1. What information do energy policy makers need to consider in order to make good energy decisions?

As with all important decisions, energy policy-makers need to understand the uncertainties and the consequences of their decisions. Energy is an essential ingredient in a modern economy and way of living, so its relative cost is important to the sustainability of businesses and the prosperity of households. Traditional energy supply technologies have large economies of scale, so energy policy has tended to involve relatively few decisions but with each having large consequences. Because the distribution of energy, especially of electricity and natural gas, is a natural monopoly within each geographical area, simple market mechanisms are not expected to produce optimal economic outcomes. Energy supply technologies also have substantial effects on human health and the environment, which are not accounted for in energy markets but must be considered in making decisions that most benefit all members of our society. Most energy investments are long-lived, so some of their consequences are often far in the future and therefore significantly uncertain. Energy decisions are also technical, requiring significant expertise in engineering, economics, and ecology to adequately project the consequences of decisions.

Michigan's basic set of institutions for making energy decisions is sound but needs to be refurbished. The Public Service Commission provides a venue for adjudicating most energy decisions. The Commission's procedures provide the opportunity for stakeholder engagement in those decisions. Commission staff have considerable experience and expertise in energy issues. The Utility Consumer Participation Fund, overseen by the Utility Consumer Participation Board, provides funding for stakeholder intervention in Public Service Commission proceedings. In specific circumstances, the Commission and intervenors are able to review and examine comprehensive analyses commonly referred to as Integrated Resource Plans. However, there are significant deficiencies that need to be addressed:

1) Integrated Resource Plans are required only for large utility investments and are not available as context for legislative policy analysis, decisions to maintain or retire existing plants, evaluation of energy efficiency programs, and the like.
2) The Commission lacks independent analytical capacity for integrated resource planning, generally depending on information submitted by regulated utilities.
3) Intervenors generally do not have the information or wherewithal to develop independent analyses of alternative scenarios not provided voluntarily by utilities and utility analyses are not transparent.
4) The Utility Consumer Participation Fund may only be used for intervention on behalf of residential ratepayers; it cannot, for example, provide funds for small electricity generators to oppose anti-competitive behavior by utilities.
5) The Commission generally lacks the capacity and does not require utilities to adequately forecast the health effects, environmental effects, household sustainability effects or

employment and income effects of its decisions.

Policy makers will need access to a great deal of objectively-curated data, compiled and reported in appropriate forms to support decision making. The most pressing need is for publicly available, up-to-date, integrated resource planning (IRP) at several levels of detail (e.g., multi-state region or RTO territory, state, sub-state region or group of counties or utility service territory, substation, distribution feeder). At present, transmission planners and utilities engage in resource planning, but their activities and actions are not necessarily made public and if they are made public they are not always presented in forms that make them easily understandable to anyone who is not intimately well versed in the particular modeling tools used, including policy makers. Ideally, the planning process should include local governments and utility customers and invite the most broadly democratic and customer-centric means of planning and decision making. Achieving this ideal will not be easy, because of the difficulty in understanding the utility infrastructure planning process. In order to overcome this problem, state level policy makers should work diligently to bridge this knowledge gap. Michigan could also play a leading role in making IRP modeling readily accessible to all interested parties. This effort requires much more than the occasional publishing of a reports like the 2007 *Michigan 21st Century (Electric) Energy Plan* or the 2006 *Capacity Needs Forum*. What is needed is a sophisticated and capable, GIS enabled mapping and modeling capability, similar to but even more complete than what has been developed thus far by the U.S. National Energy Laboratories for the Eastern Interstates Planning Council (EISPC)EZ Mapping Tool (https://eispctools.anl.gov/).

Some of the specific data that needs to be collected, reported, and assimilated by policy makers includes:

1. Reliable data on and best practices for facilitating achieving the technical, economic, and market-ready potential for customer demand response in reducing peak loads;

2. A thorough understanding of and best practices for removing existing barriers and obstacles to the installation and operation of combined heat and power (CHP) systems and microgrids capable of intentional islanding;

3. Thorough understanding of barriers and obstacles and best practices for providing low-cost financing for distributed resources, including distributed generation;

4. Best practices in identifying, planning, and modeling cost effective non-transmission alternatives;

5. Best practices in coordinating energy planning with water and wastewater utilities; and,

6. Best practices in coordinating amongst the development and implementation of utility smart-grid investments with progress in "smart city" development and implementation.

It is also absolutely important that policy makers understand the folly of depending on markets for making critically important decisions about energy production and use, when those markets are seriously distorted by long-standing subsidies for traditional fossil fuels. (See answer to Question 4.) In addition, current market prices do not reflect ecological negative externalities, leading to conclusions and decisions that fail to fully consider the total economic and non-economic costs involved.

Also, irrespective of anybody's personal views about global climate change science, a very substantial portion of all Michigan greenhouse gas emissions can be prevented by procuring rapidly all already-fully-

cost-effective energy efficiency and renewable resources. The best available assessment, published in the *Michigan Climate Action Plan* (http://www.michigan.gov/deq/0,1607,7-135-50990-213752--,00.html), concludes that approximately 1/3 of all greenhouse gas production is already avoidable not at an incremental cost but for a savings. In other words, even if one rejects the science underlying the global climate change debate, taking steps to reduce greenhouse gas emissions in Michigan should still be undertaken from a purely economic perspective. Furthermore, the *Climate Action* study concludes that if some of those cost savings would be used to purchase even more gains, as much as 40% to 50% of all Michigan greenhouse gas emissions could be avoided at net zero cost.

Finally, it would be irresponsible not to include in any analysis of how best to meet Michigan's future energy needs the risk of changes to the underlying fuel costs associated with each type of generation; the prospect of federal legislation or regulation to address global climate change (regardless of anyone's views as to the desirability of such federal action); innovation advances that have the prospect of changing the market fundamentals of different types of generation (including a dispassionate analysis of where innovation is happening most rapidly); regional transmission planning processes and national reliability and transmission siting developments and their impacts on the Michigan electricity markets; the development of demand side management procedures within the MISO territory and continued development of DSM procedures within PJM; and the prospect of other economic, legislative or regulatory changes that have the potential to impact energy markets.