

ENGR 498 Day 1

- How do we put a dent in coal and petroleum use
- 50-70% of energy use is in buildings conservation would be some good low hanging fruit
- 42% of imports is petroleum 18% from Canada 60% of petroleum is imported
- China and USA are neck in neck in terms of CO2 output
- Most renewables are hydro

Ash VP from McKinstry

- Engineer at heart

Work going on at McKinstry

Background

- Aerospace engineer to start began as a consultant
- Passions really lay in energy
- Solar thermal panels on his grandparents house that really was fascinating to him in the beginning
- Continued to drive him throughout his education
- Control algorithms on buildings was his primary focus and ultimately his degree
- Progressed then to renewable energy
- Trying to make energy efficiency important in a place with the lowest energy rates was tricky and to make solar work also
- Ultimately went a different direction in the beginning
- Very passionate about what renewables can do for us
- Make sure that no matter what you do you have an immense passion for it
- This area is ripe with opportunity and there is a real need for passionate people

McKinstry

- 50 year old company Anniversary on 4.1.09
- Began as a plumber
- George Allen was one of the founders of the company
- Did not want to get into a battle with his clients
- Important to take responsibility for the people employed, the client and the work done
- '70's and '80's brought engineers in house immediately as the market saw it, it was the end of McKinstry
- Must know how to engineer solutions not just build them
- Allowed them not just to be good builders but to be good innovate new solutions
- Decided that they should be around for the life of the building
- Keeping them efficient post construction work
- What do the service teams believe are more service able
- No layoffs in this last recession, very diversified
 - Protect and take care of our people
 - Protect our client and take full responsibility

- Integrate from design to delivery and post

Energy efficiency at McKinstry

- Bring energy services idea into a company
- 2000- Went to McKinstry and became the first 2 employees of the new energy services dept. within McKinstry
- Seemed to be a natural fit but had some differences that needed to be debugged
- 2001/2002- Just started energy services and construction dropped and brought to light that clients were looking for retrofits not new construction
 - In the worst economic times there are often significant opportunities
 - Reduce operational costs and making systems more efficient

Do commercial work (non-residential)

- 80 billion of existing square footage
- consume a lot of energy about 65% and put 40% of CO2

There is a lot to do out there

- Must conserve resources first
- Operate more efficiently second
- To start must move energy around more efficiently either in a building or in a grid
 - Use a data center and spin the heat off for different building uses

Third bring on clean resources

McKinstry math tells them to reduce first energy efficiency is the first thing we must focus on

1. Wring out the towel
2. Move energy around
3. Bring on clean power

McKinstry is not a political company and they do not endorse candidates

- Gave Obama a tour of there facilities

Financial engineering of these products

- Did not forecast having to lay anyone off and have been hiring about 2 people/week
- This company cares about its employees, community, labor and environment
- What's good for business and good for the environment are perfectly inline
- Innovation to use less and make more money makes good business sense

If we, the US don't capitalize other countries such as China will.

Questions

- 2001 earthquake was not a driving force in terms of upgrades
- How are clients paying up front in a recession for a savings they wont see for years.
 - 49% technical engineering 51% financial engineering
 - take the risks of costs and guarantee a costs savings

- provide a loan (tax free for municipalities)
- grants and tax credits may cover 30% of costs and fees are paid out of the project.

By hiring really talented people and having 6-9 months of development a lot of the risk is worked out.

17 offices in 10 states every market is highly competitive
 #1 energy services company in CO after 3 years with no brand recognition

Energy Trends

1 of 16 companies doing federal work

- considered technically superior

Cap and trade carbon market

- Businesses opposed a regional system
- We are going to get a carbon market
- EPA is now regulating GHG
 - EPA felt that needed to act regulating GHG and that the free market needed

GHG carbon costs are going to increase the cost of energy

When gas hits \$4 will you buy more a more efficient vehicle

We will not act unless we need to and prices are going to go up in the future

When energy costs rise efficiency is noticed

It is just a price indicator

Places with cheap power are bringing inefficiency to there area

Expensive gas is good lets just hope that we get 200mi/gal vehicles

All retro fits are over get out!!

But new energy efficient technologies are emerging and we can always be upgrading our systems

Mechanical electrical - better motors, etc

Incandescent bulbs that are more efficient are coming out, more efficient dimming ballast systems can look at it on your PC and as cost effective

Moving energy through buildings

Controls are getting better wireless how much CO2 is in the room how much air must be brought in

If a window is open heating shuts down very sophisticated control systems

LED lamps are coming along quite well parking lights traffic lights etc

5 years for classrooms to have leds maybe

Life expectancy is running nearly 3x as long

Total cost of ownership perspective

Balance human environment and costs

30 megawatt biomass systems use material from waste streams

corn husks to create energy and then return the nutrients

Wind with pumping stations to create a type of energy storage system

Solar PV not efficient but thin film solar is moving nicely but still inefficient
Must be heavily subsidized

Solar thermal is getting some new tech
Concentrated solar is the next trend

Micro grid: setups are messed up by people messing with them and not resetting them
Alarm when not running poorly but when messed with

No system set to identify when and where energy is needed
Smart grid at the macro level and micro grid on the building level

Storage ideas:

How to integrate plug in electric vehicles
Charge at night and bring it to work and sell the energy to the building

Nissan Leaf launched last week
E-tech powering stations going up in WA and OR

Going to need an entirely different financing structure

Green Securities

Trillions of dollars of opportunity here
No real new construction mostly retrofitting
Green securities backed by energy efficiency

If the project can be financially sound pocket books open
Conservation as power generation
Financial instruments are going to treat conservation as generation
Durable savings will allow long term financing
Want home efficiency to be put in to home values and loan possibilities have the energy bill be disclosed before the sale of a house

Energy efficiency will be a trillion dollar industry

Innovation center will be starting in the spring. Looking to remove 50% of the waste from the built environment

Green does not cost more either in new construction or retrofitting
Inefficiencies are more in how the projects come together
Getting really good at small scale renewable energy systems is going to help more people have power
Get away from lines and move to small localized energy production

Total cost of ownership not just the cost of your innovation