Technology Development As a Driving Force for Future Climate Change

David G. Streets[1,2] and Fang Yan[1,2]

[1] Decision and Information Sciences Division, Argonne National Laboratory, Argonne, IL, USA

[2] Computation Institute, University of Chicago, Chicago, IL, USA

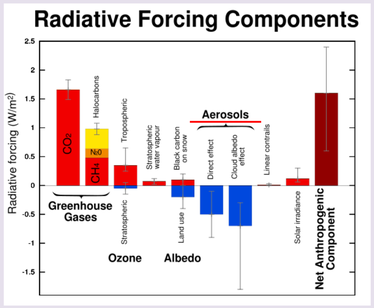
UID: 72990

Background and Rationale:

Technology Choice

➢Is a key determinant of the emissions of many important atmospheric species (SO_2, PM, BC, OC, NH_3, NMVOC, etc) that influence climate

➢Is influenced not only by regulation and policy, but also by economic conditions, personal preference (especially for vehicles), and commercial competition (for industry).



Ref: Climate Change 2007: Synthesis Report

Argonne National Laboratory (ANL) is presently constructing a new technology driver model to:

➢Quantify the linkage of technology choice in each economic sector to economic, energy, and policy drivers (in collaboration with the University of Illinois at Urbana-Champaign, UIUC)

➢Test the emissions outputs from the model within the GU-WRF/Chem air quality and climate simulation model (n collaboration with North Carolina State University, NCSU)

➢Explore the policy implications of the resulting environmental impacts

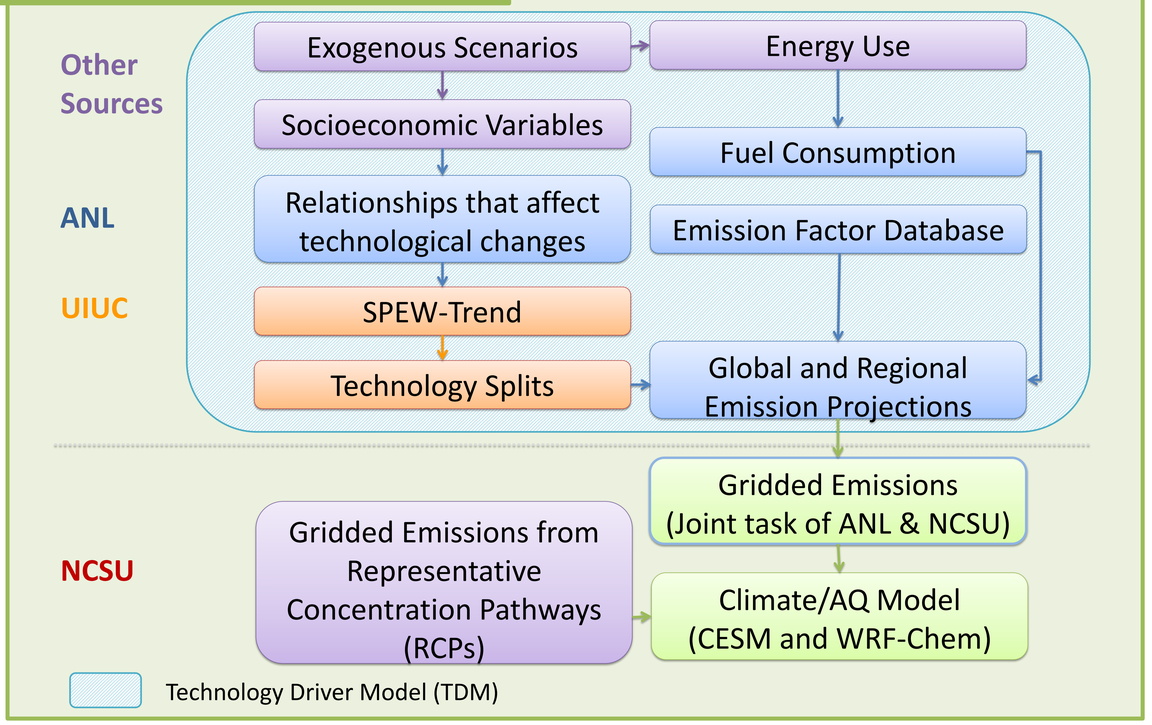
Objectives:

➢We believe that it is necessary to examine technology development quantitatively within the framework of a macroeconomic model or as a stand-alone tool driven by macroeconomic model outputs, **in order to make reliable forecasts of atmospheric species that will influence climate change in the future**

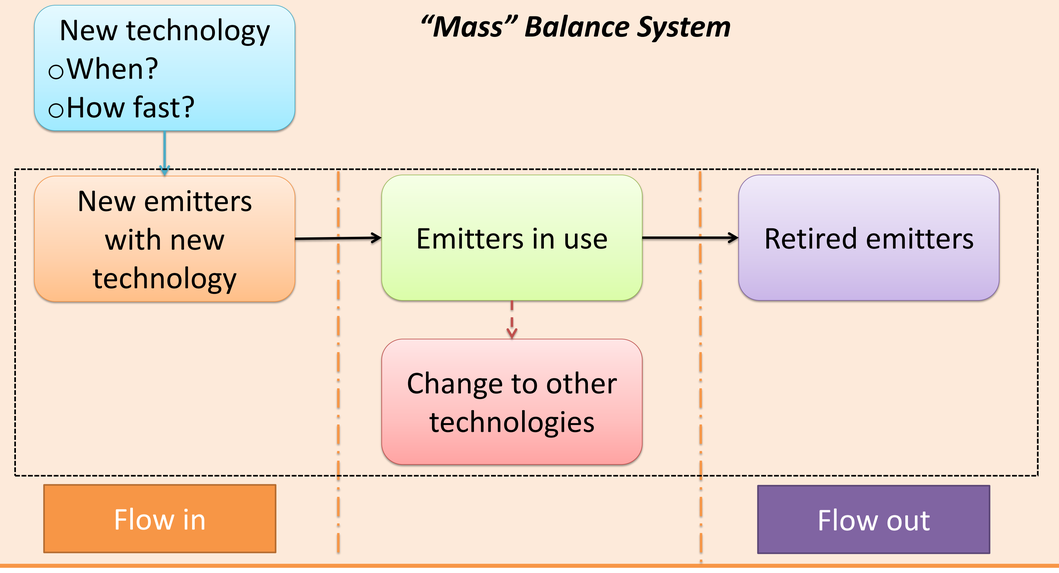
➢We assert that such a model can be made sensitive to a wide range of policy measures and other factors that fundamentally influence technology choices, **in order to provide a tool to test the effects of these policy measures on future emissions in an integrated way (including greenhouse gases, agricultural emissions, and species of concern to local and regional air quality).**

➢We will apply the model to **generate forecasts of 2050 emissions under a variety of alternative policy futures** that will be more advanced and reliable than anything available today.

Schematic of emission projections:

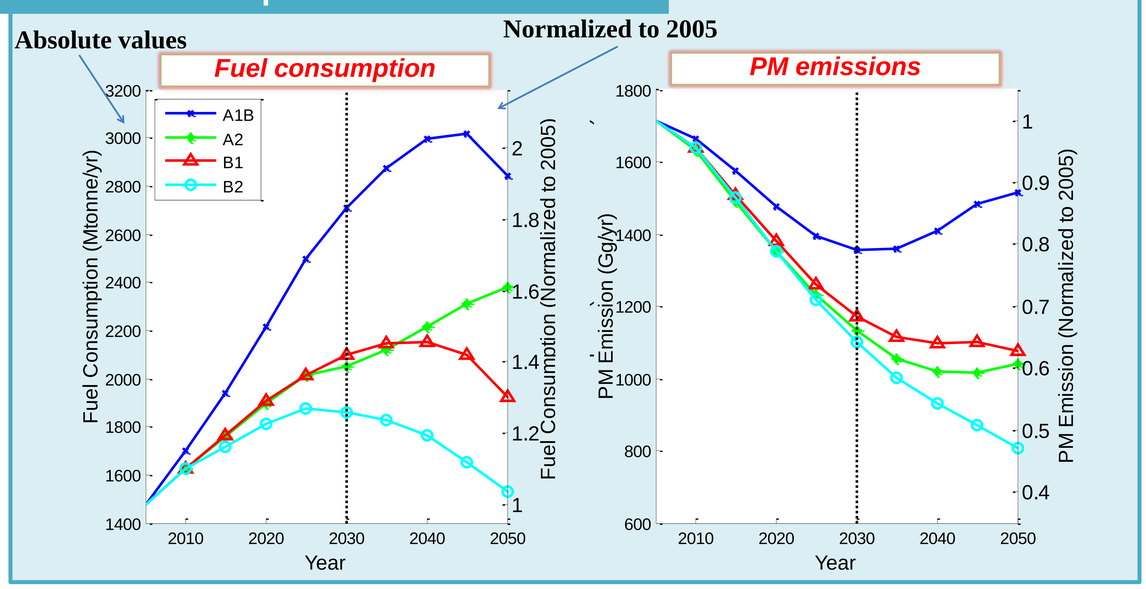


Fundamental Idea of TDM:

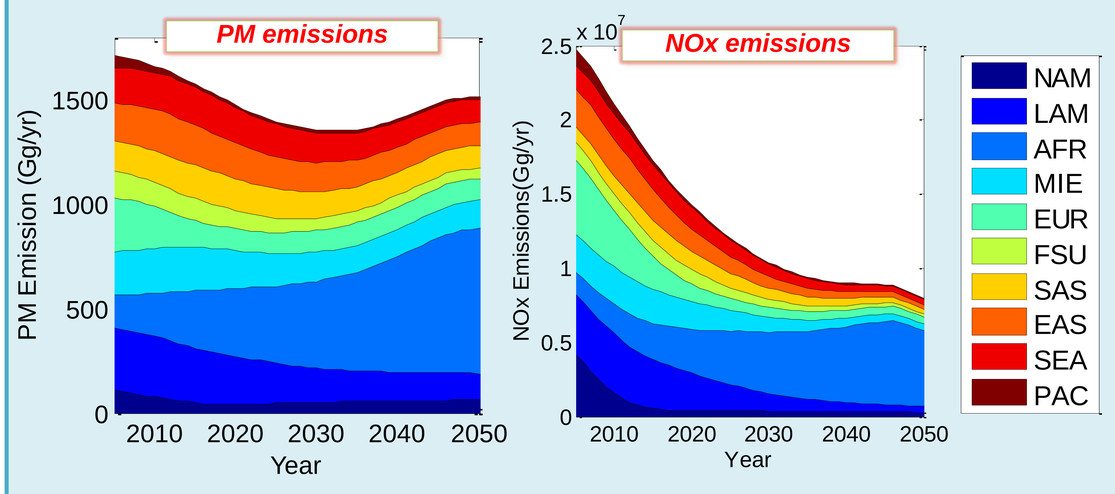


The TDM is currently being developed, and its initial application to the on-road transportation sector under various climate scenarios demonstrates the need to consider technology development on future emissions. Selected preliminary results follow.

Global Fuel Consumption and PM Emissions:



Regional PM and NOx Emissions under A1B Scenario:



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