1. Case Study 1: What’s the Buzz on Smart Grids?

1. How do smart grids differ from the current electricity infrastructure in the United States?

Current electricity grids do not provide any information about how consumers actually use energy. That makes it difficult to develop more efficient approaches to distribution. The current system offers few ways to handle power provided by alternative energy sources. Without useful information, energy companies and consumers have difficulty making good decisions about using energy wisely.

A smart grid delivers electricity from suppliers to consumers using digital technology to
- save energy
- reduce costs
- increase reliability and transparency

The smart grid enables information to flow back and forth between electric power providers and consumers and
- allows both consumers and energy companies to make more intelligent decisions regarding energy consumption and production.
- provides information that would help utilities raise prices when demand is high and lower them when demand lessens.
- helps consumers program high-use electrical appliances like heating and air conditioning systems to reduce consumption during times of peak usage.
- could possibly lead to a five to fifteen percent decrease in energy consumption.

2. What management, organization, and technology issues should be considered when developing a smart grid?

Management: Information feedback would allow consumers to see how much energy they are consuming at any moment and how much it’s costing them. That would allow them to make better decisions about using appliances like air conditioners and furnaces. They could potentially lower their energy bills. However, governments and energy companies need to help consumers overcome the intrusive feelings associated with the technology. Dashboard monitoring software must be easy for consumers to understand and use.

Organizations: There are many disincentives for energy companies associated with smart grids. Operating budgets and profits would be severely impacted if consumers greatly reduced their energy consumption. Implementation costs would be extremely high, even with federal government assistance. Consumer backlash is already evident in the few experimental cases to date. Without properly structuring the implementation, that backlash could grow against the energy companies.

Technology: Networks and switches for power management, sensor and monitoring devices to track energy usage and distribution trends; systems to provide energy suppliers and consumers with usage data, communications systems to relay data along the entire energy supply system, and systems linked to programmable appliances to run them when energy is least costly, are all expensive and time-consuming to retrofit into all the homes across the nation. Basically, the entire energy infrastructure would require retrofitting.
3. What challenge to the development of smart grids do you think is most likely to hamper their development?

Some challenges to the development of smart grids include:

- Changing the infrastructure of the entire electric grid across the nation
- Installing two-way meters that allow information to flow both to and from homes and businesses
- Creating dashboards that are user-friendly
- Extremely high costs of retrofitting the entire grid infrastructure, estimated to be as high as $75 billion
- Potential intrusiveness of new technology
- Perceived and real loss of privacy
- Potential economic impact on energy companies

4. What other areas of our infrastructure could benefit from ‘smart’ technologies? Describe one example not listed in the case.

One example that could benefit from “smart” technologies similar to the proposed electric grids is monitoring water usage in homes and businesses. Smart technologies could allow water utilities and consumers to

- Monitor water flows much like electric usage
- Turn off lawn sprinklers during the heat of the day or based on predetermined schedules
- Use monitors in lawns and around plants and shrubs to prevent over- or under-watering
- Monitor evaporation rates
- Monitor pools, fountains, and other water features for usage

5. Would you like your home and your community to be part of a smart grid? Why or why not? Explain.

Reference should be made to the following issues:

- How would individuals use the smart grid to reduce energy consumption?
- What kind of software would customers be willing to install and use?
- Would users be willing to absorb some of the costs, all of the costs, or none of the costs associated with retrofitting homes, buildings, and appliances?
- How much information would individuals be willing to share with the energy companies and potentially, local, state, and federal government agencies?
- If customers weren’t part of a smart grid, would they be willing to pay more for energy or would they balk at differing rates?
2. List and describe the organizational, management, and technology dimensions of information systems

- **Organization**: The organization dimension of information systems involves issues such as the organization’s hierarchy, functional specialties, business processes, culture, and political interest groups.

- **Management**: The management dimension of information systems involves setting organizational strategies, allocating human and financial resources, creating new products and services and re-creating the organization if necessary.

- **Technology**: The technology dimension consists of computer hardware, software, data management technology, and networking/telecommunications technology.

3. Distinguish between data and information and between information systems literacy and computer literacy.

- **Data** are streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use.

- **Information** is data that has been shaped into a form that is meaningful and useful to human beings.

- **Information systems literacy** is a broad-based understanding of information systems. It includes a behavioral as well as a technical approach to studying information systems.

- **Computer literacy** focuses primarily on knowledge of information technology. It is limited to understanding how computer hardware and software works.

Discussion Questions

1. **Information systems are too important to be left to computer specialists. Do you agree? Why or why not?**

Although student answers will vary, this is a good place to reiterate that information systems are more than just technology. Information systems development and usage involves organization, management, and technology dimensions. It is important to understand who will use the information systems and how the information systems will be used to facilitate decision making and control within the organization. Computer specialists understand the technology and definitely play an important role within the development and maintenance of information systems. Computer specialists have an in-depth technology background, but may not be well versed in the business or its operations. This is why computer specialists should function as part of a team, and this team should have the hybrid strength of many different skills and personalities. The team should definitely understand the business, the business requirements, and the goals for the information systems.