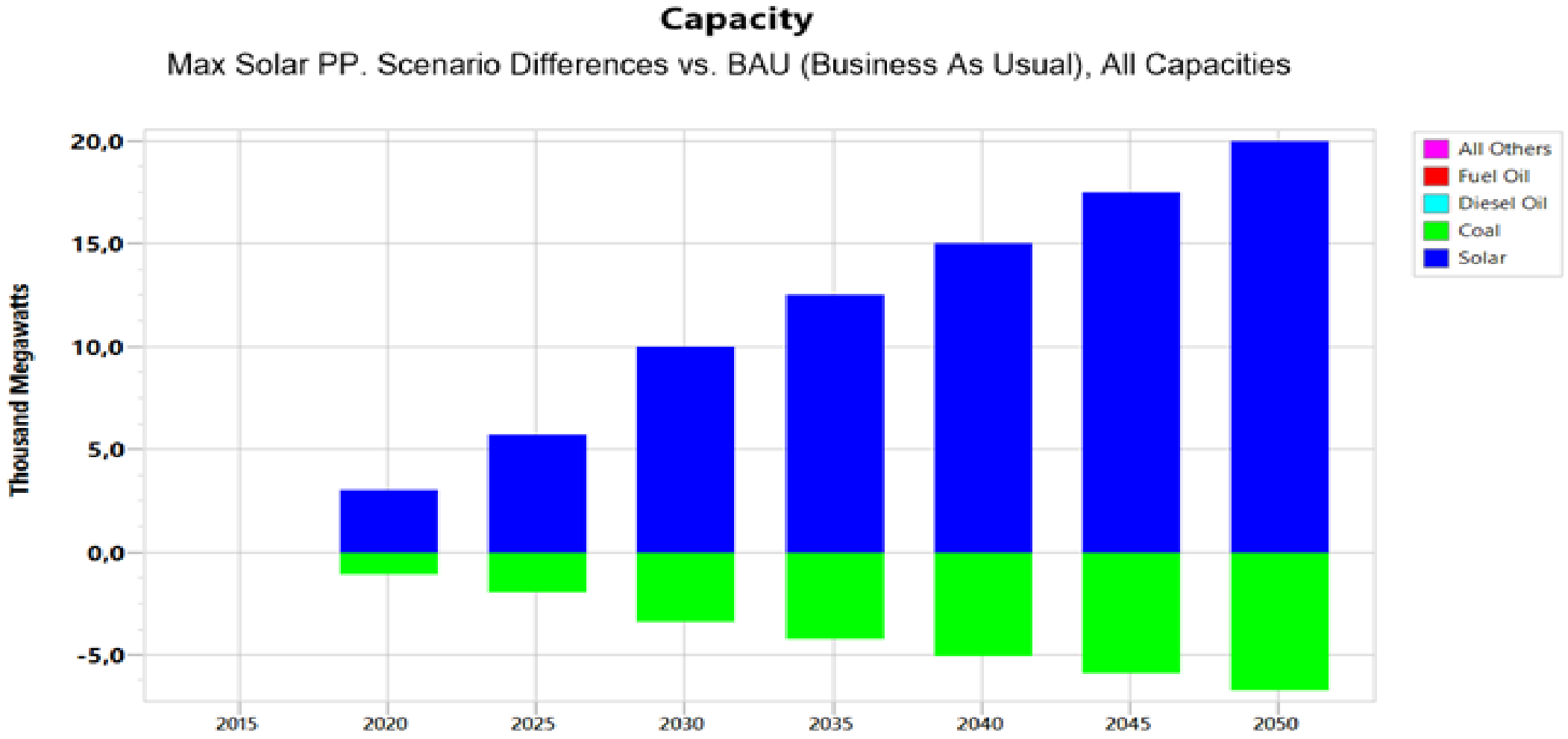
    b) High Efficient (imported)Coal-Avg. Pro. Ef. 47% IGCC (Integrated Gasification Combined Cycle) Data: World Energy Invesment Outlook WEIO2014PGAssumptions (2).xlsx

4. High Nuclear Power Plant Scenario (Nuc+4)
5. HAM TR Scenario

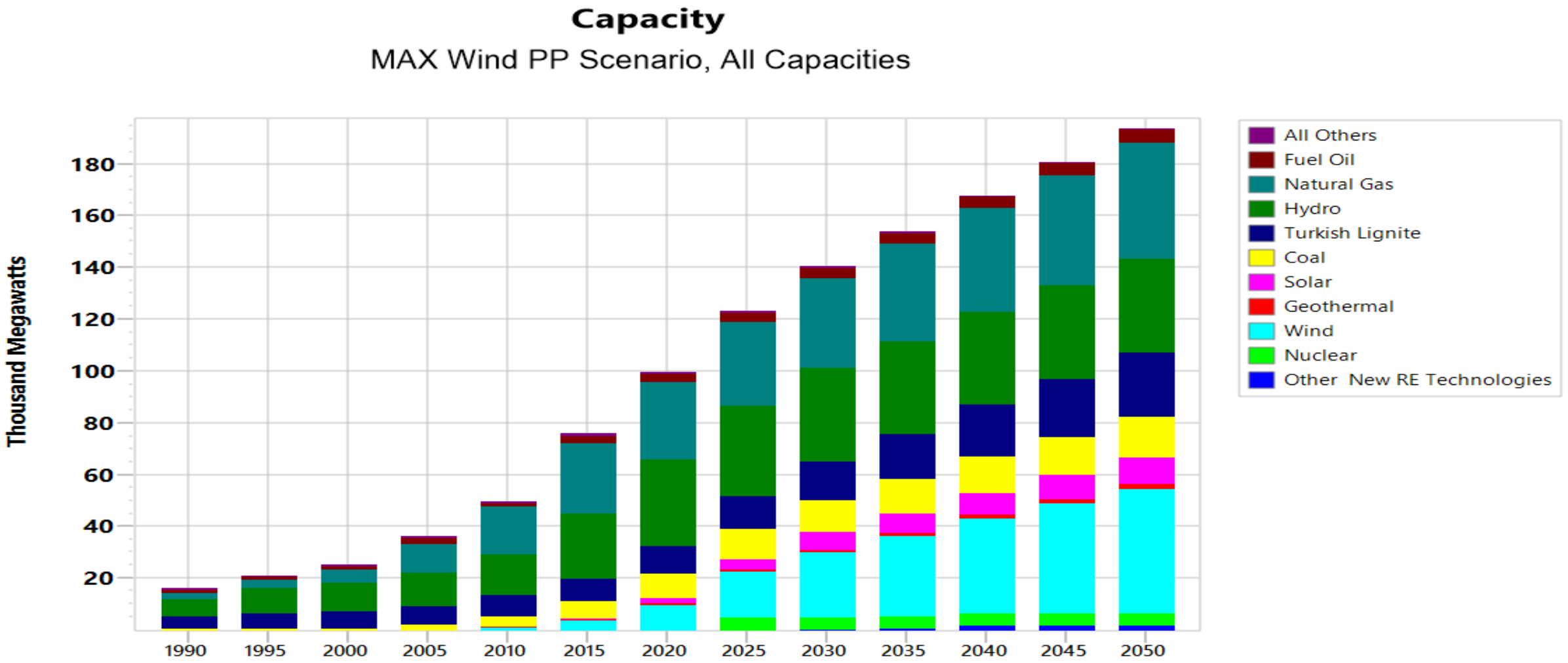
Max Solar Scenario



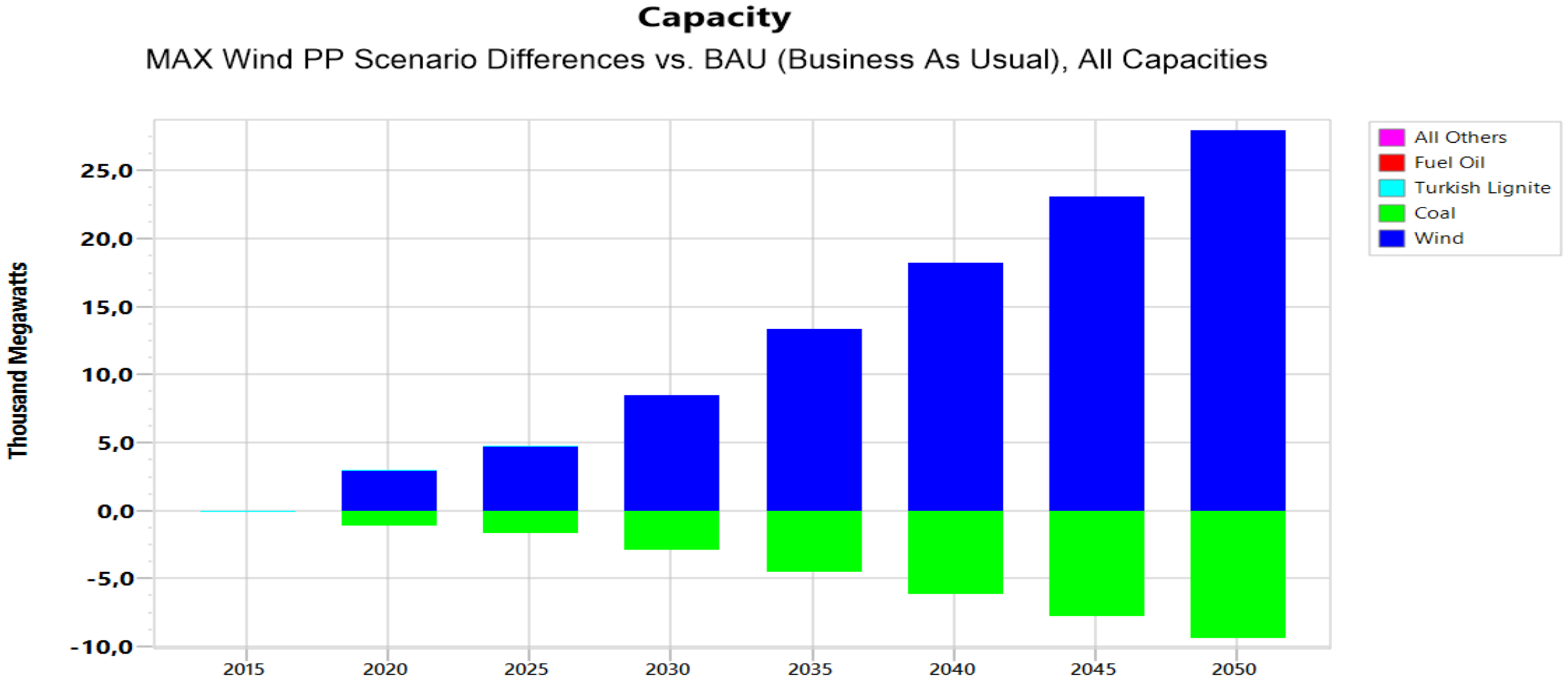
Differences Compared to BAU



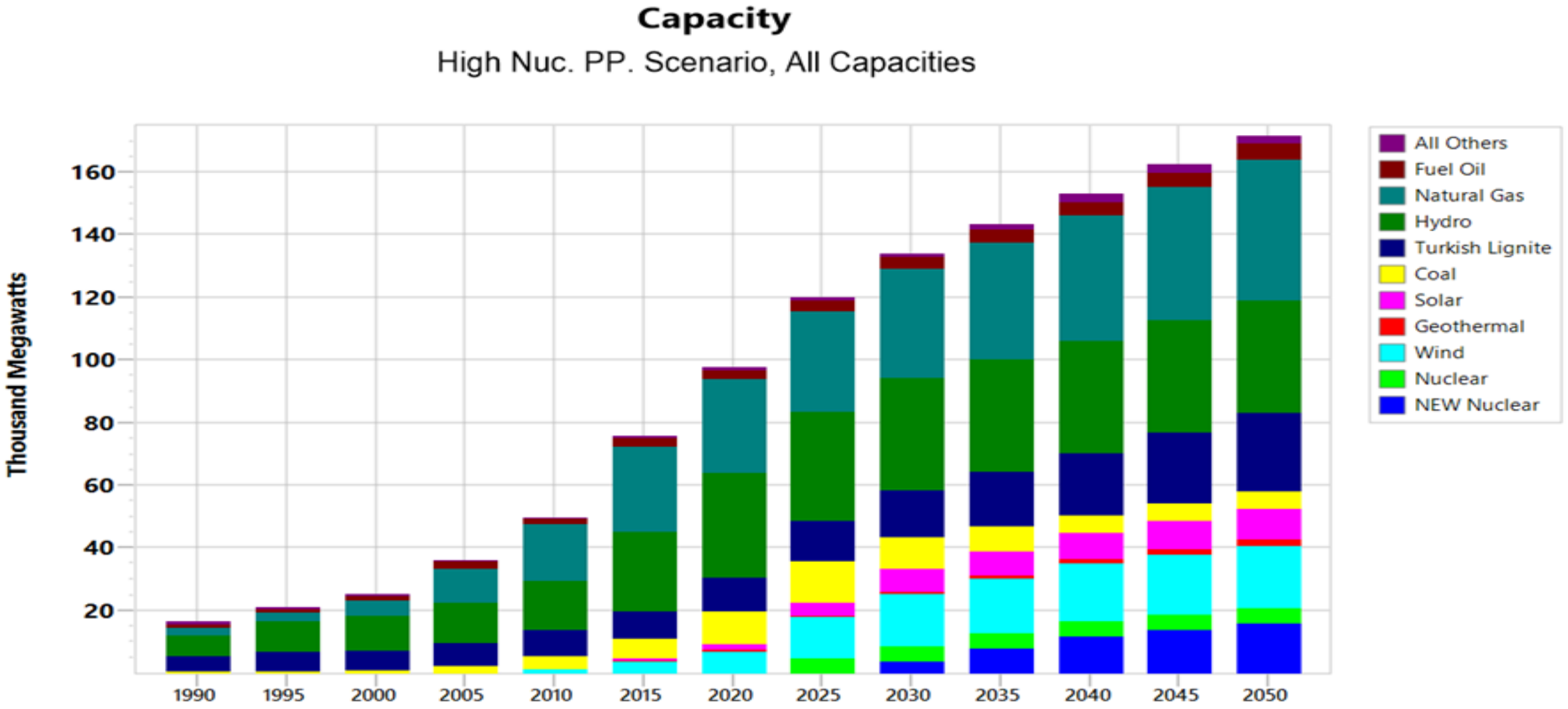
Max Wind Scenario



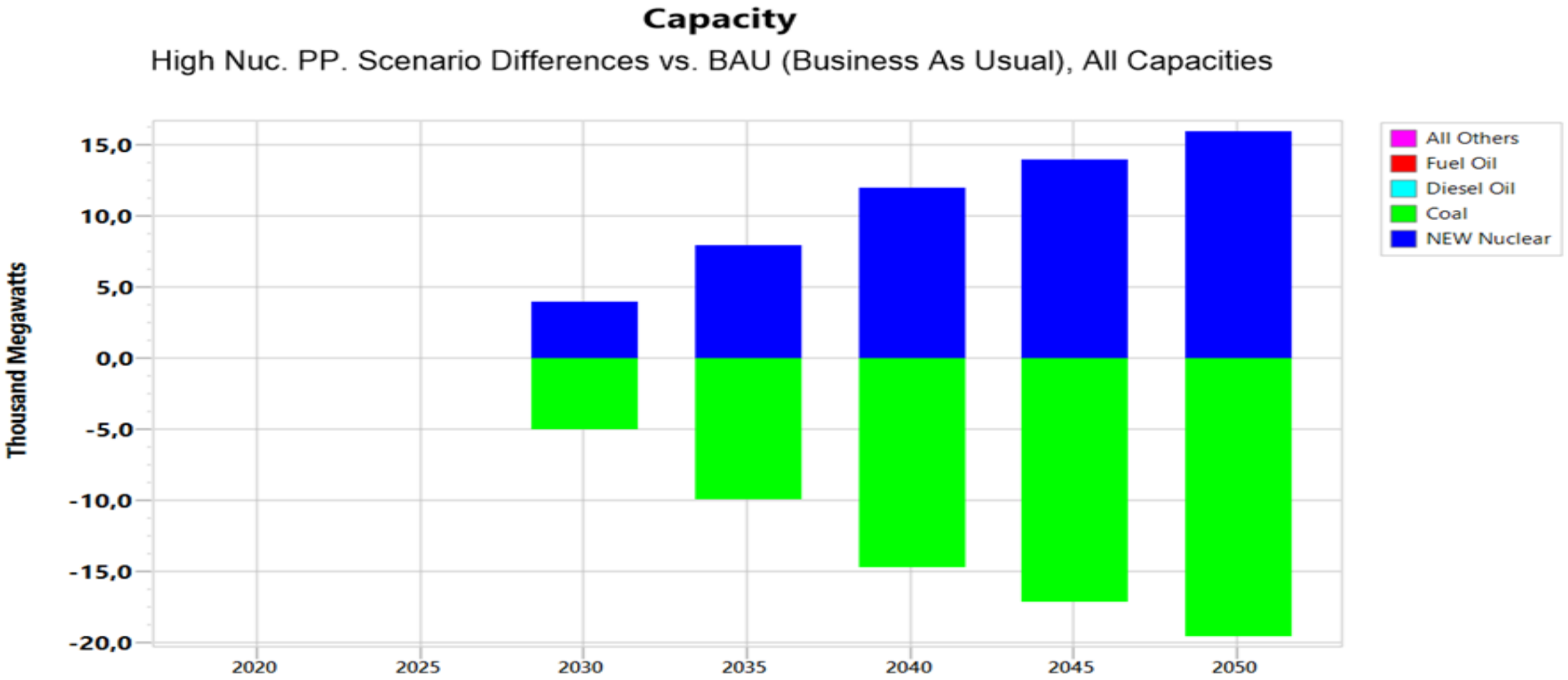
Wind Scenario Differences with BAU



High Nuclear Power Plant Scenario (Nuc+4)



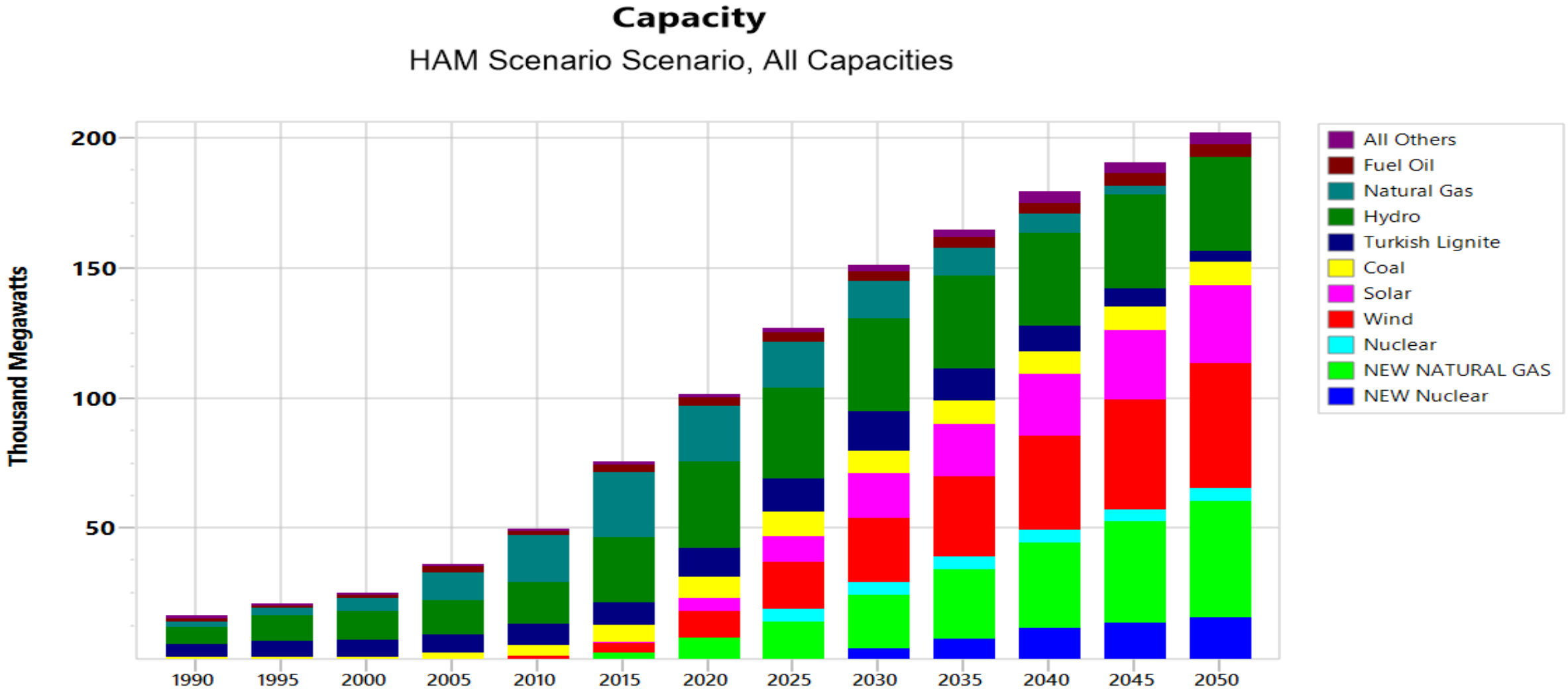
Nuclear Scenario Differences With BAU



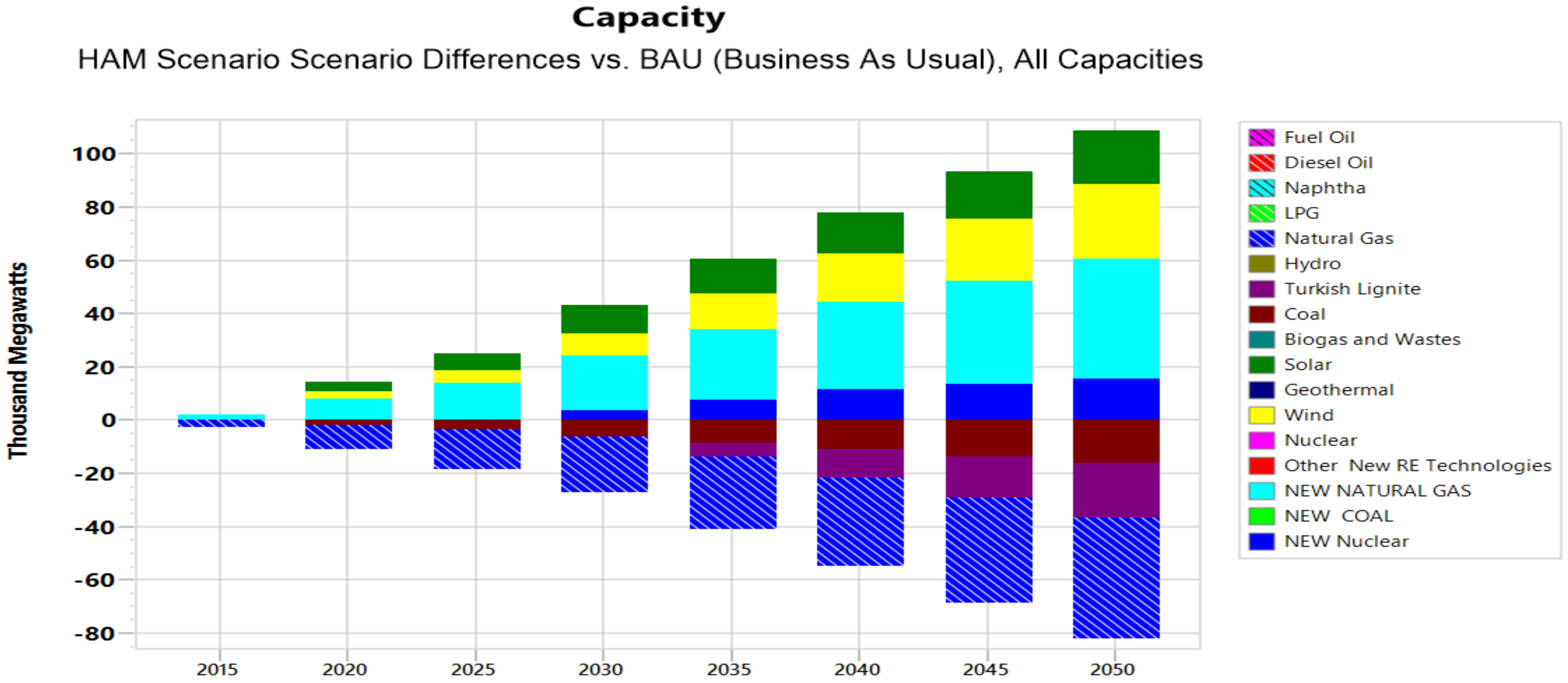
HAM Scenario

- 5 scenarios, which have best results in cost benefit analyses, were integrated into one scenario, called HAM (Highest Ambitious Mitigation) Scenario (manually and automatically combined by using LEAP software).These scenarios are;
- Max. Solar, Max Wind, High Nuclear and the sub-scenario New Natural Gas scenario.

HAM Scenario Capacities

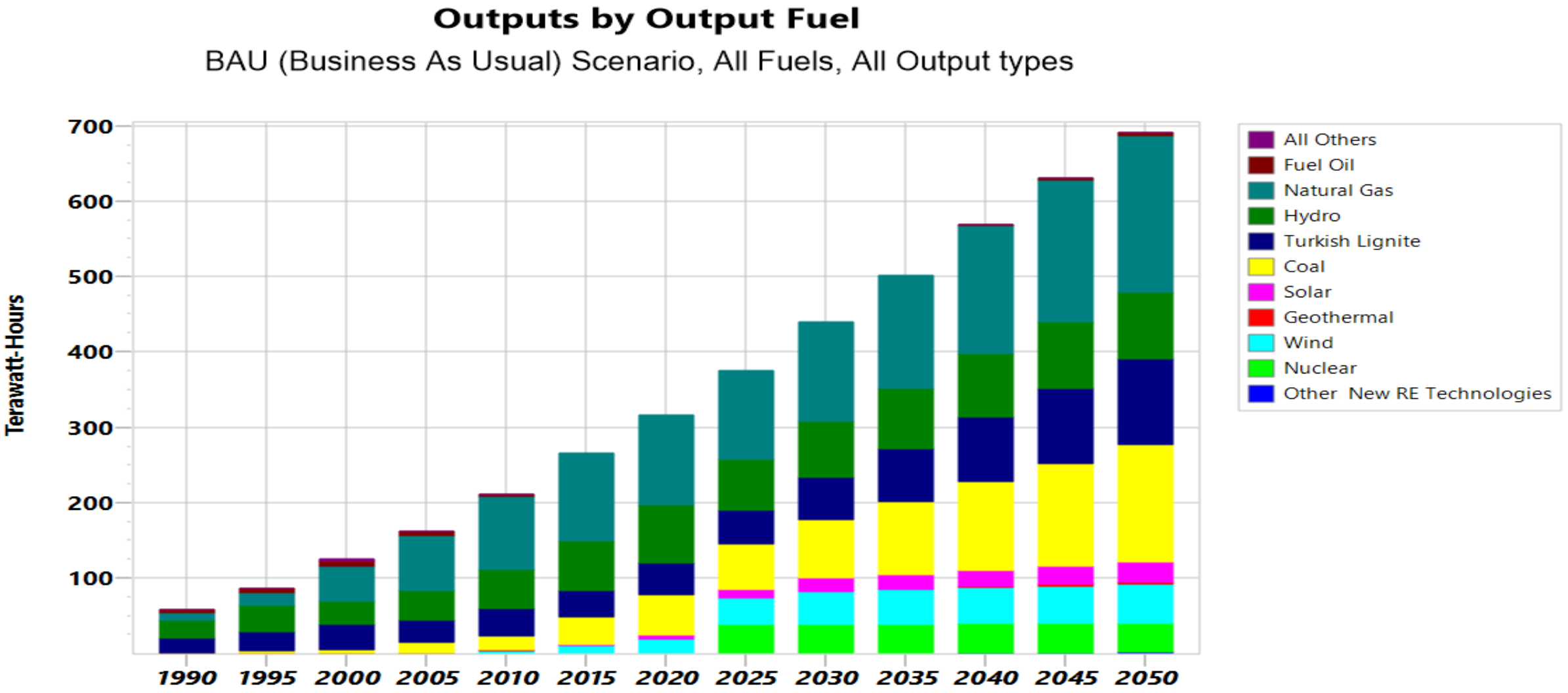


HAM Scenario Differences with BAU

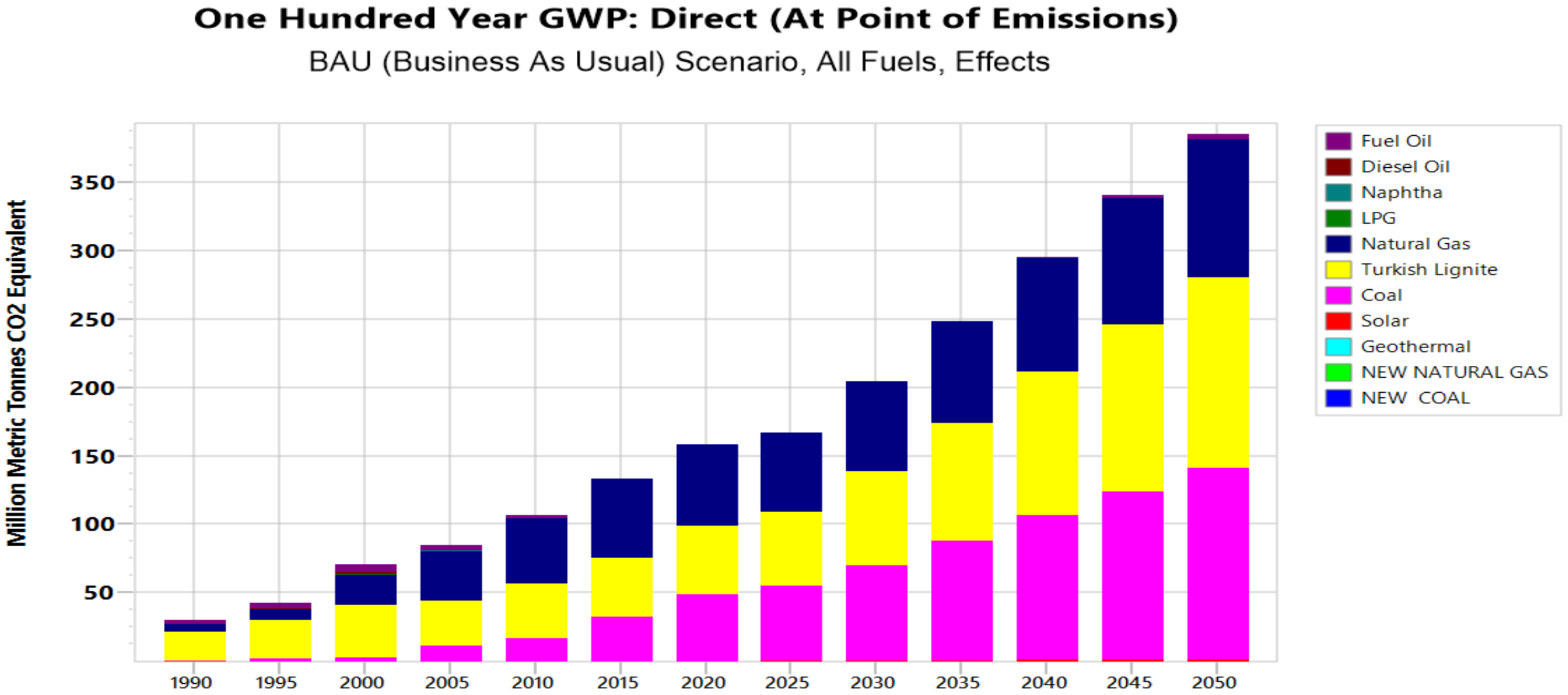


RESULTS?

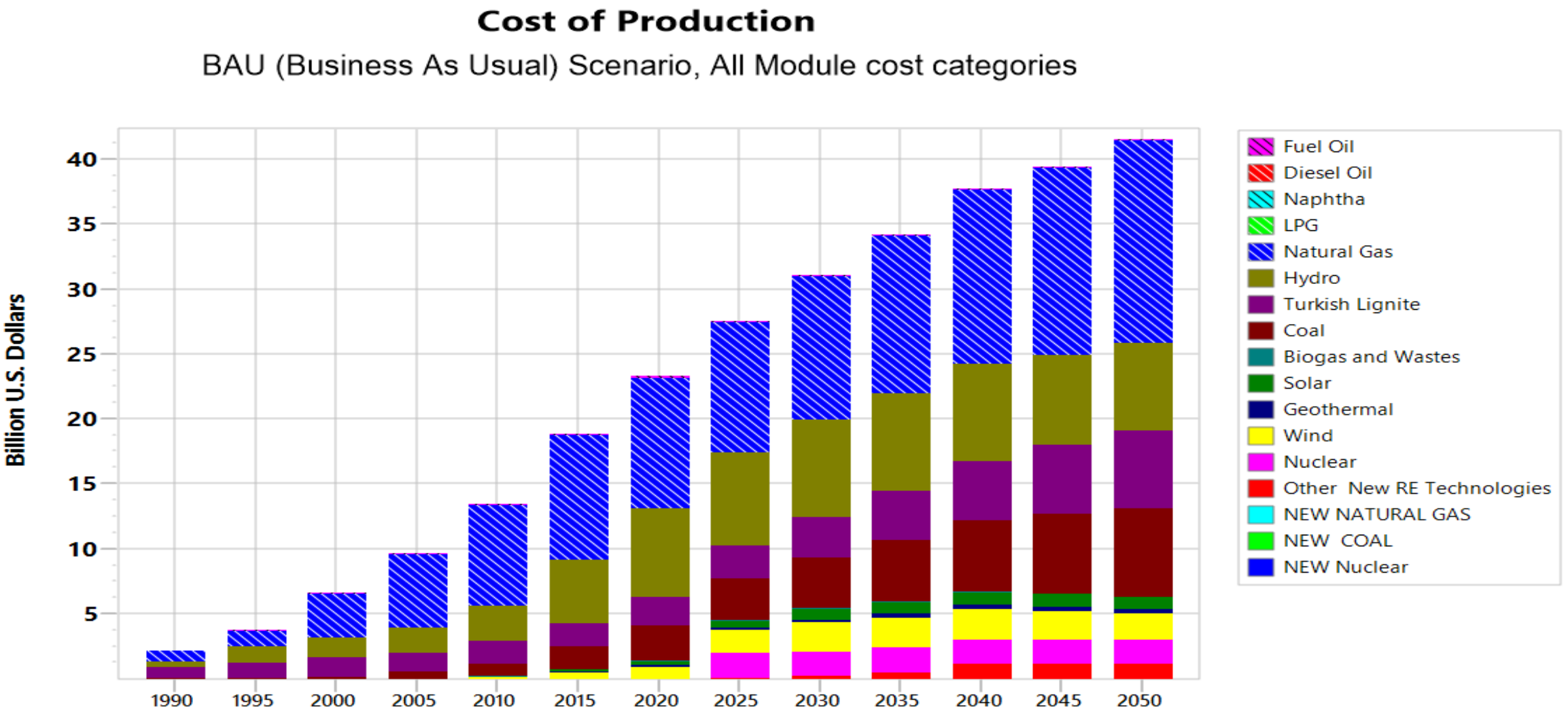
BAU Electricity Production by Fuels



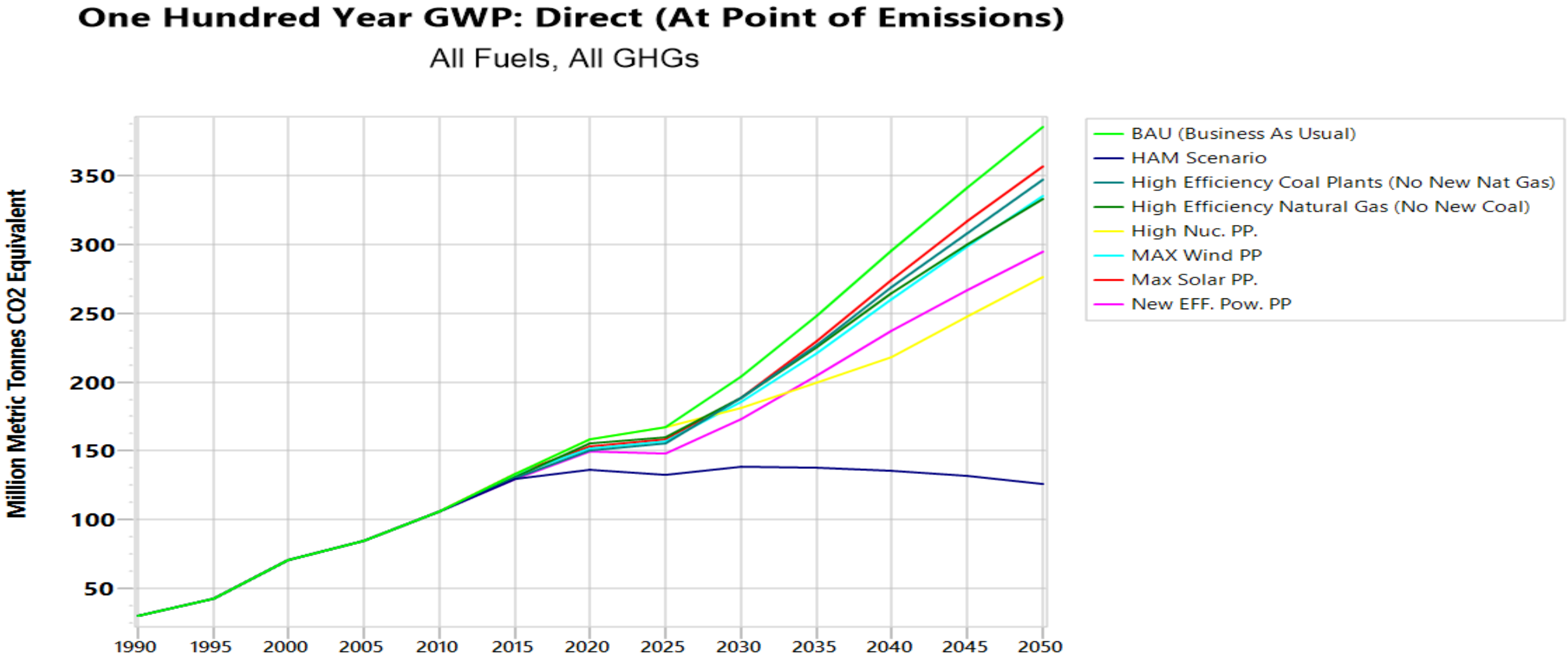
GHG Emission from Electricity



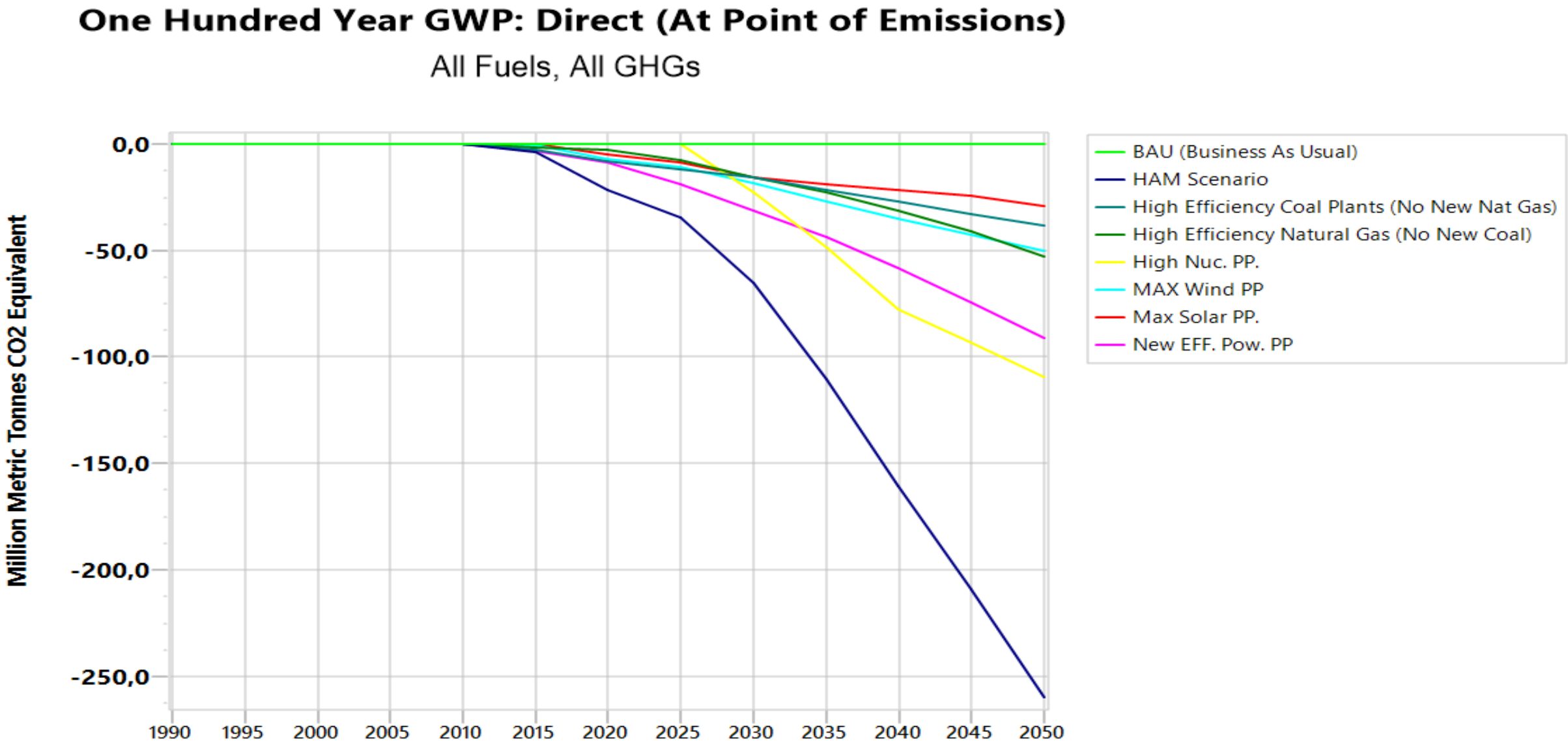
Cost Of Production



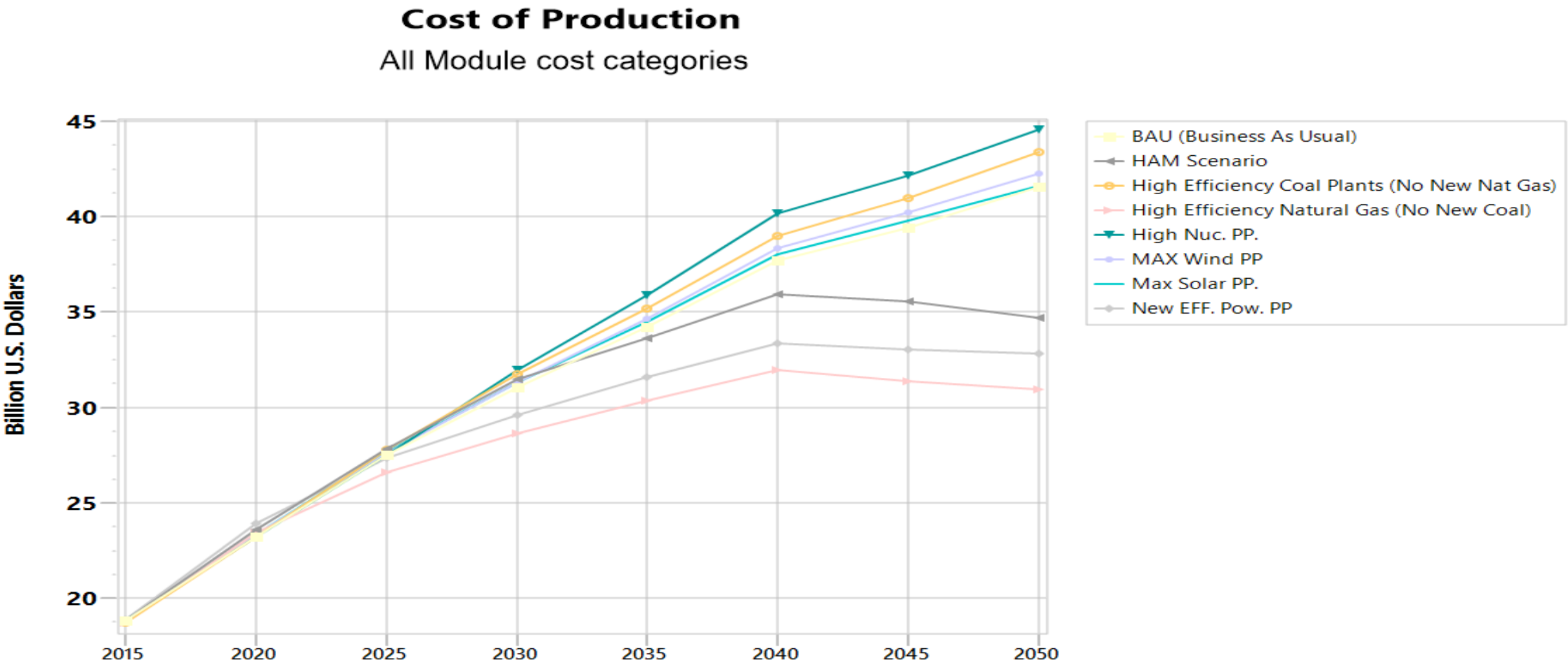
BAU and HAM Scenarios



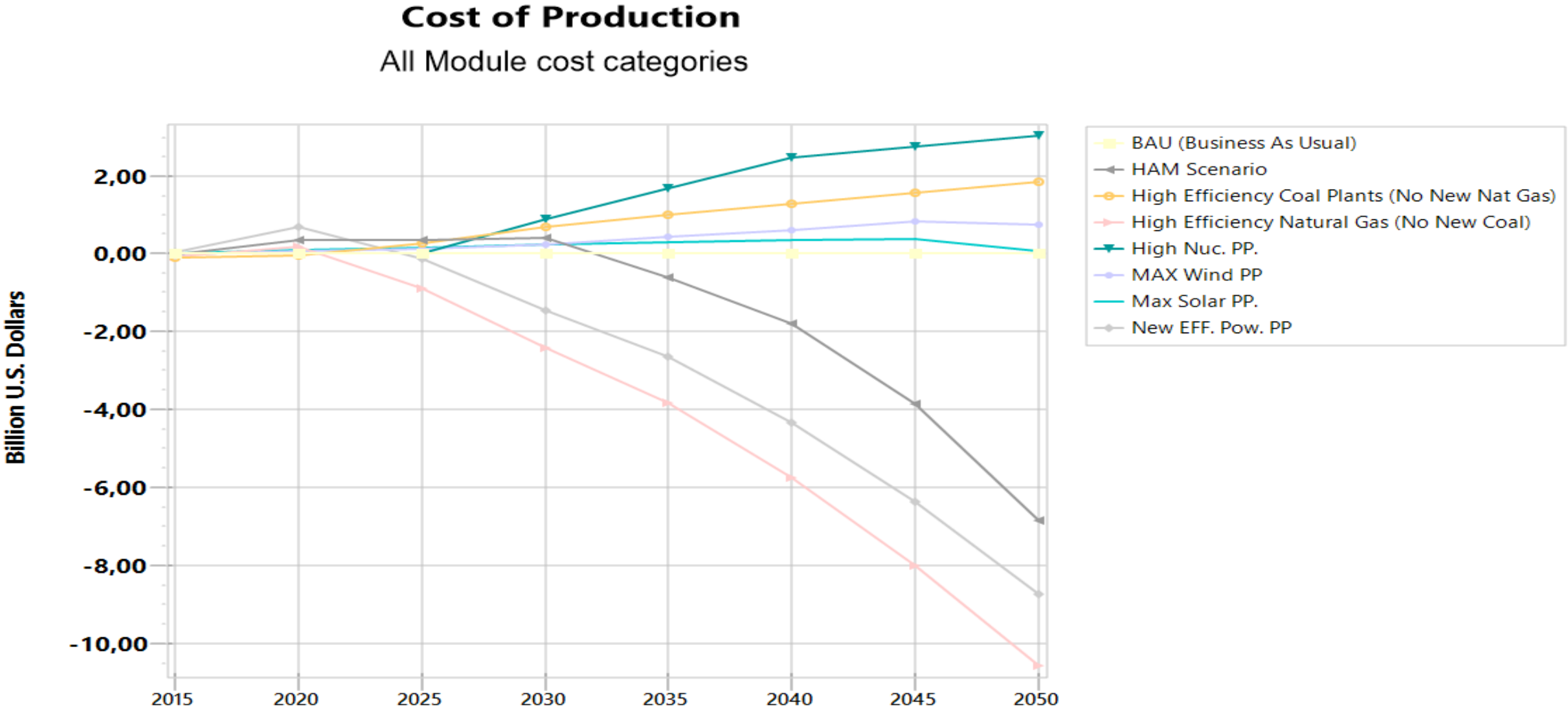
GHG Results Compared to BAU



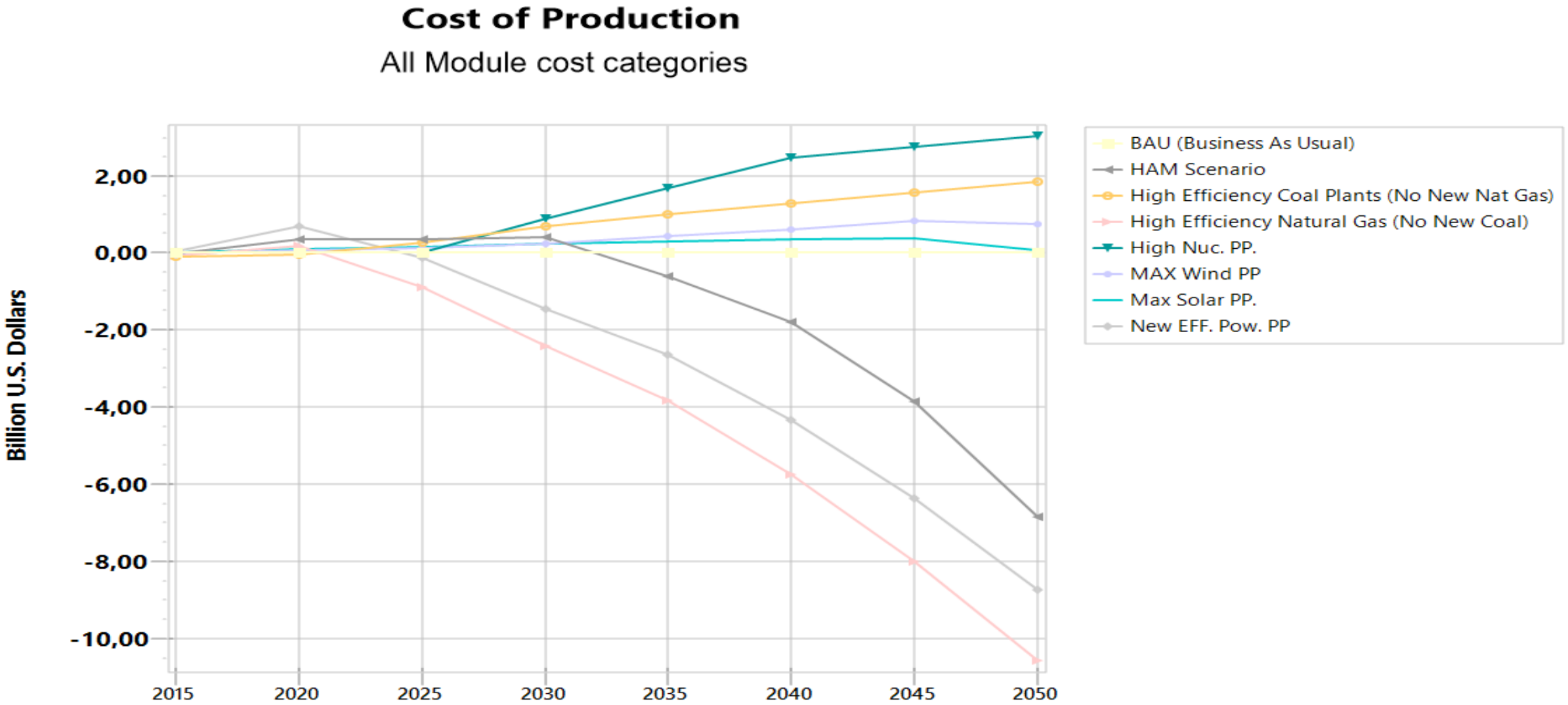
Cost Data and Comparison of Mitigation Scenarios In Terms Of Costs

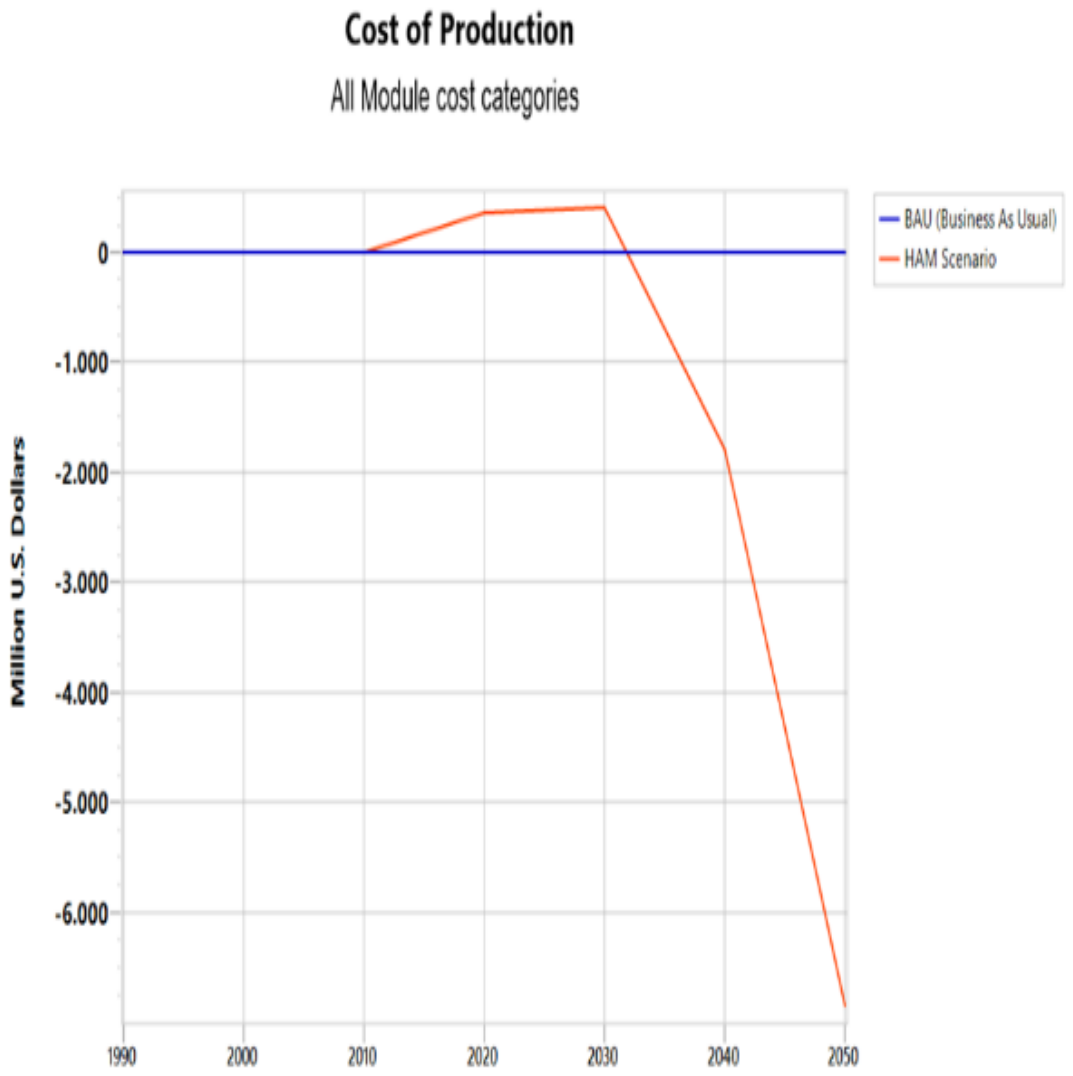
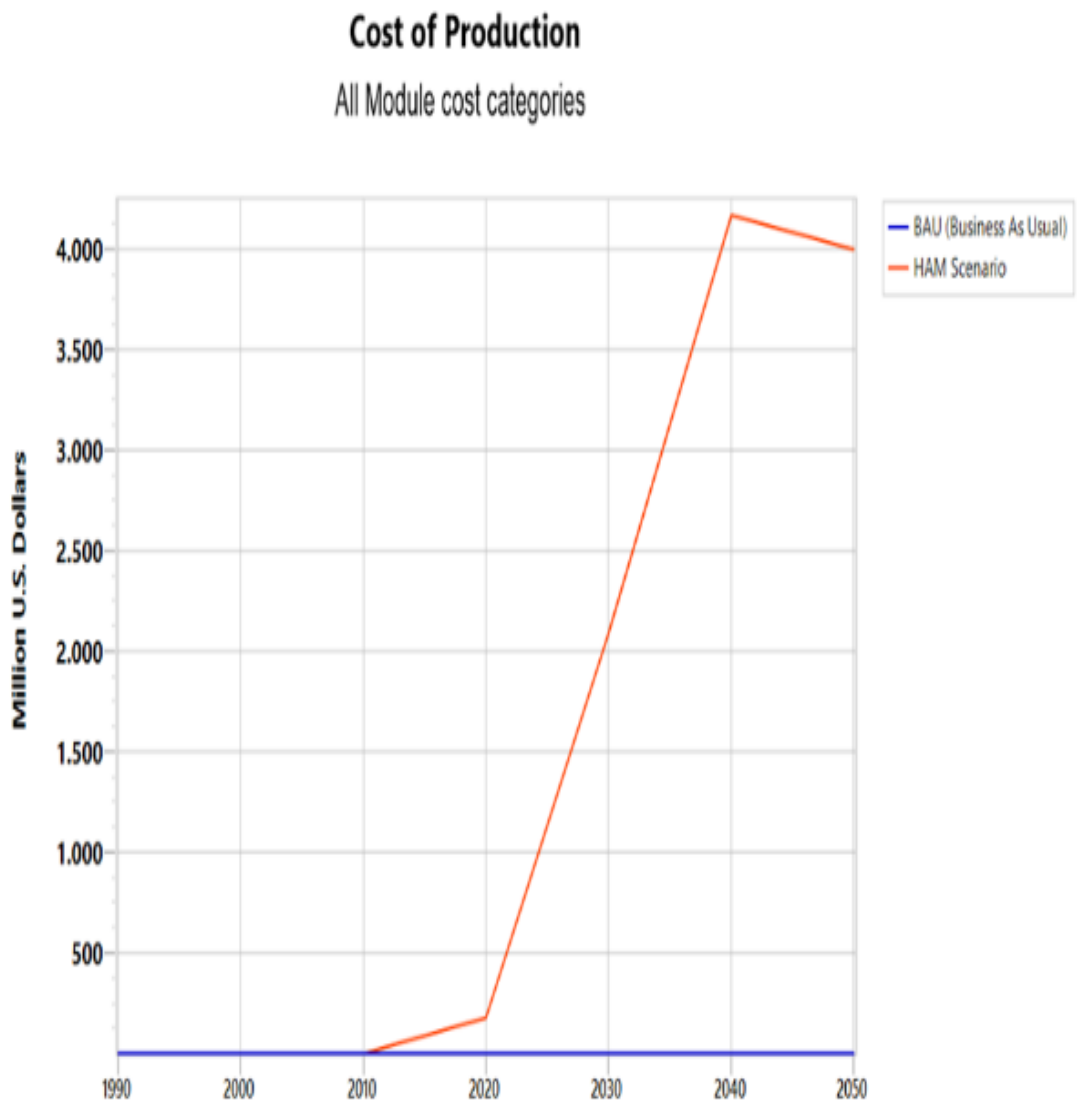


Differences with BAU in terms of Cost of Production



Cost Benefit Analyses



The HAM with Efficient Natural Gas PPs Sc.	The HAM without Efficient Natural Gas PPs Sc.
	

Cumulative Costs & Benefits: 1990-2050. Relative to Scenario: BAU (Business As Usual).
Discounted at 5,0% to year 2005. Units: Billion 2005 U.S. Dollar

	MAX Wind PP	Max Solar PP	New EFF Pow PP	High Nuc PP	HAM Scenario	High Efficiency Natural Gas (No New Coal)	High Efficiency Coal Plants (No New Nat Gas)
Transformation	6,0	4,2	23,6	9,0	35,0	12,2	7,9
distribution and lossess	-	-	-	-	-	-	-
Coke Production	-	-	-	-	-	-	-
Electric Generation	6,0	4,2	23,6	9,0	35,0	12,2	7,9
Refining	-	-	-	-	-	-	-
Resources	-	-	-4,3	-	-1,7	-4,3	-
Production	-	-	-4,3	-	-1,7	-4,3	-
Imports	-	-	-	-	-	-	-
Exports	-	-	-	-	-	-	-
Unmet Requirements	-	-	-	-	-	-	-
Environmental Externalities	-	-	-	-	-	-	-
Non Energy Sector Costs	-	-	-	-	-	-	-
Net Present Value	6,0	4,2	19,4	9,0	33,4	7,9	7,9
GHG Savings (Mill Tonnes CO2e)	854,0	551,7	1.464,9	1.538,7	3.794,2	768,6	719,6
Cost of Avoiding GHGs (US Dollar/Tonne CO2e)	7,1	7,6	13,2	5,9	8,8	10,3	11,0

- Any Questions?