

Technology and USA Emissions Mitigation In A Low Carbon Society

AIM International Workshop

Jae Edmonds, Marshall Wise, Page Kyle, Kate Calvin

February 15, 2009

NIES

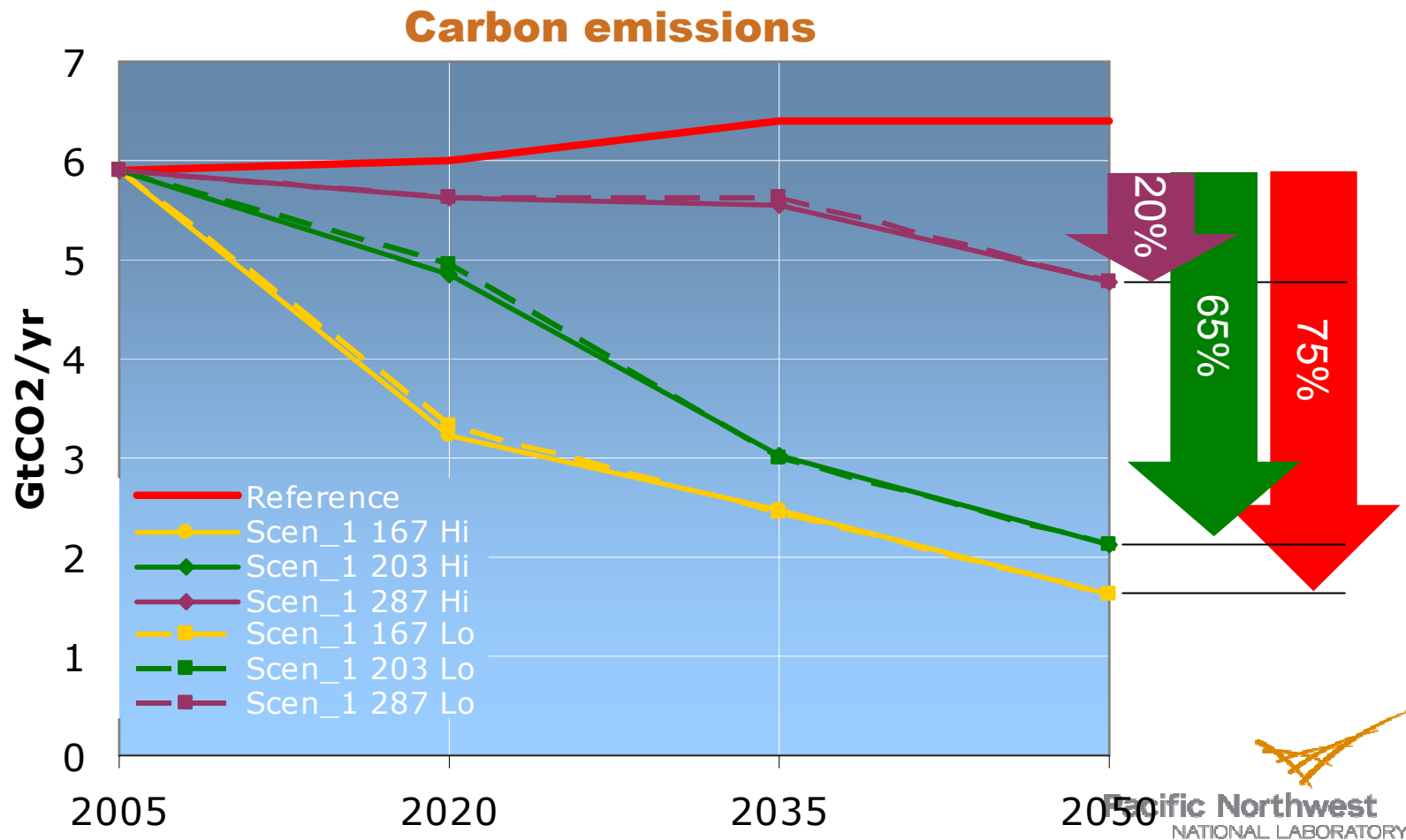
Tsukuba, Japan

Key Design Characteristics of MiniCAM

- ▶ Participating Model: miniCAM
- ▶ Participating Modelers: Jae Edmonds, Marshall Wise, Page Kyle, Kate Calvin
- ▶ Number of Regions: 14
- ▶ Time Step: 15 years
- ▶ Dynamic Recursive
- ▶ Energy and agriculture sectors explicitly modeled
- ▶ Underlying Computing Framework: C++
- ▶ **The MiniCAM USA Transition Scenarios are still a work in progress.**

MiniCAM USA Carbon Emissions: 2005 through 2050

Three alternative policy regimes: 167, 203, & 287 PgCO₂



Overview of the Scenarios

**"Known Technologies"
w/o Nuclear**

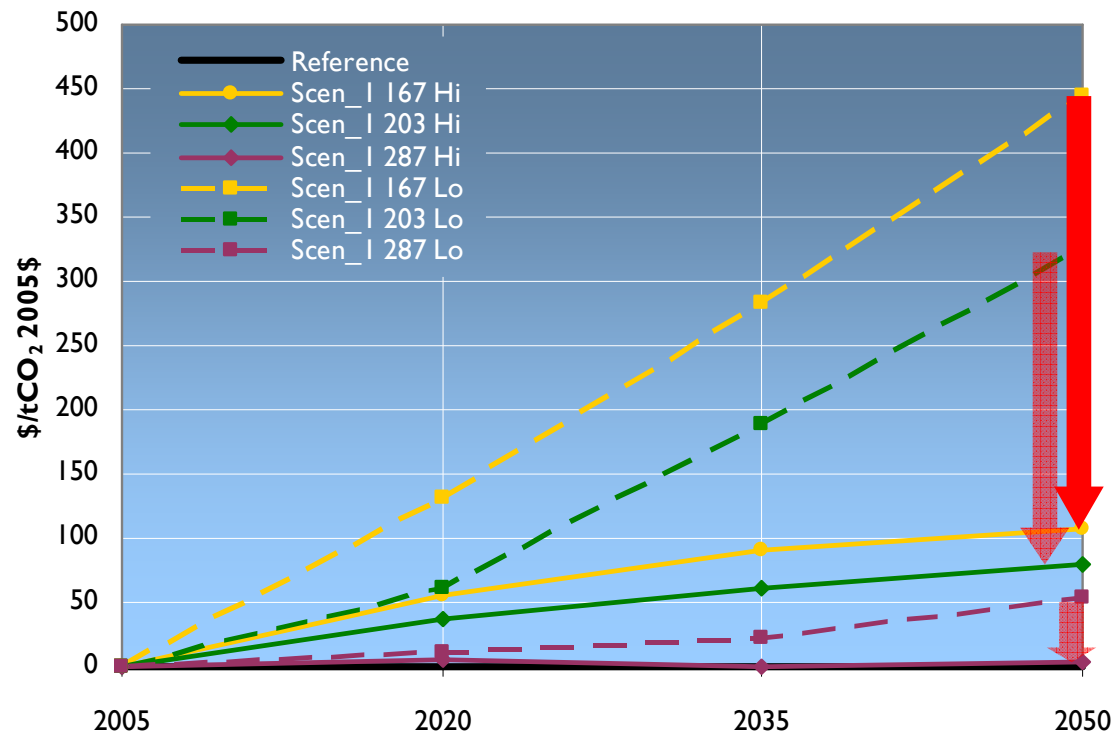
**Nuclear & Advanced
Technologies**

	Reference	Nuclear Reference	Nuclear Advanced	CCS	Bio and CCS	Renewables	End Use	End Use & Renewables	Hydrogen & Supply	Advanced
Transportation: Electric Vehicles	Reference	Reference	Reference	Reference	Reference	Reference	Advanced	Advanced	Reference	Advanced
Transportation: Fuel Cell Vehicles	Reference	Reference	Reference	Reference	Reference	Reference	Advanced	Advanced	Advanced	Advanced
Transportation: Other	Reference	Reference	Reference	Reference	Reference	Reference	Advanced	Advanced	Reference	Advanced
Buildings	Reference	Reference	Reference	Reference	Reference	Reference	Advanced	Advanced	Reference	Advanced
Industry	Reference	Reference	Reference	Reference	Reference	Reference	Advanced	Advanced	Reference	Advanced
Electricity and Hydrogen CCS	No CCS	No CCS	No CCS	Advanced	Advanced	No CCS	No CCS	No CCS	Advanced	Advanced
Dedicated Energy Crops	Reference	Reference	Reference	Reference	Advanced	Advanced	Reference	Advanced	Advanced	Advanced
Hydrogen Production	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Advanced	Advanced
Wind Power	Reference	Reference	Reference	Reference	Reference	Advanced	Reference	Advanced	Advanced	Advanced
Solar Power	Reference	Reference	Reference	Reference	Reference	Advanced	Reference	Advanced	Advanced	Advanced
Nuclear Fission	No New Nuclear	Reference	Advanced	No New Nuclear	No New Nuclear	No New Nuclear	No New Nuclear	No New Nuclear	Advanced	Advanced
Geothermal	Reference	Reference	Reference	Reference	Reference	Advanced	Reference	Advanced	Advanced	Advanced

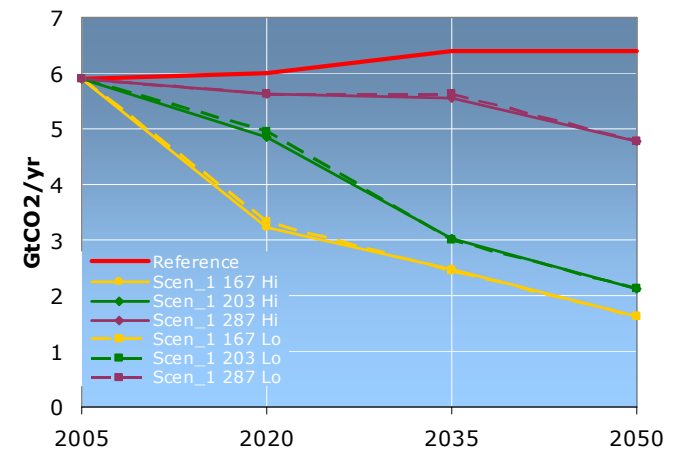
MiniCAM USA Carbon Price and Carbon Emissions: 2005 through 2050

- ▶ Technology character and availability dramatically affects cost.

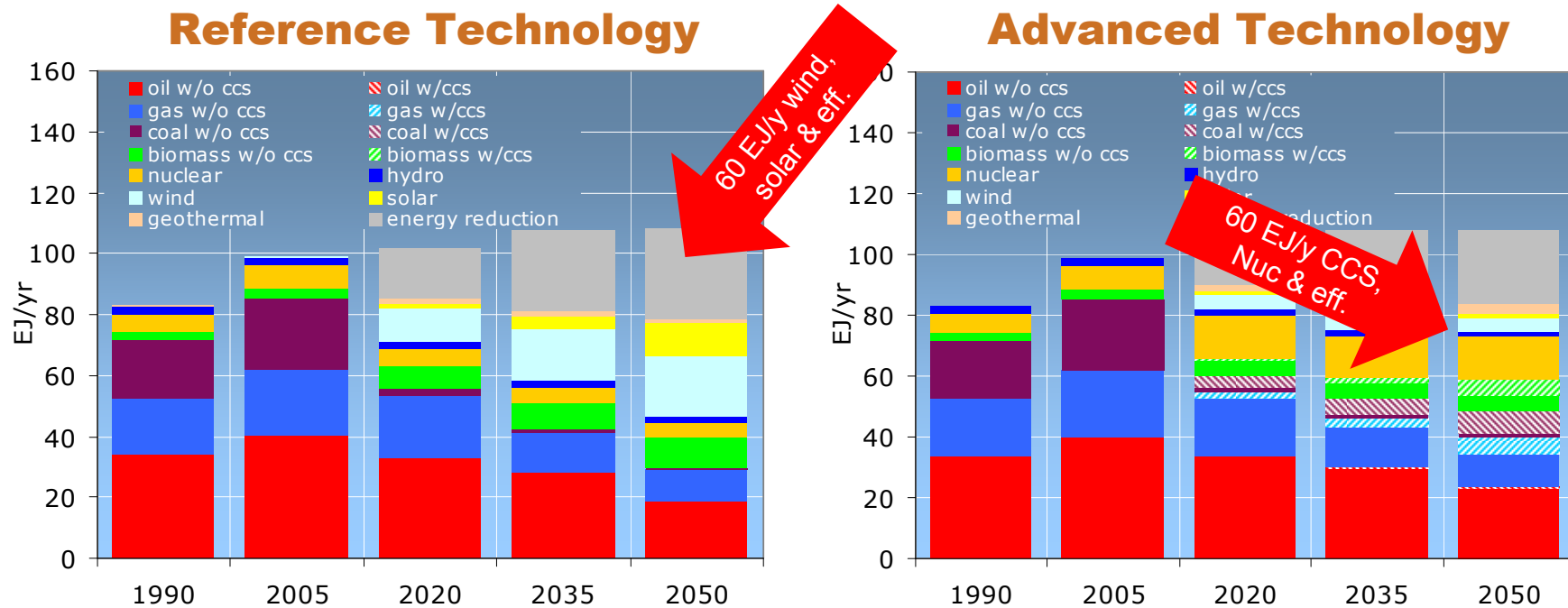
Carbon prices



Carbon emissions



USA Primary Energy Consumption, Scenario 1 167: Reference and Advanced Technology



▶ 60 EJ/y wind, solar & eff.

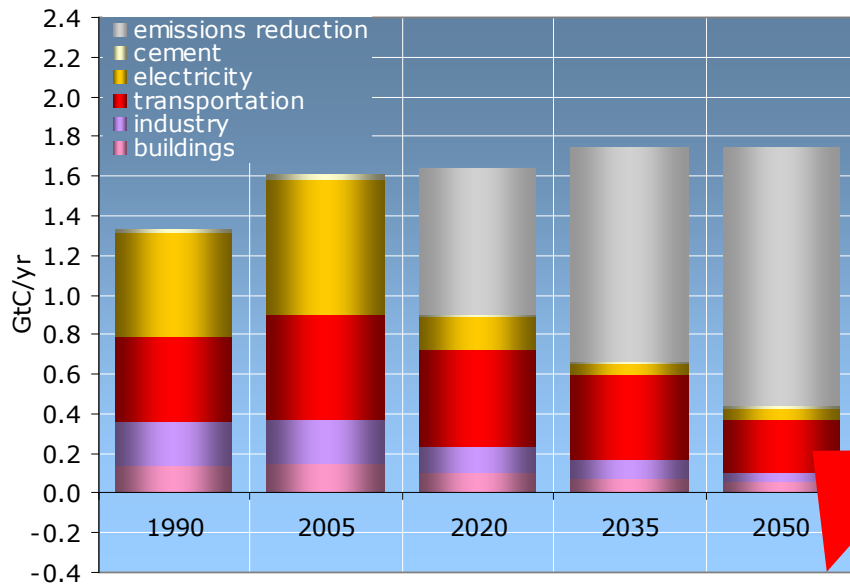
▶ 20 EJ/y CCS

▶ >10 EJ/y nuclear

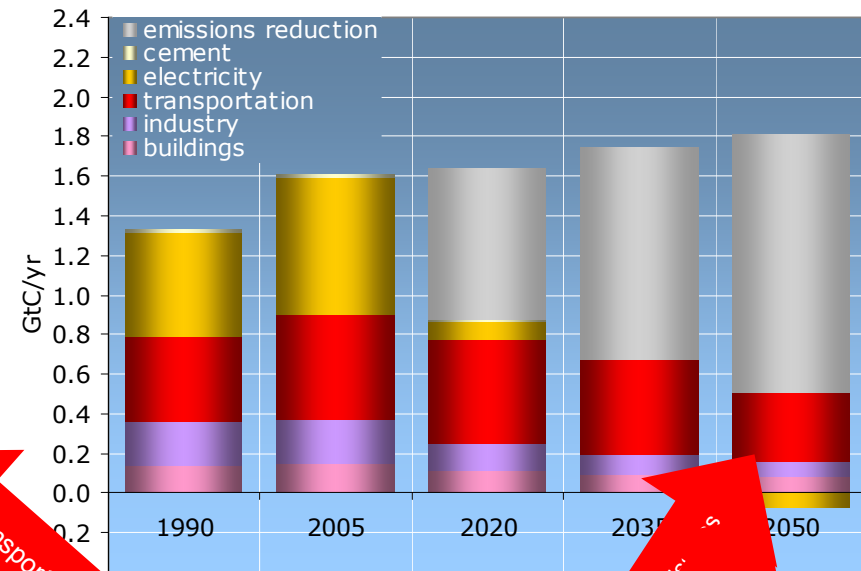
▶ >20 EJ/y eff.

USA Carbon Emissions by Sector, Scenario 1 167: Reference and Advanced Technology

Reference Technology



Advanced Technology

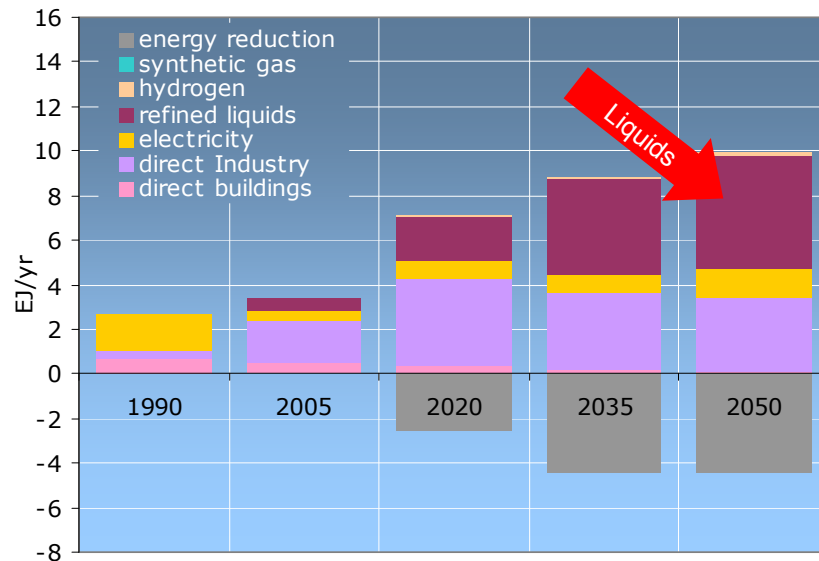


Transport Emissions

Transport Emissions
Negative Utility Emissions

USA Bioenergy Consumption by Sector, Scenario 1 167: Reference and Advanced Technology

Reference Technology



Advanced Technology

