
Michigan Memorial Phoenix Energy Institute

*Supporting and Growing Research and
Education for a Secure, Affordable and
Sustainable Energy Future*



History

- Phoenix Project of the University of Michigan - created as a world war II memorial in 1948
- “Devoted to the peaceful, useful and beneficial applications and implications of nuclear science and technology to the welfare of the human race.”



Vision

In 2004, Regental action in broadened the charter of the Phoenix Project beyond atomic energy to encompass "research on the development of energy policies that will promote world peace, the responsible use of the environment, and economic prosperity." The new charter furthermore stresses interdisciplinary research and education that encompasses "perspectives from the natural and social sciences, engineering, medicine, and the arts and humanities



Michigan Memorial Phoenix Energy Institute (MMPEI) as an “enabling” organization.

- **Develop, coordinate and promote** multidisciplinary energy research and education across the University
- **Support** areas of intellectual activity that constitute our existing strengths and infrastructure
- **Establish** new faculty and research appointments in growth areas and build bridges between science/technology and public policy
- **Serve** as a unified voice on energy research and education for the University



The Energy Challenge

Every aspect of contemporary society is dependent upon the availability of clean, affordable, and flexible energy resources

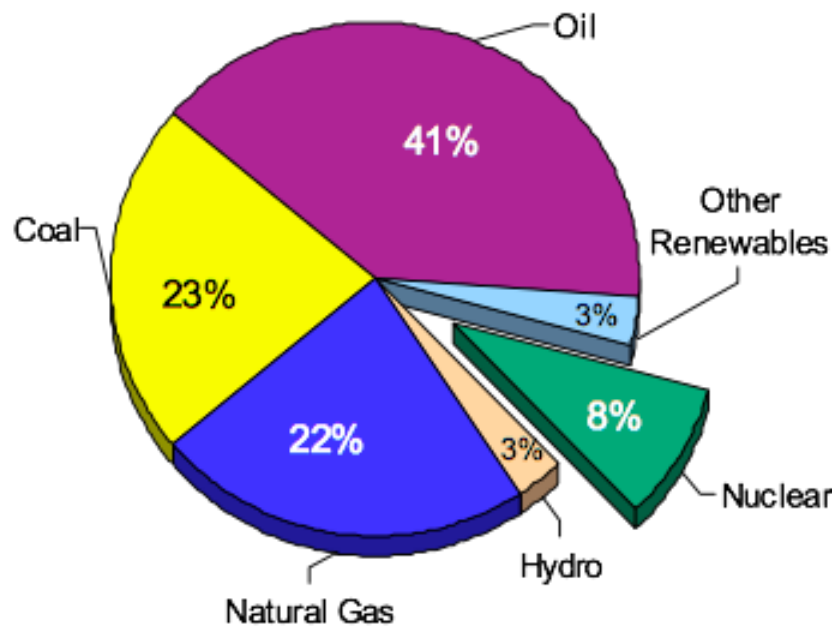
- *The most cataclysmic threat to global economic development, global stability and improved standards of living is climate change due to anthropogenic activity.*
- *The second is over-reliance on a dwindling, unsecured and unstable supply of oil*
 - *There is increasing competition for fossil-fuel supplies from developing economies.*
 - *Global oil and natural-gas production will peak within the next several decades*
 - *Supplies can be disrupted by events in unstable regions of the world.*



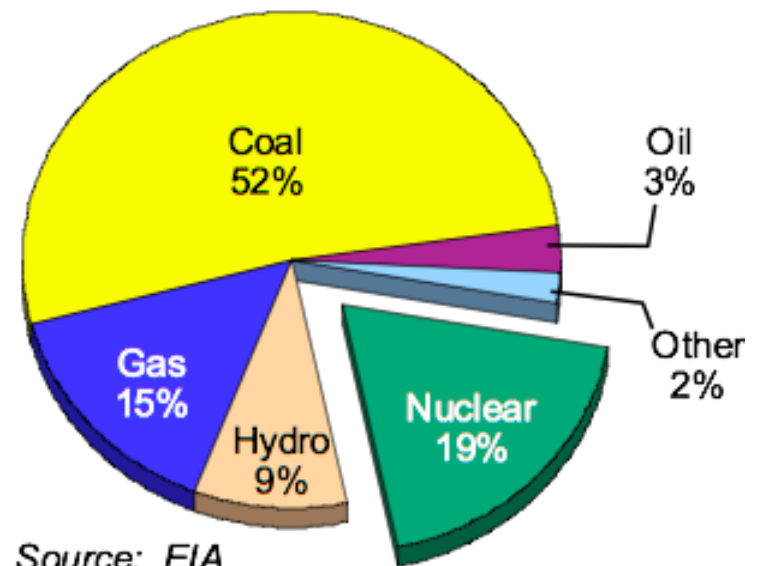
Energy Mix (U.S.)

86% of all energy is from fossil fuels

70% of all electricity comes from fossil fuels



Energy Production

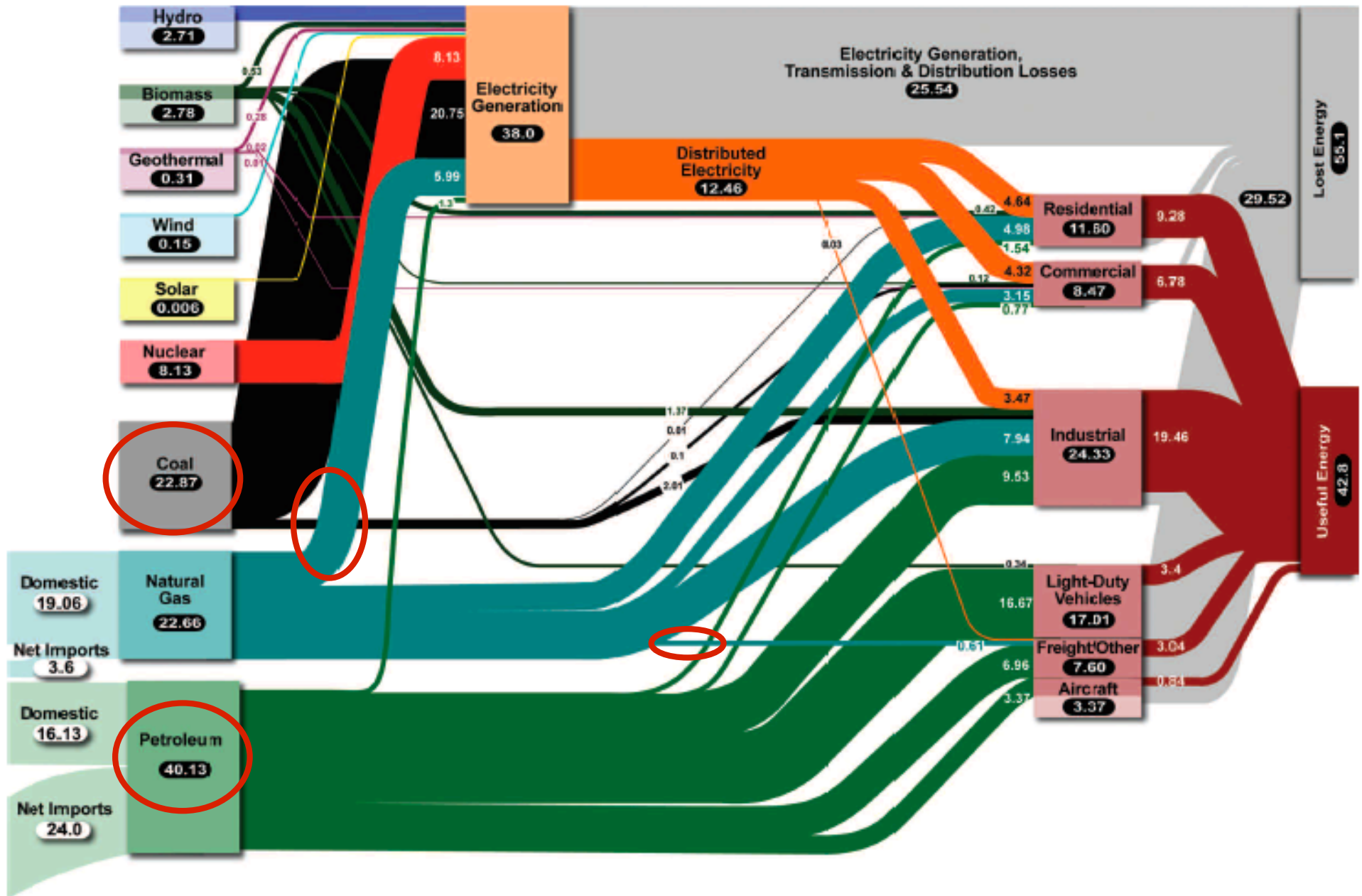


Source: EIA

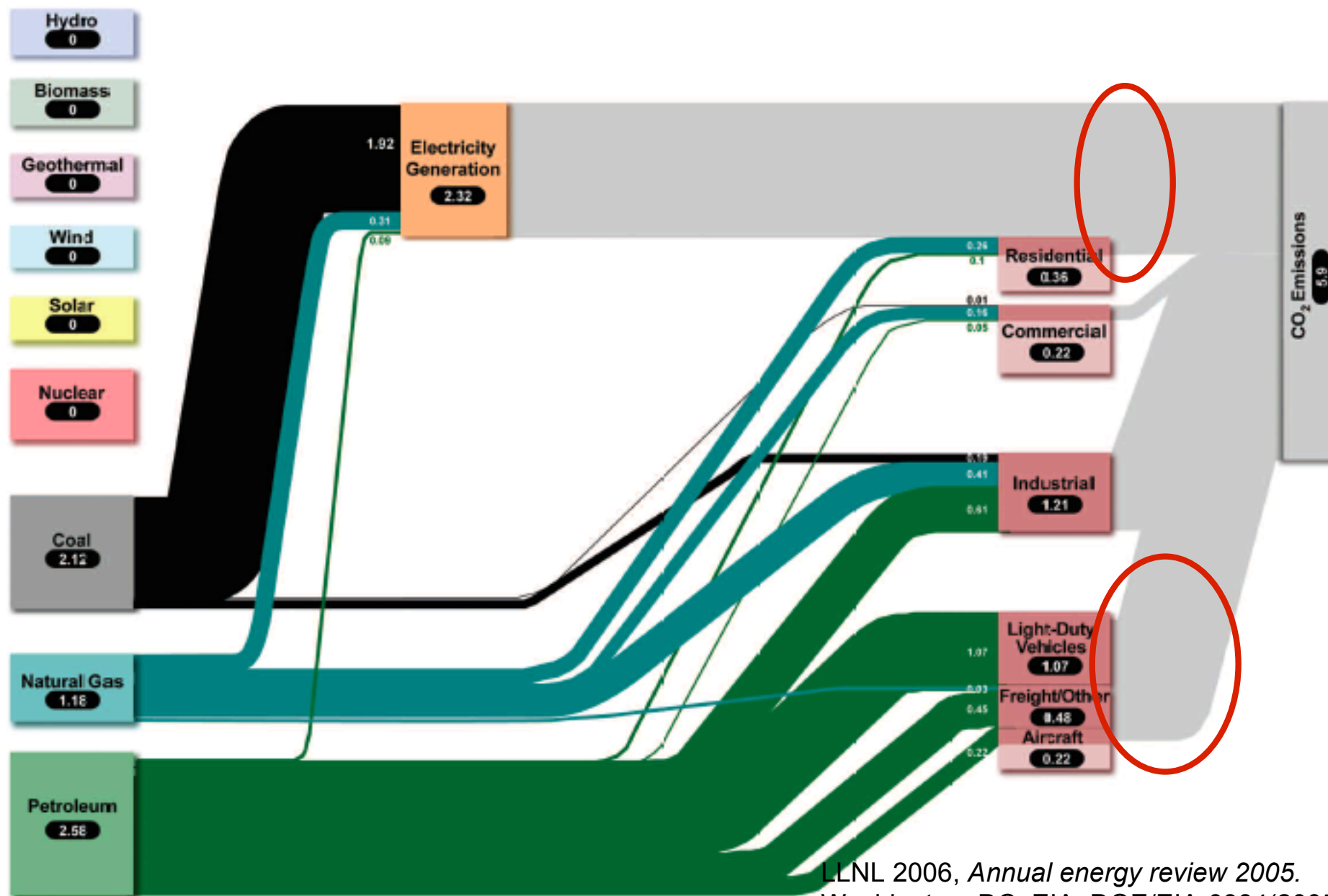
Electricity Production

>95% of all transportation energy use is from oil

Energy Flow, 2005 (quads)



U.S. CO₂ emissions, 2006 (billion metric tons)

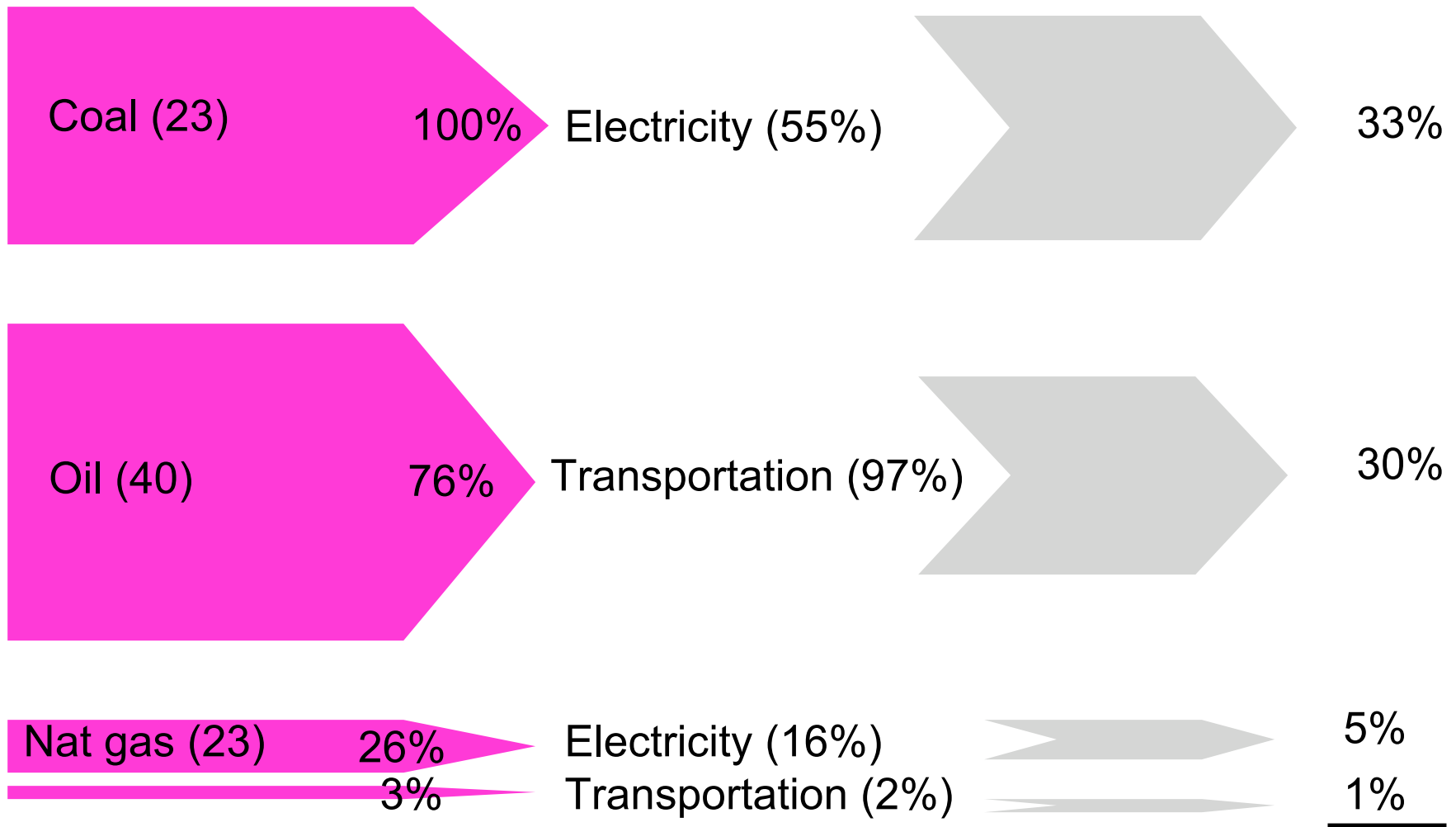


LLNL 2006, *Annual energy review 2005*.
Washington, DC: EIA. DOE/EIA-0384(2005).

Fuels (Quads)

Usage (%)

GHG (%)



How to achieve this goal?

Ultimately, the development of 2 technologies can achieve this goal:

- **cost effective solar energy**
- **high energy density batteries**

In the near and intermediate terms, nuclear energy can substitute for both to a large degree

The Larger Context

Rarely has technological innovation by itself succeeded in impacting complex, global challenges without close integration and coupling to the social context. That is, without a system for efficiently transferring technology to the private sector, without well-crafted public policy to encourage private sector investment in the technology, without a reasonable regulatory structure, public policy, economic competitiveness and an existing business infrastructure, and without societal acceptance, technological innovation will never leave the laboratory.

Mission

To chart the path to a secure, affordable and sustainable energy future by applying our strengths in public policy, economics, business and social sciences to lay the foundation for successful implementation of our scientific and technological achievements.



Energy Research at UM

- Research Thrusts
 - *Carbon-neutral electricity generation*
 - *Energy storage and efficiency*
 - *Transportation systems and fuels*
 - *Policy, economics and societal impact of the energy challenge*



Research Thrusts:

Carbon-neutral electricity generation

This thrust will address modes of electricity generation that minimize or eliminate the production of greenhouse gases. Our strengths are in nuclear engineering and a large and growing activity in solar energy materials. In addition, established programs to tap wind and ocean energy are developing those sources for local deployment

Research Thrusts:

Energy storage and efficiency

Energy storage is a limiting technology in the development of vehicles powered by batteries and hydrogen. The development of lightweight, cost-effective, high energy density batteries and research on hydrogen storage technologies are major focal points of this thrust. Improved energy efficiency in lighting and the built environment are major focal points in energy utilization.

Research Thrusts:

Transportation systems and fuels

UM is at the center of the world's automotive industry and automotive engineering is the nation's premiere program. The development of alternate power plants and fuels for transportation is a strong and growing program involving significant interaction with the automotive industry and growing interaction with the petrochemical industry. The conversion of fuels into more attractive forms is a major challenge in the move away from fossil fuel consumption for transportation.

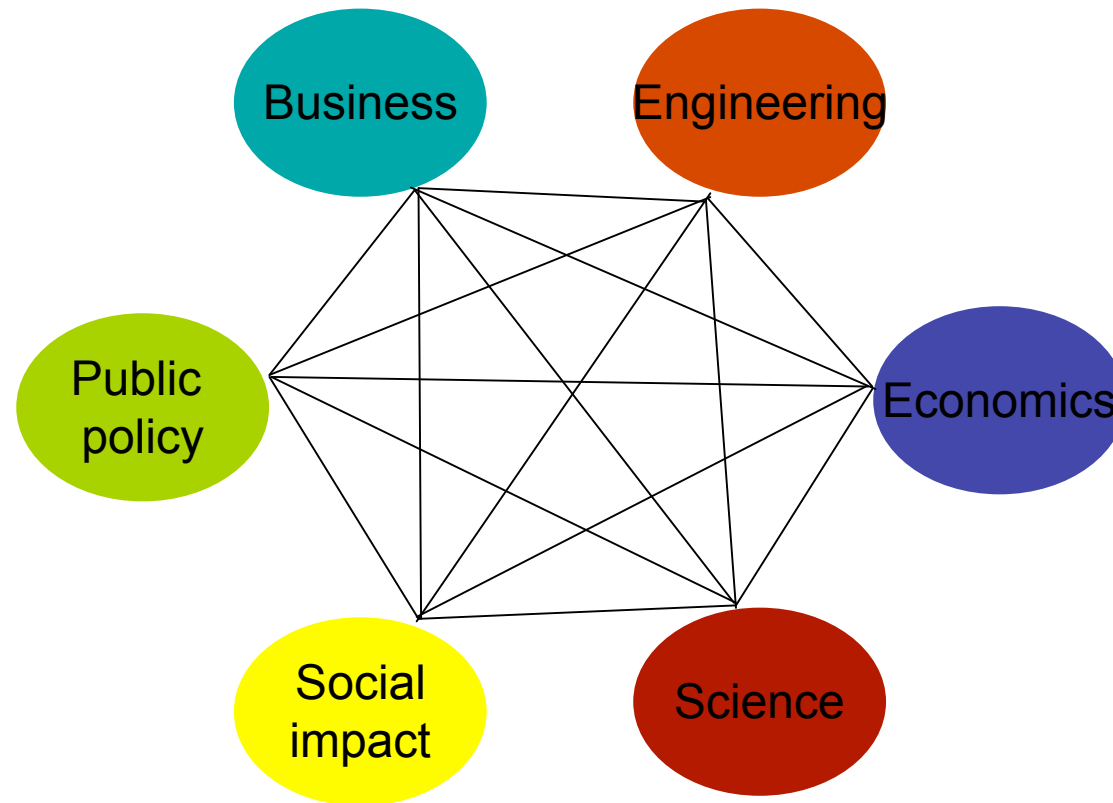


Research Thrusts:

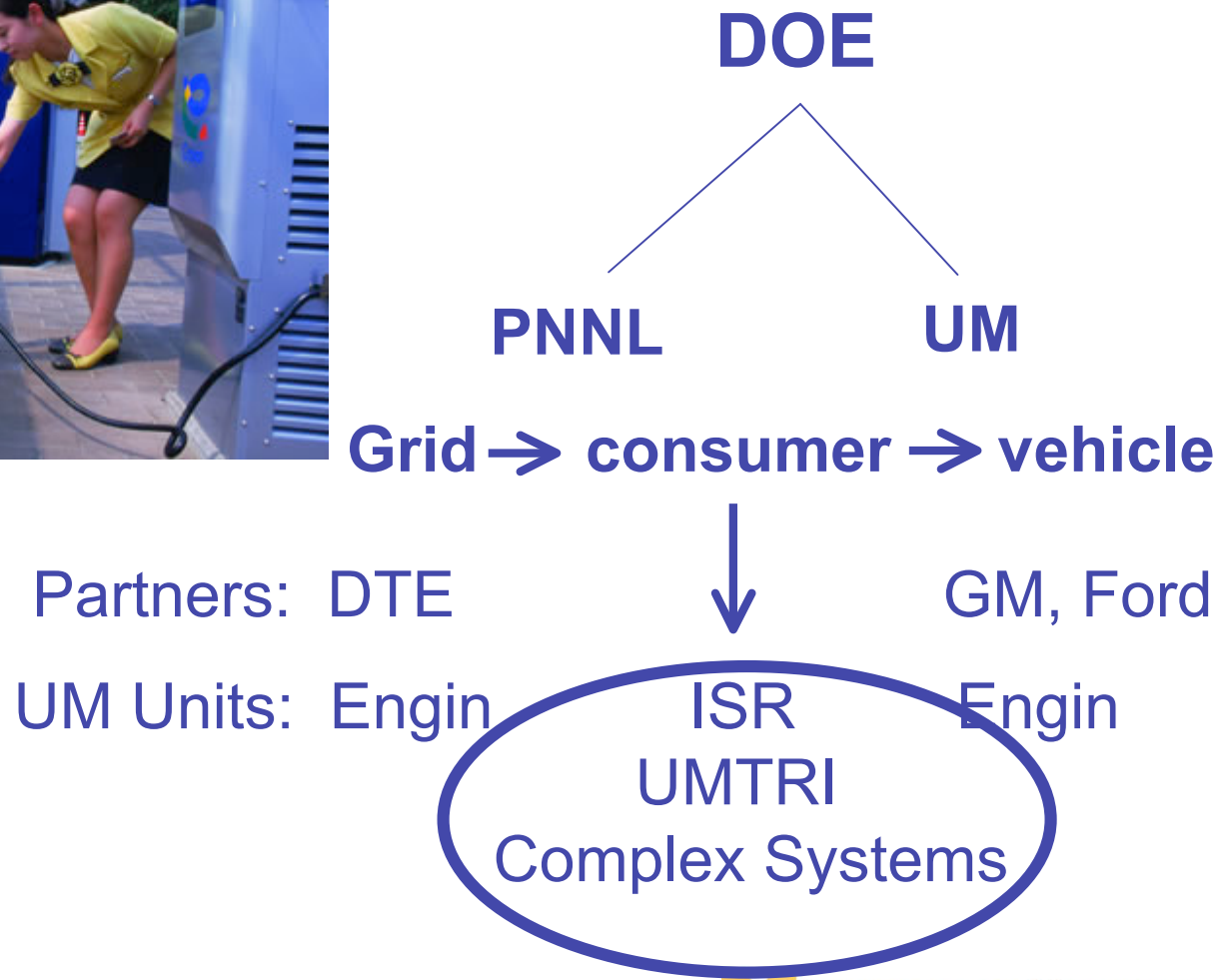
Policy, economics and societal impact

Recognizing that the pathway to the implementation of technological solutions is via public policy, economics and societal impact, the UM is pursuing a comprehensive approach to overcoming barriers to the implementation of technical solutions to energy challenges.

Linking the social and physical sciences



PHEV Initiative



Outreach

- Industry - energy and transportation companies
- Universities - through the University Research Corridor
- Business - Next Energy and Ann Arbor Spark
- State - DLEG to help define Michigan's energy business options
- Ann Arbor - contributed to the city's successful proposal to become one of 12 designated solar cities

What we've done and where we're going

- **Formal establishment of Institute (Sept. 22, 2006)**
- **ESTP RFP for cross-disciplinary energy projects (Nov. 3, 2006)**
- **Executive committee established (Dec. 2006)**
- **Internal Workshop held on Jan. 18, 2007**
- **Energy Science, Technology and Policy Symposium held Feb 13-14, 2007**
- **Publication of Symposium proceedings in progress**
- **Six MMPEI-Rackham Energy Fellowships awarded June 30, 2007**
- **Faculty Fellows program launched Fall 2007**
- **Second ESTP RFP to be issued Fall 2007**
- **Student energy event on September 19, 2007**
- **Podcast and position paper series underway**
- **PML renovation - 2008**





University of Michigan WORKSHOP ON ENERGY

Thursday, January 18, 2007 • Michigan League

All-day workshop where you can hear short presentations by faculty from Engineering, Natural Resources & Environment, Public Policy, LSA, Business, Architecture, Law and UMTRI on a variety of energy-related research projects at Michigan.

8:30 AM	Plenary Session (UM Tech, Environment, Business Overview)		
Concurrent Presentations (including one policy talk per block)			
9:30 AM	Fuels	Utilization	Enabling Technologies
11:15 AM	Production	Utilization	Enabling Technologies
12:30 PM	LUNCH & Session summaries		
1:30 PM	Production	Utilization	Sustainability
3:00 PM	Transportation	Vehicles/Fuels	Sustainability
4:15 PM	Session summaries		
4:45 PM	Reception & Announcement of MMPEI seed grants		
Details, including speakers at www.mmpei.umich.edu/workshop.html			

Michigan Memorial
Phoenix Energy Institute



Workshop Co-Sponsors

Graham Environmental
Sustainability Institute



Erb Institute for Global
Sustainable Enterprise



University of Michigan Symposium



Energy Science, Technology and Policy

FACING THE CHALLENGE

The University of Michigan launched an energy research initiative in September 2006 with the establishment of the Michigan Memorial Phoenix Energy Institute. This symposium brings together many influential people from government, industry and academia to present their views on science, technology and policy topics in the energy field.

Organized by the Office of the Vice President for Research and the Michigan Memorial Phoenix Energy Institute.

Sponsored by
DTE Energy



8:00 AM - 4:30 PM, February 13-14, 2007
Horace H. Rackham Amphitheatre
945 E. Washington, Ann Arbor 48109-1070

KEYNOTE ADDRESS

Samuel W. Bodman
U.S. Secretary of Energy

Speakers Include:

Dennis N. Assanis, University of Michigan • advanced powertrains
Rosina M. Blumhagen, University of Michigan • climate change science & policy
J. Christopher Brown, DTE Energy • addressing consumer needs
Lawrence D. Burns, General Motors • transportation & sustainability
John R. Deaborn, Dow Chemical • challenges for the chemical industry
James J. Duferstadt, Univ. of Michigan • energy futures in the Great Lakes region
Stephen R. Forrest, University of Michigan • advances in lighting
Kenneth Kozgura, Michigan State University • future of biofuels
Gregory A. Keoleian, University of Michigan • energy sustainability metrics
Nathan S. Lewis, CalTech • sustainable energy technology
Thomas P. Lyon, Univ. of Michigan • carbon constraints & energy investments
William McDonough, Wm. McDonough & Partners • design for sustainability
Ernest J. Moniz, Massachusetts Institute of Technology • nuclear options
Margo T. Oge, Environmental Protection Agency • energy and pollution
James E. Rogers, Duke Energy • fuel diversity for utilities
Gerhart Schmidt, Ford Motor Company • environment & energy security
Daniel Sperling, University of California-Davis • new fuels & vehicles
Levi T. Thompson, University of Michigan • hydrogen technologies
Gary S. Was, University of Michigan • UM approach to the energy challenge

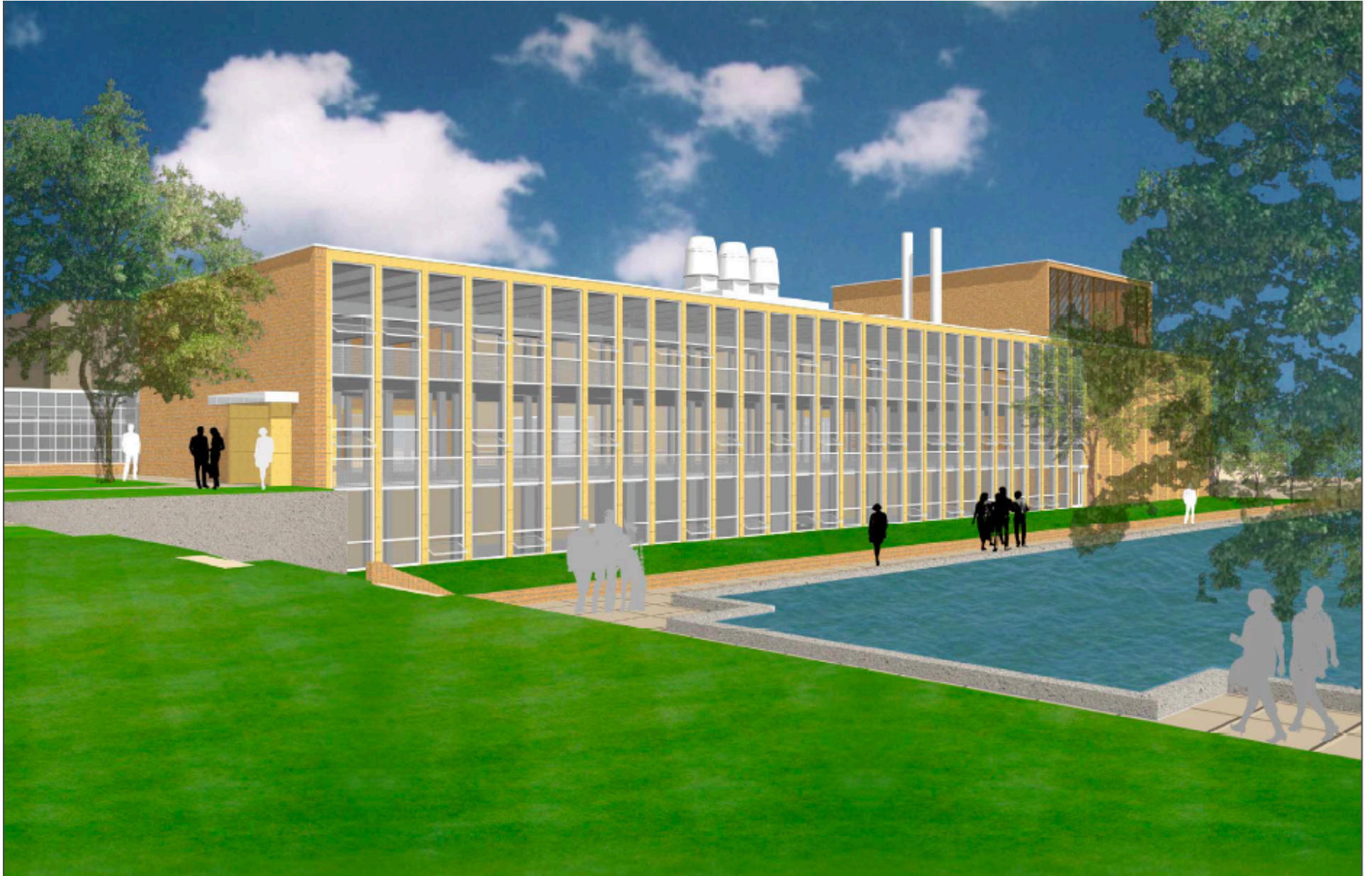
Symposium attendance is free to all
Registration at www.mmpei.umich.edu/symposium.html

What we've done and where we're going

- Formal establishment of Institute (Sept. 22, 2006)
- ESTP RFP for cross-disciplinary energy projects (Nov. 3, 2006)
- Executive committee established (Dec. 2006)
- Internal Workshop held on Jan. 18, 2007
- Energy Science, Technology and Policy Symposium held Feb 13-14, 2007
- Publication of Symposium proceedings in progress
- **Six MMPEI-Rackham Energy Fellowships awarded June 30, 2007**
- **Faculty Fellows program launched Fall 2007**
- **Second ESTP RFP to be issued Fall 2007**
- **Student energy event on September 19, 2007**
- **Podcast and position paper series underway**
- **PML renovation - 2008**



PML Renovation



***Supporting and Growing
Research and Education for a
Clean, Affordable and
Sustainable Energy Future***

