HARC Organization and Capabilities

Jim Lester
President
Houston Advanced Research Center

www.harc.edu
HARC Organizational Characteristics

- **Mission**: Moving knowledge to action to improve human well-being and the environment

- **Focus**: Sustainability science for the Gulf Coast region (with global applications)

- **Approach**: Performing and translating research for decision making and technology transfer

- **Themes**: Interdisciplinary teams working on:
  - clean energy
  - air quality & climate
  - watersheds and the coast
HARC Expertise

Environmental Science
- B Buzcu Guven (PhD) env eng & modeling
- A Cuclis (MS) chemical eng.
- K Frost (MS) toxicology & env sci*
- S Glenn (PhD) env. eng. & hydrology
- L Gonzalez (MS) env. mgmt. & fisheries
- R Harriss (PhD) earth system science”
- J Lester (PhD) env. science
- E Olaguer (PhD) meteorology & air quality
- J Ronk (MS) geology & energy systems

Information Management
- Z Vernon (MS) geography & GIS
- K Bender (MS) web site & media
- J Williams (MS) system engineer
- A Vardhan (MS) MIS

Engineering, Design & Tech Transfer
- Yiqun Huang (PhD) automotive eng.
- R Haut (PhD) oil & gas exploration eng.
- D Bullock (MS) energy systems
- L Price (MS) energy eng.
- K Umamaheswar (MS) energy eng.
- J Colvin inventor & eng. tech

Planning, Policy & Human Dimensions
- E Biltonen (PhD) economist*
- D Hitchcock (MS) urban planning & transportation
- P Weeks (PhD) cultural anthropology*
- R Tomlin (MS) energy policy
- A Webb Cabrera (MS) social policy”

* retired or resigned
HARC Program Experience

- **Research Management**
  - **Air Quality Research Program:** policy relevant science on ozone and air toxics using peer review process
  - **NOx Emission Reduction Technology:** stimulating verification of commercial technologies for diesel engines and retrofits (state funding ending)
  - **Environmentally Friendly Drilling:** coordinating evaluation of technologies to reduce damage to air, water, land and wildlife from drilling
Technology Assessment

- Diesel emission reduction technology: EPA funded assessment of retrofits and other solutions

- Environmentally Friendly Drilling: Evaluation of technologies for reducing impacts on land, water and air from drilling operations
HARC Project Experience

Clean Energy

- **Combined Heat and Power**
  distributed power for saving energy, reducing emissions and disaster resilience

- **Sustainable Oil & Gas Exploration**
  technologies and techniques for reducing environmental impacts

- **Energy efficiency** in municipal buildings

- **Solar and wind energy** for public buildings
HARC Project Experience

Air Quality and Climate

- **Air quality monitoring:** state of the art instrumentation for monitoring air pollution
- **Air quality modeling:** small scale modeling system for simulating neighborhood level concentrations
- **Clean engine design:** contribute to the next generation of cleaner liquid/gas fueled engines
- **Texas Climate News:** electronic journalism on climate issues and debate relevant to Texas
HARC Project Experience

- **Water and Watersheds**
  - Watershed Protection Plan
  - Water quality assessment of Galveston Bay & tributaries
  - Biological basis for setting river flow regimes
  - Strategy for monitoring ground water quality in Texas
HARC Project Experience

- Ecoinformatics
  - Status & Trends of Galveston Bay watershed ([www.galvbaydata.org](http://www.galvbaydata.org))
  - Indicators of Health of Galveston Bay
  - Central Southwest Gulf Coast Information Node of National Biological Information Infrastructure ([cswgcin.nbii.gov](http://cswgcin.nbii.gov))
HARC Project Experience

Human Dimensions

- **Valuing Nature in Texas:** ecosystem services valuation and policy analysis of trade-offs in land and water management

- **Well being of resource dependent communities:** understanding the changes in social systems due to environmental change

- **Community level impacts of climate change**

- **Role of human behavior in introducing invasive species**
HARC Project Experience

Informing Policy

- **Transportation and Air Quality Forum** evaluation of transportation policies for application to air quality issues in Texas

- **Air Quality Research** provided a foundation for regulatory strategies on ozone reduction

- **Social indicators for fishing communities** used by federal government to guide fishing regulation

- **Congressional testimony** on BP oil spill and offshore drilling
Partnerships

- City of Houston
- Harris County
- State Agencies
- Federal Agencies: EPA, DOE, USGS, etc.
- Energy Companies: Shell, Chevron, etc.
- Universities: Texas A&M, U. Houston, Rice, U. Texas
- Environmental Organizations: NWF, Sierra Club, Nature Conservancy, etc.
Mayor Annise Parker launches *Houston Drives Electric*

"A robust stakeholder process led by the City, ECOtality and the Houston Advanced Research Center (HARC), has led to the development of major planning documents to guide the City’s deployment of electric vehicle infrastructure. These documents include the Electric Vehicle Charging Infrastructure Deployment Guidelines, Long-Range Electric Vehicle Charging Infrastructure Plan and Micro-Climate Plan."
HARC organizes conferences and workshops related to research programs and industry partnerships.
PROJECT FUNDING MIX 2011 VS. PREVIOUS THREE YEARS

This chart compares type of funding for projects that were active at August 31 of each year based on the source of funding.
Challenges & Strategy

Government funding decline
- Diversify funding with private sources

Anti regulatory political regime
- Stress market based solutions and adaptation to climate change

Energy crisis delayed by increasing fossil fuel inventory
- Work on reducing impacts of fossil fuel use
- Stress natural gas over coal
- Focus on water crisis