World ETSAP- TIAM
TIMES Integrated Assessment Model

Non-CO2 non-energy emissions
Climate module

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World TIMES Integrated Assessment Model

Energy Information Administration of the US-DOE (SAGE variant - System for the Analysis of Global Energy markets)

EFDA project (European Fusion Development Agreement)

EMF (Energy Modeling Forum WG 22: LT and transition climate policies under uncertainty)
⇒ non-CO2 GHGs, sinks, and stochastic analysis

International Energy Agency (ETP – Energy Technology Perspectives)

Expert and literature inputs (IER Stuttgart, IPCC reports, MARKAL-Canada, etc.)

Climate module

ETSAP-TIAM model

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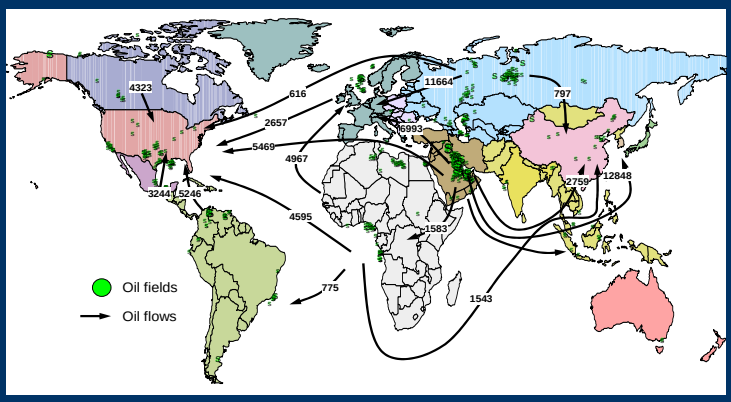
15 regions

AFR, AUS, CAN, CHI, CSA, EEU, FSU, IND, JAP, MEA, MEX, ODA, SKO, USA, WEU

Linked by trade variables of the main energy forms (coal, oil, gas) and of emission permits



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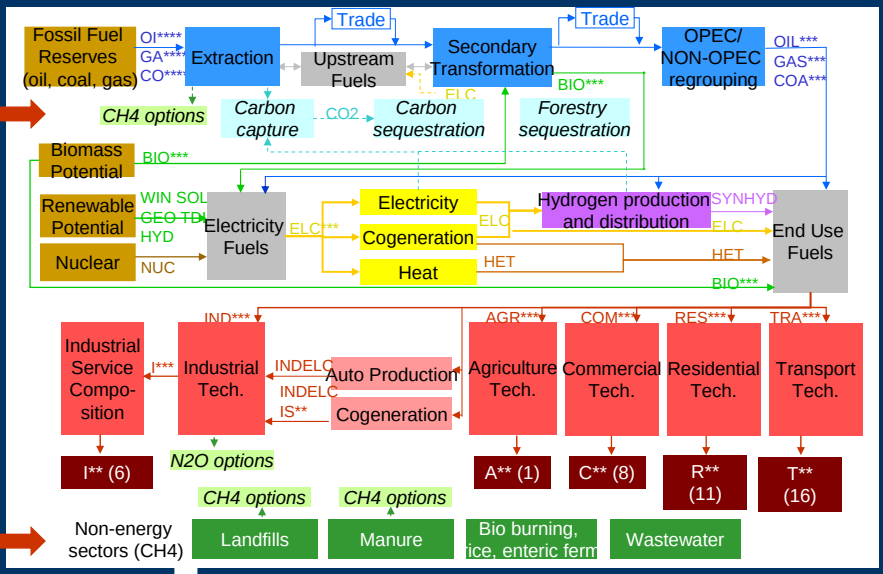
Reference Energy System (2000-2100)



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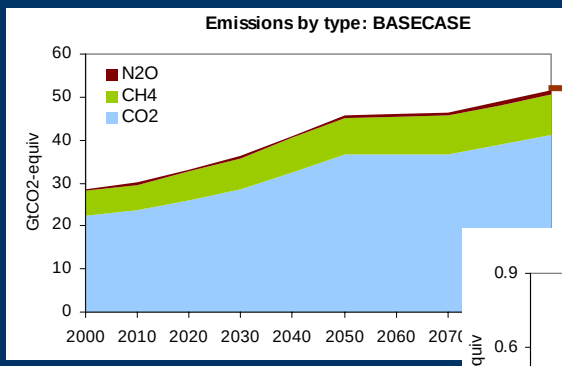
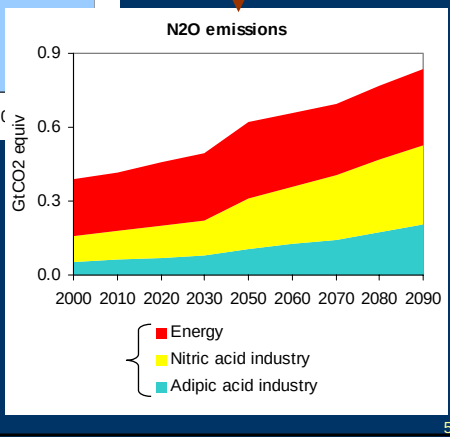
Non-energy non-CO_2 emissions





Nitric and adipic acid industry:
WEU, CHI, USA, IND

To be included: N2O from soils
~10% CO2-equiv in 2000
Very important in developing countries

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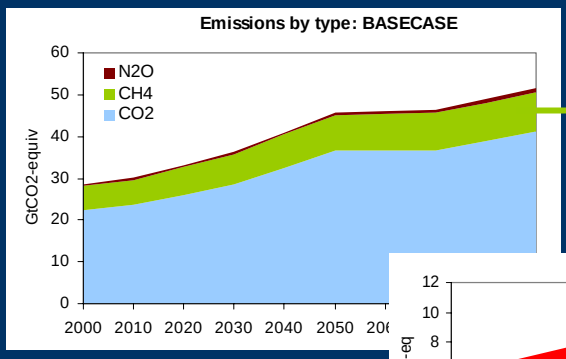
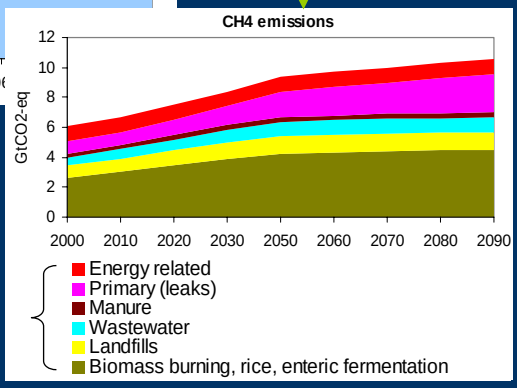
Non-energy non-CO_2 emissions





Agriculture:
Very important in developing countries (>60% of CH4)

Landfills:
More important in industrialized countries in 2000
Expected increase in developing countries

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Mitigation options

CH4	**Landfills:**	11 (eg. anaerobic digestion, composting, flaring, etc.)
	Manure:	4 (eg. farm-scale electricity generation using manure digester)
	Primary:	26 (eg. flaring instead of venting in oil sector, degasification of coal mines, gas pipeline inspection & maintenance)
N2O	**Adipic acid:**	1 (thermal destruction)
	Nitric acid:	7 (specific catalytic destruction)

No CH4 mitigation option in agriculture sector

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Importance of non-CO_2 GHGs

Contribution to radiative forcing and temperature increase

Regional variations

Cheap and short-term mitigation options

Transition policies before cheaper CO_2 mitigation options become available

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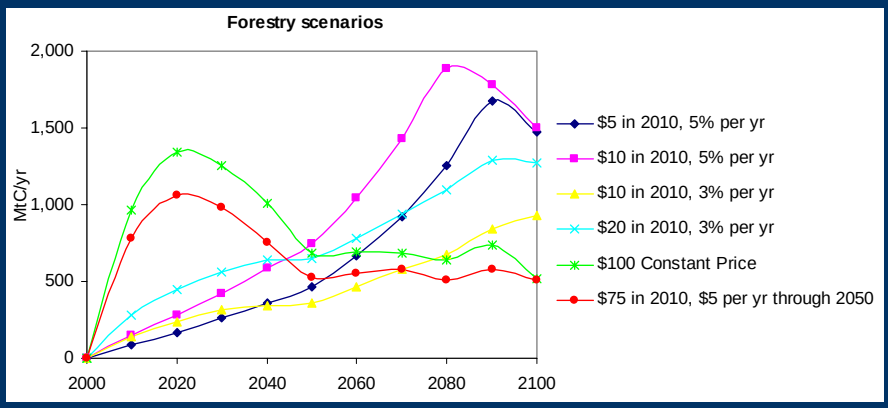
Sequestration by forests



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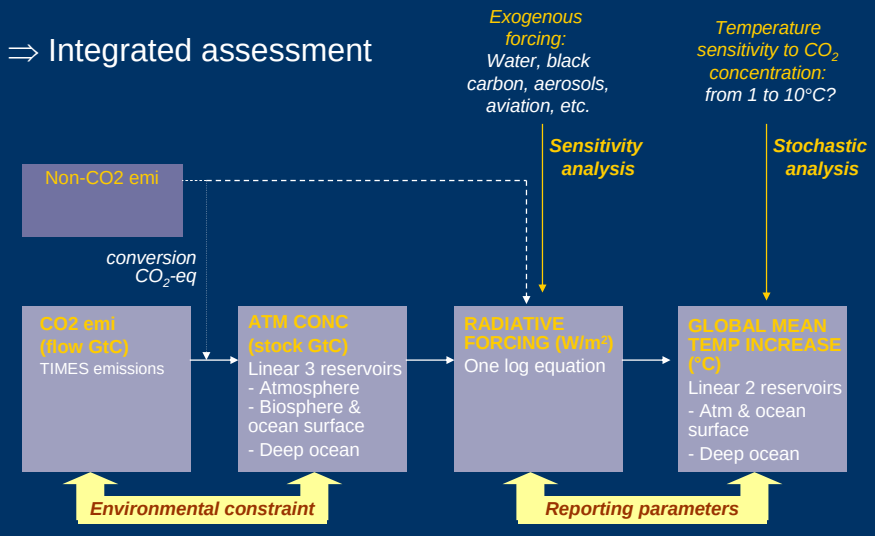
Climate module (adapted from Nordhaus and Boyer, 1999)

⇒ Integrated assessment



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Exemples of further analyses

Refine some technological information (H_2, CCS, biomass, soil N2O emissions)

Evaluate other GDP projections (higher base case emissions)

Enhance the model with feedbacks from Climate to Economy (eg. modified demands for space heating and cooling, hydro potentials, release of methane from permafrost)

Focus on regional results: regional climate policies, contribution to global GHG mitigation, permit trade, CDM projects, energy trade

Regional differentiation related to energy / technology policies (eg. nuclear policies)

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Thank you