

NOVO POWER

enlightened generation

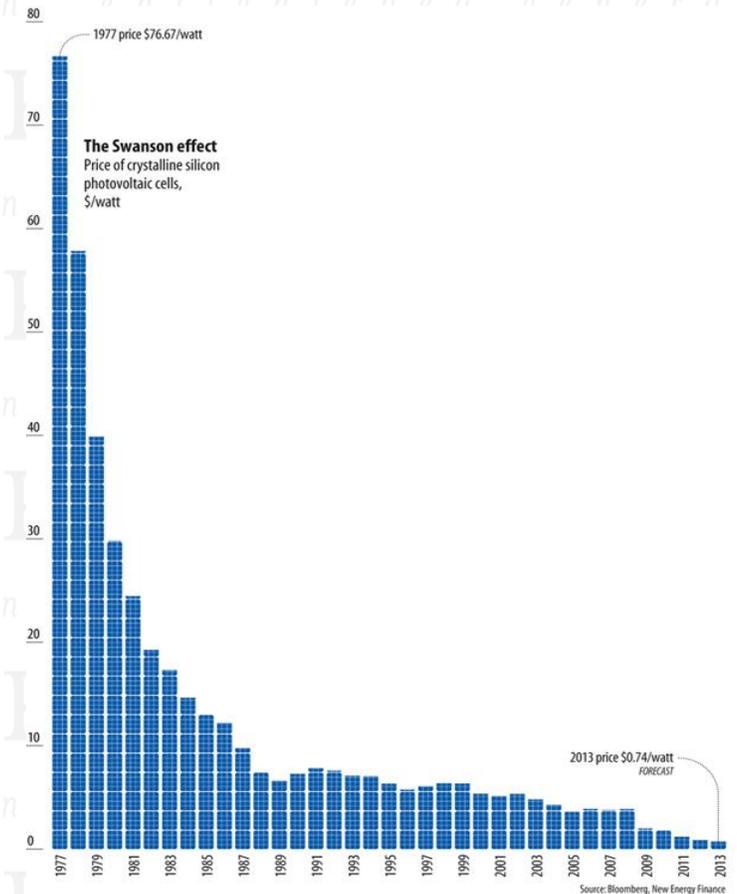


Presentation to the Winter Watershed Conference
January 30, 2015

Dynamic Changes in Renewable Power

- Solar Pricing
 - Price per watt has dropped to less than 2% of pricing per watt in 1977.
 - Utility scale solar projects are signing PPAs for ~\$50/MW, down by 50% in less than 5 years.
- Rooftop Solar
 - Proliferation of rooftop solar could potentially meet the required increases in renewable energy portfolio standards.

*This trend is dependent on the sun-setting of tax credits in 2016 and changes to laws on Net Metering.



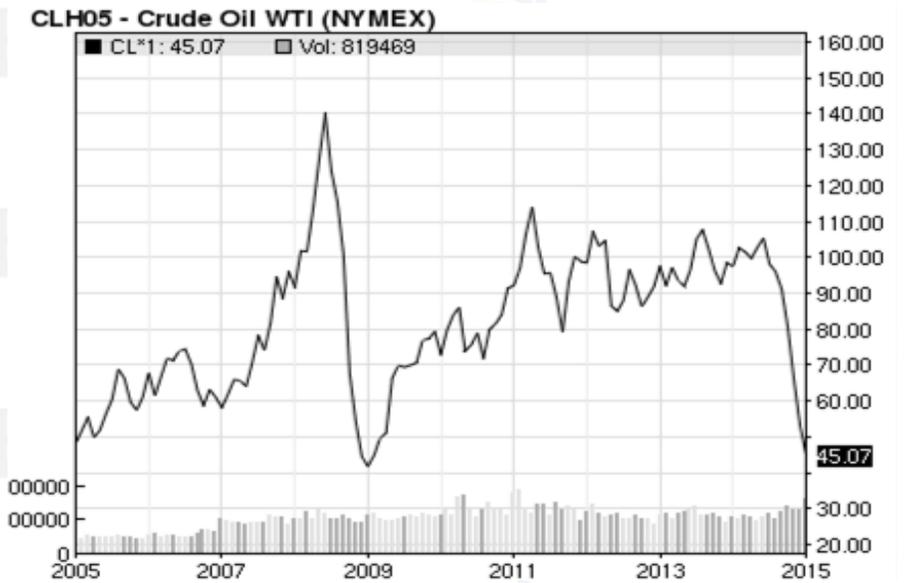
Dynamic Changes in Renewable Power cont...

- **Attack on Coal**

- EPA Rulings 111B and 111D would create an expedited shut down of the coal fleet in AZ. If required to do so, the cost of stranded capital along with the capital investment in NG plants could set renewables back several decades.
- The cost of changing to NG and the subsequent decrease in emissions profile will allow the Utilities to not want or need more expensive renewable power to meet emission requirements.

- **Oil Pricing**

- Decreased pricing for oil and subsequently NG will make the Utilities more anxious to move to NG long term.



Benefits for the Utility Companies

Why is the Biomass Plant Valuable to SRP and APS?

- Green Credits
- Base Load power vs Intermittent power
- Local power production
- Large consumer of Parasitic power
- Emissions benefit
 - CO₂ - Unlike a Coal Plant, Biomass plants are considered a carbon neutral facility. This a major advantage to Coal Plants as coal is sequestered CO₂ that is excavated and released anew into the atmosphere.
 - SO₂ - A Biomass plant generally emits less than 10% of SO₂ per megawatt than a Coal Plant.
 - NO_x - A biomass plant emits less than 50% NO_x per megawatt than a coal plant
 - CO - This emission is the result of incomplete combustion of the fuel. This is the one emission that is worse from a Biomass plant due to the variability in fuel type and the combustion process.

Novo Power must adapt to stay competitive!

- Novo Power is adapting through increased performance and driving shifts in the current cost model
- Reinvestment of all profits back into the plant has led to 10% gain in efficiencies!
- Economic Cost Model Shift
 - Vaagen Sawmill
 - Use of permitted landfills
 - Long Term Comittments



Impact to Watershed

Novo Power consumes 200,000+ Bone Dry Ton each year.

~50% Pine, 30% Pinion/Juniper, 20% Valley Waste

Water consumption by species:

- **Ponderosa Pine: 200-300 gallons per day for a mature tree**
 - Certain stands have gone from 20 trees per acre to over 2000 trees per acre in the last 100 years.
- **Pinion/Juniper: 100-150 gallons per day for a mature tree**
 - Nonexistent in many of our grasslands 100 years ago, we now have densities of 20-50 trees per acre

Senator McCain at SRP Watershed Conference in 2014:

"NAU and The Nature Conservancy recently produced some fascinating research which found thinning our forests over a 10-year period could produce up to 20% more water, on average, than if the forest wasn't thinned. Experts say that thinning just 30,000 acres in the Salt and Verde River Watersheds over the next 3-years would yield an [total expected] increase of 20,000 acre feet of water, thinning a full 250,000 acres by 2024 would result in an [total expected] increase of 100,000 acre feet of water."

Reducing Fire Risk

On October 29, 2014 Forest Supervisor James Zornes sent a letter stating the following:

Novo is the largest market for wood fiber and more importantly utilizes every facet of the tree from the stump to the tip. While other markets are selective in the size, length, species, occurrence of knots and defect naturally occurring in the timber, Novo consumes the residual fiber other markets cannot utilize. The capacity to use all manners of wood fiber for feed stock makes for a finished treatment following a mechanical treatment, finished in that the residual fiber, known as slash piles and pre-commercial timber, do not remain on site. The Forest savings of not contracting fire crews and equipment to further treat the biomass following restoration treatments is \$900,000 annually. This savings is a major factor in the Forest affording to accomplish more restoration acres than the other forests across the region. And since the Forest treats more acres, in turn new forest products markets are generated and existing markets can expand or enhance their product lines.

Reducing Fire Risk cont...

Cost of fighting a wildfire:

Major forest fires in the last 12 years in A-S:

- \$43.1 Million for Rodeo Chedeski (~450k acres) – 2002
- \$109 Million for Wallow (~500k acres) – 2011
- \$6.5 Million for San Juan (~7k acres) - 2014

*Cost estimates on Wikipedia

Reducing Fire Risk cont...

Reservoir Protection

- The 1996 Buffalo Creek fire and 2002 Hayman fires burned areas in the watershed surrounding the Strontia Springs Reservoir, with subsequent storms washing timber, ash and sediment into the 7,900 AF reservoir.
- The two fires combined burned 150,000 acres around the reservoir, resulting in 1 million cubic yards of sediment entering the reservoir.
- As a result of these fires Denver water spent \$45 million on erosion mitigation and \$17 million on dredging.

Executive Summary

The Schultz Fire of 2010 burned just over 15,000 forested acres and caused the evacuation of hundreds of homes. Heavy floods followed the fire, resulting in extensive damage to property downstream from the charred hillsides. Nearly three years later, seasonal flooding is still a concern and residents continue to live under the threat of swift floodwaters that may carve unanticipated pathways through their sloping neighborhoods.

Official reports from city, county, state, and federal governments have listed response and mitigation costs of the fire and flood at nearly \$60 million. This study adds to those costs, exploring the impacts on private property owners, as well as societal costs that are often overlooked when quantifying the full impact of disasters.

Through analysis of Coconino County Assessor's records, a survey of residents in the fire/flood impact area, and the perceived value of both endangered species habitat and human life, this study conservatively estimates the total impact of the Schultz Fire at between \$133 million and \$147 million. The major costs and drivers explored are the following:

- Loss in personal wealth due to reduced property values: \$59,353,523
- Official expenditures of government agencies and utilities: \$59,104,394
- Destruction of habitat: \$400,000–\$14,200,000
- Loss of life: \$6,000,000
- Structural damage: \$3,097,978
- Cleanup: \$1,825,127
- Unpaid labor: \$1,516,103
- Armoring against flooding: \$823,100
- Fire evacuation costs: \$223,572
- Flood Insurance Premiums: \$198,034

The total impact is considered conservative because it excludes measures such as volunteer work by nonprofits; destruction of recreation areas, timber, and archaeological sites; physical and mental health costs; the degraded viewshed (beyond effects on property values); and the long-term impacts to the region's amenity-based economy.

In addition to the cost accounting, this study examines some non-financial impacts as reported by the survey responses. The mental, physical, and financial tolls taken on residents of the flood area are immeasurable.

This study was performed by the Alliance Bank Business Outreach Center at Northern Arizona University's W.A. Franke College of Business upon the request of the Ecological Restoration Institute. Invaluable support was provided by many in northern Arizona, including Coconino County staff and the many area residents who offered their personal stories.

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Economic Impact to the White Mountain Economy

The Biomass Plant has disproportionality larger impact on the local economy than other generation facilities. This is caused by the fact that we source all fuel and services within 150 miles of our locations (80% within 75 miles).

- Salaries + Benefits - >**\$3M** annually
- Fuel Suppliers - >**\$7M** annually
- R&M Suppliers - >**\$3.5M**
- Other Forest Industry – We provide a subsidized backhaul for industries sending material to the valley >**\$1M**
- The Bureau of Economic Statistics provides a revenue multiplier to quantify impact of a business on local economy. Using said multiplier there >**\$26M** of impact.

Economic Impact cont...

- Subsidized Thinning for Ranchers

- Many ranchers cannot afford or justify the cost to improve their grazing lands.
- Novo Power cleared over 4000 acres in 2014 at no cost to the ranchers. At a cost of \$500/acre to thin, that is **>\$2M** benefit to our local ranchers.

- Valley Waste Green Waste Sites

- By removing green waste from the valley, the life of current landfills are being extended.
- Novo Power removed over 58,000 tons of valley waste in 2014. These loads returned that capacity to the landfill operators allowing for **>\$2M** in additional tipping fees for the returned capacities.

Conclusion

- Novo Power is THE key to augmenting watershed in the White Mountains through appropriate thinning activities.
- Novo Power is working diligently to assure our economics allow for long term generation.
- The economic impact of Novo Power in the White Mountains is extensive and much greater in proportion to other power generating facilities.