Emission Mitigation Scenarios in Turkish MARKAL Model

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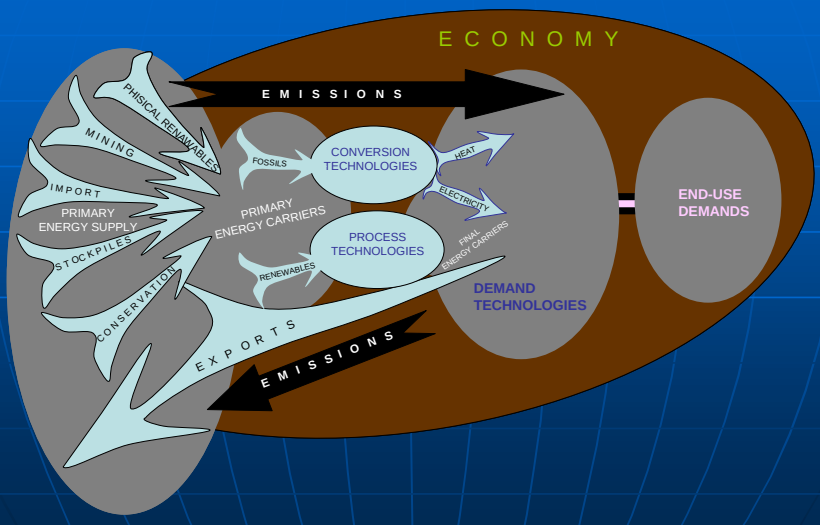
Current Status

- Calibration Year: 2005 (Base Scenario)
- Time Horizon: 2005-2025
- Consumption Growth Rate: 3% (Annual)
- Demand Growth Rate: 3.3% (Annual)
- GDP: 481.5 B US $

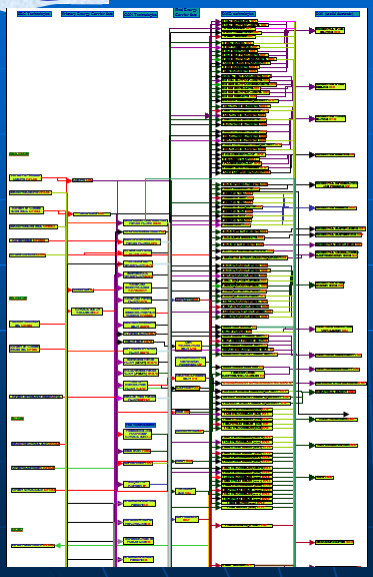
Current Status (cont'd)

- Demand Sectors:
  - Industry
  - Residential
  - Transport
  - Agriculture
  - Commercial
- Reference Energy System set for year 2005

Reference Energy System (General Structure)



Reference Energy System



27 Energy Carriers

21 Resource Technologies

18 Conversion Technologies

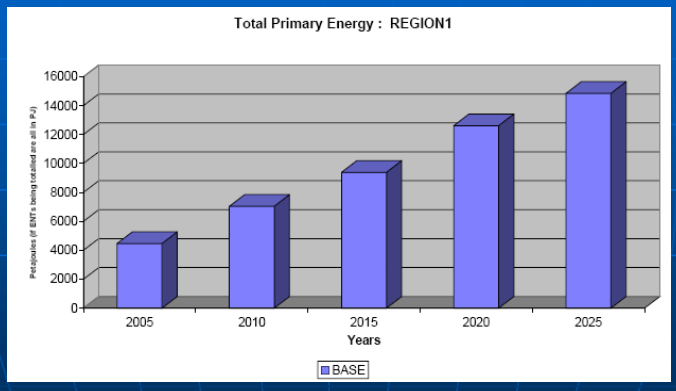
9 Conversion Technologies

137 Demand Technologies

31 Demands

Model Results

Base Scenario:

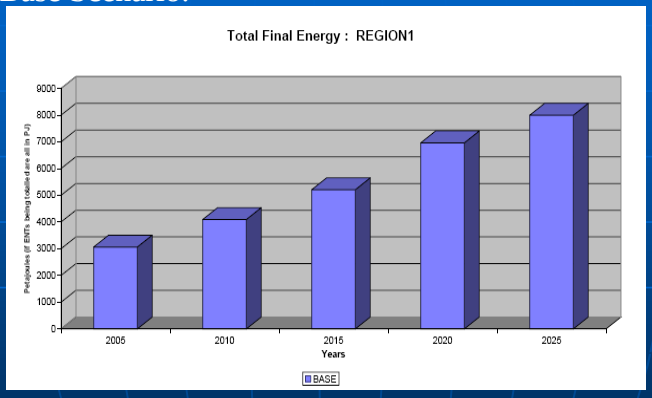


Primary Energy Supply:

4472 PJ (2005) ⟹ 14849 PJ (2025)

Model Results

Base Scenario:

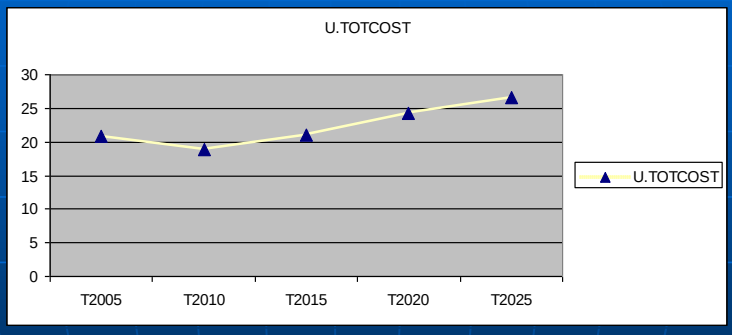


Total Final Energy :

3067 PJ (2005) ⟹ 8000 PJ (2025)

Model Results

Base Scenario:

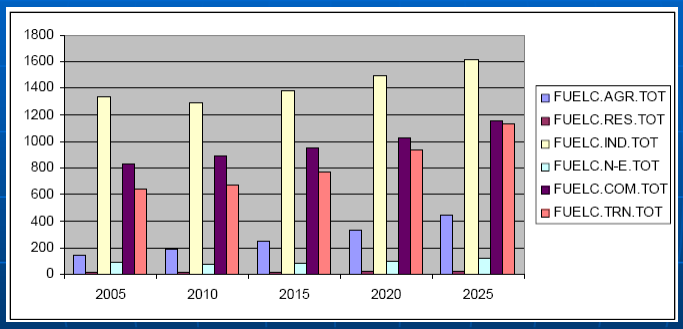


Total System Cost: 352,40 B US$ (2000-2025)

20,80 (x2000 B US$)(2005)…….26,58 (x2000 B US$) (2025)

Model Results

Fuel Consumptions by Sectors (PJ)

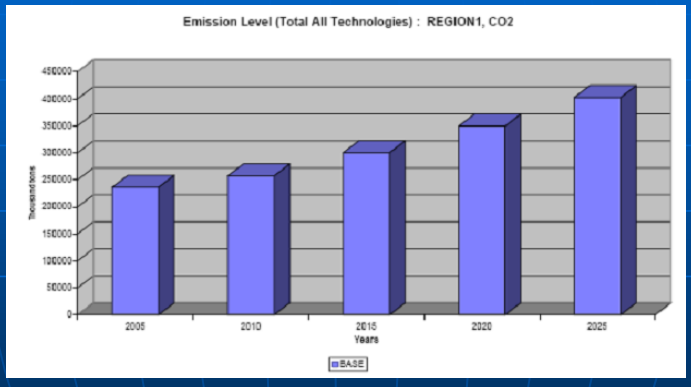


Industry :Electricity Consumption 45%, Gaseous Fuels 10x, Solid Fuels 8x increased, Natural Gas and Coal shifted by Liquid Fuels.

Residential :Electricity Consumption 80%, Gaseous Fuels 15%, Renewables 15% increased.

Model Results

Total CO_2 Emissions:



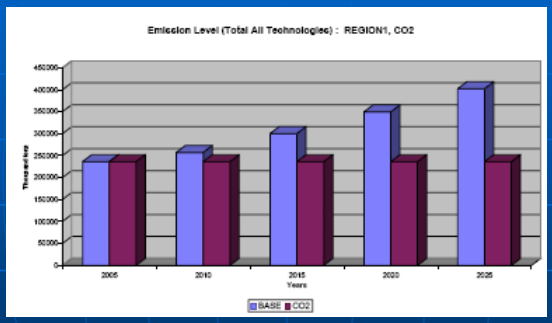
236.4 MT (2005)…….349.6 MT (2020)…… 402.4 MT (2025)

GHG Mitigation Scenarios

- **CO_2:** Stable CO_2 emission level during 2005-2020,(236.4 MT)
- **CO_2-5:** CO_2 emission level mitigation 5% upto 2020.
- **NATCOM:** 11% mitigation of CO_2 compared with the BAU. (derived starting from year 1990.)

Model Results

CO_2 Scenario vs. Base:



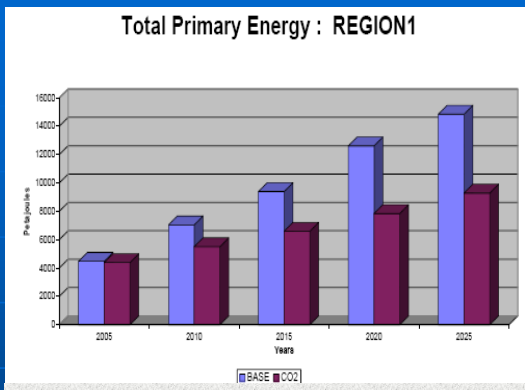
Case	Parameter	Units	Region	Emission	2005	2010	2015	2020	2025
BASE	EMISSION.L	KT	REGION1	CO2	236,414.652	257,389.022	300,364.495	349,665.555	402,489.517
CO2	EMISSION.L	KT	REGION1	CO2	236,414.650	236,414.650	236,414.650	236,414.650	236,414.650
MITIGATION RATIO					0 %	8.8%	27%	48%	70%

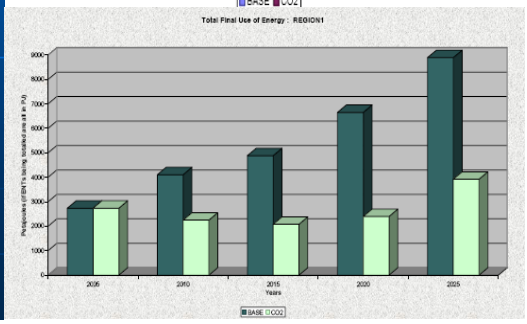
Model Results

CO_2 Scenario vs. Base:

Total Primary Energy level decreased 40%,

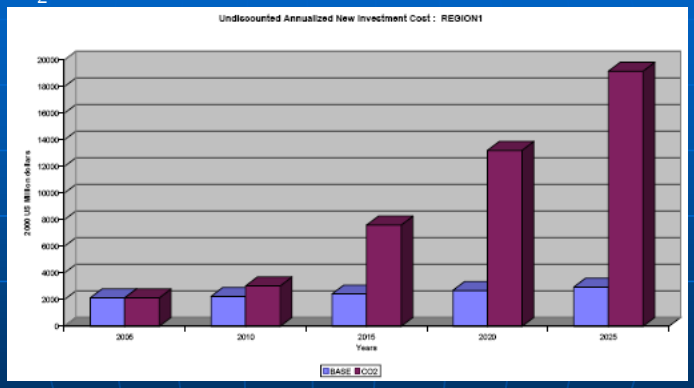
Total Final Use of Energy level decreased 55%.





Model Results

CO_2 Scenario vs. Base:



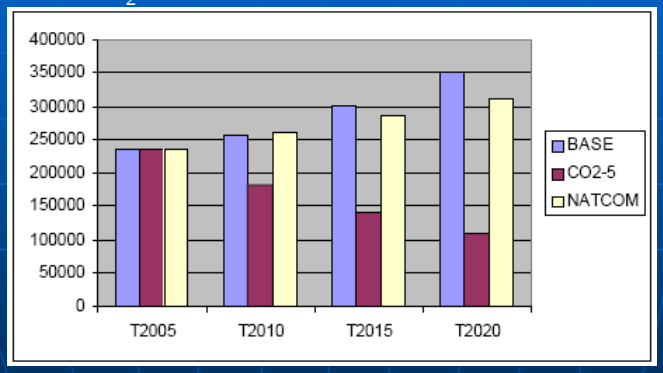
System needs 9x new investments by 2025.

Especially in renewables, reforestration and energy forestry.

Model Results

CO_2-5 and NATCOM Scenarios vs. Base

Total CO_2 Emission Levels:



Case	Parameter	Units	Region	Emission	2005	2010	2015	2020	MITIGATION
BASE	EMISSION.L	kt	REGION1	CO2	236,414	257,389	300,364	349,665	% 0
CO2-5	EMISSION.L	kt	REGION1	CO2	236,414	182,933	141,55	109,528	% 69
NATCOM	EMISSION.L	kt	REGION1	CO2	236,414	261,430	286,447	311,463	% 11

Conclusion

A complete and particular model for Turkey with,

- Technical
- Economical
- Environmental parameters and results,

can be used for analyses of policy revisions for these three aspects mentioned above.