



In Partial Fulfillment of the Requirements for the Degree of

## **Doctor of Philosophy**

### **Rajesh Buch**

Will defend his dissertation

### **Decision Support Framework for Sustainability Assessment of Institutional Energy Use**

#### **Abstract**

The global transition towards sustainable development will require the collective efforts of national, regional and local governments, institutions, the private sector, and a well-informed public. Private and public sector institutions will have to provide the leadership role in this transition, by way of sustainability-oriented organizations, infrastructure, and ultimately, cultures.

Institutions acquire energy from many sources to service their many energy consuming entities and activities which impact their economic performance, the environment and the community within which they serve. These energy systems are not unsustainable, per se, but current management strategies are balanced in terms of sustainability, providing the necessary administrative functions while avoiding adverse effects of energy consumption. A state of balance implies subjective management of necessary functions and adverse effect avoidance, resulting from collective and individual decision processes.

To bring objectivity to these value-laden approaches, this research project presents a sustainability-based decision support framework to assess the long-term sustainability of an institutional energy system, utilizing Arizona State University's Tempe campus (ASU) energy system as a case study. The energy system technologies, operation and management are fully understood, linking the quantifiable system with the qualified, human-dimension perspective of stakeholders. Broad sustainability principles have been operationalized for energy sustainability, and a principle-based, participatory sustainability assessment approach is proposed.

ASU energy system stakeholders participated in three workshops. First, stakeholders defined how the performance of the energy system is currently measured. Second, stakeholders developed a comprehensive and integrated vision for a sustainable energy system at ASU based on energy sustainability principles.

Finally, an initial strategic plan was developed to realize the vision of a sustainable energy system. An Excel-based sustainability assessment has been developed to quantify sustainability of ASU's existing energy system, based on metrics defined by stakeholders.

The versatility of the integrated, holistic and adaptive sustainability assessment developed herein is that it can actively inform decision making to bring about dynamic change - a continually improving state of sustainability. As such, this framework and sustainability assessment process is a living methodology that can be continuously improved and reapplied.

Monday, November 14th, 2011

10:00AM

Wrigley Hall, Room 401

Faculty, students, and the general public are invited.

Supervisory Committee:

Dr. Arnim Wiek, Co-Chair

Dr. George Basile, Co-Chair

Dr. Eric Williams, Member