

OCL Study Session
Renewable Energy 101
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Elet Callahan—

Businesses increasingly aware of, and taking action on, becoming more sustainable. Why?

- Harming the environment has an economic impact
- Business opportunities
- Increasing awareness of the importance of the triple bottom line: social justice/environmental quality/economic benefit

Renewable energy serves as a critical link between economic and environmental interests.

Neal Abrams—Photovoltaics

U.S. consumes 25 percent of world's energy. Photovoltaics, which convert solar radiation into electricity, is part of the solution to U.S. energy needs by reducing use of nonrenewable sources. 100x100 mile area in Southwest would be ample to supply all of U.S. electricity production.

Advantages to using photovoltaics:

- Renewable and vast
- No emissions, combustion, radiation
- Cheap
- No moving parts
- High reliability
- Modular—can use on roofs, ie.

Disadvantages:

- Diffuse source (sunlight)
- High installation costs
- Poor reliability of system components
- Lack of efficient energy storage—how to store what we need when sun isn't shining

Different types of panels, and they vary in efficiency. Less efficient panels are less costly. Currently silicon PV technology requires about four years to generate the

same amount of energy required to produce and maintain the system. Other types of PVs take 2 years.

Heavy initial cash outlay to install PVs, but big benefit in long term. After first couple of years, start generating electricity to offset energy needs. Over 30 years, generating power longer than paying for it.

As demand for modules grows, costs of panels have gone down. Greater demand, lower the cost. As more efficient cells are created, costs go down.

Some things that can help with cost:

- Federal tax credits: Commercial tax deductions as well as residential tax rebates (with no cap) for 30% of the cost.
- State: 40-45% deduction of installation costs; low-interest financing; commercial incentives

Before installing, need to factor in:

- building infrastructure
- neighborhood restrictions
- availability of installers
- cost benefit (cost-benefit calculators available online)

Mike Kelleher—Generating Heat through Solar Thermal and Wind

Because of lack of sun in Upstate New York during coldest months, the most practical application of solar thermal here is for heating water.

Easier to turn sun's energy into heat than into electricity. Photovoltaic takes four times the area to collect the same amount of energy as solar thermal systems. BUT PV=electricity; ST=hot water.

Wind turbines come in all sizes, from commercial wind-far size to residential/small business size. Commercial turbines use more efficient technology, but siting is an issue because they can mar scenic views.

Considerations:

- Turbines need to harvest undisturbed air—which is why commercial turbines are so tall.
- Need at least 12 mph winds to be economically efficient.
- Vertical axis turbines are gaining popularity but need more research. Not as efficient as horizontal at this point.

Tim Volk—Biomass heating

Biomass—wood, corn, other plant products and animal waste—can be efficient and effective replacement for heating oil. We could divert money spent on oil now and funnel into incentive programs for biomass and other alternatives.

Benefits:

- Renewable and sustainable
- Huge quantities
- Local resources
- Stable prices
- Price increases are more gradual
- Money stays in local economy

Challenges:

- Infrastructure not in place yet
- Higher capital and maintenance and operating costs
- Requires more attention during operation
- May have to build and maintain local fuel supply network
- Create emissions—although cleaner than coal

Some considerations with biomass: moisture content affects heat output. As moisture increases, heat decreases. Need to know moisture content in order to calculate NET amount of heat available. Another consideration, biomass requires transportation.

Every alternative energy system presents tradeoffs. Economic-environmental issues vary.

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