

Alternative sources of energy: Barriers to market entry

Marcela wanted to start the discussion with Susan and what she believes the challenges are with clean coal and carbon emissions.

Susan – Carbon capture and carbon sequestration will help reduce the carbon footprint and also allows us to use coal with no increase in power prices. The problem with the carbon capture and sequestration is two-fold. The technology doesn't allow it to be economically viable. It's running at a deficit. It costs about \$75-100/ton but international trading is at \$20/ton. Secondly, carbon capture is not allowed under the Kyoto Protocol. In the US we're concerned at the cost and how is it going to be paid. Currently the barrier is trying to develop a technology that will decrease the price. A big barrier is "Not in my back yard."

Marcela asked Janet what technology developments are going on in solar and the challenges for commercial delivery.

Janet – Crystalline technology – growing silicon crystals and making cells out of them. It's very reliable and been around since the 50s and used in satellite technology. Thin film technology has a lot of opportunity since it can be produced at a lower cost. It's still a new player and they don't know the reliability issues and long will it last and will it produce the way manufacturers say it will. A lot of research and lab work is still going on with this. They're starting to develop the solar technology to be more integrated, i.e. becoming part of the building. Solar is important to utilities since it takes care of peak demand loads. The barriers are too many utility companies with different standards and incentives. Many interconnection issues, not enough transmission lines, net metering, permitting, training of personnel, etc.

Marcela – What is happening with the waste energy environment and the issues they are dealing with?

Barry – garbage is a renewable energy source. Each one of us produces 4 ½ lbs of garbage every day. Garbage is now being looked at as a valuable resource and how to convert it into energy. Landfill gas to energy – take methane from the landfill and use as an energy source or sell it to utilities. It used to be just burned off. There is a new resurgence in incinerating waste to create steam which creates electricity. Today, they are taking landfill gas and converting it into liquefied natural gas (LNG). They are taking the landfill gas, liquefying it and transporting it to users in California. At full production it will produce 13,000 gals per day, enough to power 300 of their garbage trucks. Also converting the landfill and converting it to CNG. In Seattle they created a filling station that powers garbage trucks and cabs. They've partnered with Valero and Terrabon converting organic waste to create a high octane gasoline. The barriers of entry are in three buckets. 1) cost 2) regulation 3) people. There are many infrastructure issues. Regulatory has a very long lead time. Again, with people they have the mentality of "Not in my backyard."

Marcela asked Carey to tell us about the current technology with regards to patents.

Carey – Patents give the company the right to protect their technology and the right to exclude others to practice their technology and also the right to sue, or place an injunction and shut them down. Patents are important in the alternative energy section since it shows 1) what's going on 2) who's doing what and 3) where.

The "what" perspective is how patents give a sense of where the research is going. The patents show specific trends. In the US, biomass is the trend. There are three global players 1) large companies who

are well funded and multi-national 2) entrepreneurial – startups and spin-offs and 3) govt and academic research. The most patent filing is occurring with #2 companies in most countries. She's seeing a lot of biomass and CO2 sequestration patent filings.

Marcela asks Jamey about nuclear energy and why the US is so reserved with respect to implementing this technology and the challenge to overcome the public perception.

Jamey – There is a lot of new technology coming around. 17 companies have proposed new nuclear technology, deployed globally, but not in the US. A major barrier that nuclear energy faces is the financing for projects. Why? Nuclear plants are very efficient and cheap to operate. However, the costs come from the development – starting and building the project. These plants are large therefore, the cost is astronomically. Some plants are adding on. Public opinion has strengthened over this energy source since it helps the US get away from fossil fuels and nuclear plants also employ many people.