Sustainability and Choice

April 17, 2008
Announcements

- Lab 2 and 3 due Next Wednesday
- Don’t forget about *Ecotopia*
- Earth Day is this Sunday
Is this Technology a Key to Sustainability?
How It Works
Cool Biz

- From June 1 to September 1, thermostats in public buildings set to 82 degrees Fahrenheit.
  - Previous year setting was 77 degrees Fahrenheit.
  - Workers encourage not to wear jacket or tie and to wear short-sleeve shirts.
  - Other businesses encouraged to participate.
The Kyoto Protocol

- Kyoto Protocol negotiated in December 1997 in Kyoto Japan.
- Treaty ratified by more than 170 countries (36 developed).
- The goal of the is to lower worldwide emissions of greenhouse gases to 5.2 % below 1990 levels.
- Gases are: CO2, Methane, Nitrous Oxide, Perfluorocarbons (PFCs), Hydrofluorocarbons (HFCs), Sulfur Hexafluoride.
- Target must be meet within 2008-2012.
- Developed nations must meet emission levels specified by treaty.
- Developing nations required to monitor and report emissions.
The Kyoto Protocol

- Developed countries can offset emissions by funding a greenhouse gas project in a developing nation.
  - Receive carbon credits that the country can sell to other developed nations.
  - For Japan, must reduce emission by 6% below 1990 levels.
- As of 2007, emissions have grown 8%.
Results of Cool Biz Campaign

- 2005
  - 460,000 ton reduction in CO2 emissions.
    - Equivalent to emissions from one million households for one month.
  - Power consumption reduction of 210 million kwh over 2004.
    - Total consumption in this time = 220 billion kwh.
  - Cool Biz savings is less than 0.1 %.
More Results...

- 2006
  - Participation in program tripled.
  - 1.14 million ton reduction in CO2 emissions.
    - Equivalent to Tokyo’s CO2 emissions for one month.
Other Effects?

- Complaints from Necktie Manufacturers
  
  “It is unfair if the campaign singles out neckties as the villains.”

  Japanese Trade Minister Shoichi Nakagawa

- Global Warming Haircuts

- Cool Biz Clothes
Some Public Reactions

• Cool Biz is fun, so I am supporting it. Every morning I get to think about what to wear for the day. If it were not for this campaign, I would have to wear a suit just like every other salaryman wears and I wouldn't stand out. I get to wear what is more to my taste and more comfortable and thus more stress free.

• Although I'm OK with Cool Biz from an environmental point of view, I am dubious about Cool Biz in terms of workplace etiquette. I feel a sense of incongruity. For instance, some workers in certain industries, such as the service sector, cannot practice Cool Biz. On the other hand, other industries encourage it. So you get a situation where workers who do not wear ties look inferior to ones who do wear them. There needs to be uniformity.
Questions

- What do you think of this approach?
- Would this work in California? In other regions in the US?
Thermostat Control in California

- Proposal to amend Energy Efficiency Building Code to include requirement that all new buildings (after 2008) must have a Programmable Communicating Thermostat (PCT)
- PCT will adjust temperature setting if it receives signal from utility
California’s Energy Needs

- In power grid, supply must match demand at all times or grid will become unstable.
- Demand for energy is constantly changing.
  - Seasonal
  - Weekly - Higher during weekdays
  - Day/Night
  - Hourly
  - Transient
Dealing with Changing Demand

- Power plants can be run below normal output with ability to instantaneously increase power output.
- Additional power plants can be brought online.
  - Typically plants are combustion gas turbines which can be started in minutes.
- Problems
  - Higher Cost: Equipment must be built and maintained just for occasional use.
  - Lower Efficiency: Plants running at lowered output do not achieve best efficiency.
  - Bad for finances and environment.
Peak Demand

- Wholesale cost of energy varies according to demand (e.g. Ontario 2006)
  - Between August and September 2006, price ranged from $318 to -$3.10 per Mwh (CAD).
- Peak usage is generally for a very small percentage of time (e.g. Ontario 2006).
  - Peak demand exceeded 25,000 megawatts for only 0.4% of the time (32 hours).
  - Maximum demand was 27,000 megawatts.
- 2006 PA/NJ/MD study - 10% reduction in peak demand would result in savings of $8 to $28 billion dollars.
Demand Response and Title 24

- **Title 24 - Energy Efficiency Standards for Residential and Nonresidential Buildings**
- Established in 1978 in response to legislation mandating California reduce energy consumption
- New set of standards issued every 3 years
  - 2008 standards currently under review
- Let’s take a look at the proposed standard for Programmable Communicating Thermostats
What do you think?

- Should this code be adopted?
Public Reaction

• Of course, liberals assume perfect knowledge on the part of the regulators and are certain that no one would ever compromise the security and proper administration of the entire system, which evidently has convinced Californians that state-controlled thermostat temperature regulation is a perfectly splendid idea.

• I understand that any clever economist or philosopher can build models or offer coherent arguments "proving" that giving government power to control the thermostats in private buildings will improve "social welfare." But no one can explain how such power does not diminish human freedom -- and is not a huge leap down the road to serfdom.
The Outcome

- After public outcry, officials said regulation would be revised so that devices were still required, but customers could override outside control.

- One week later, Energy Commission announced that regulation would be removed entirely.
Other Options

• Market price for consumers
• Voluntary, commercial programs with incentives
  • Edison SmartConnect
• Same approach - different appliances.
  • Grid Friendly Alliance project - controllers embedded in dryers and hot water heaters.
• Energy Storage
• Local Energy Production