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# Energy From Agriculture:

## New Technologies, Innovative Programs & Success Stories

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*December 14-15, 2005*



*St. Louis, Missouri*

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**Farm Foundation**


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**USDA's Office of Energy  
Policy and New Uses**

 **NRCS**





**NZ Legacy, LLC –  
a land and energy company**

Snowflake White Mountain Power, LLC  
Renegy, LLC


**December 15<sup>th</sup>, 2005**

**Bob Worsley, Owner-Developer**





# US Biomass Market

- Grid-distributed electricity:
    - > 100 facilities, > 2,250 MW operating
    - > 50 facilities, > 600 MW idle
  - Almost half of the industry is in two states,  
California and Maine
  - Self generation (esp. pulp & paper):
    - ~ 175 facilities, ~ 2,500 MW (??)
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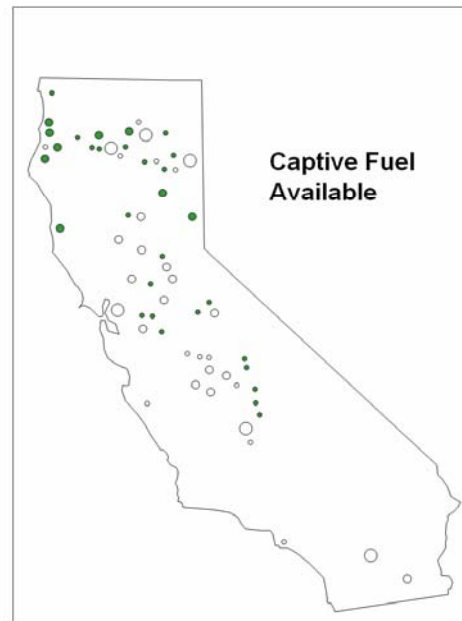
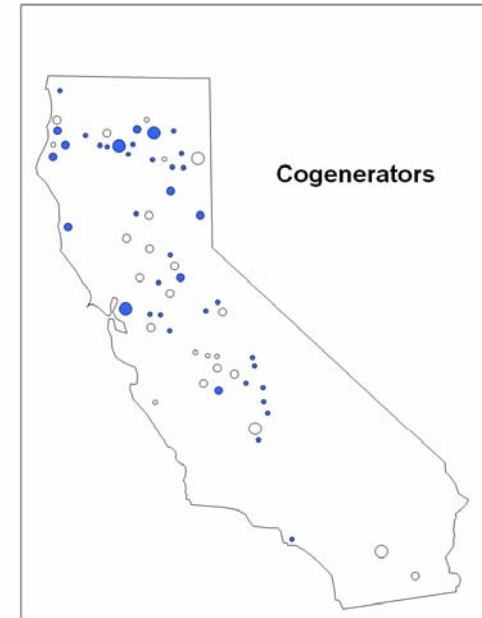
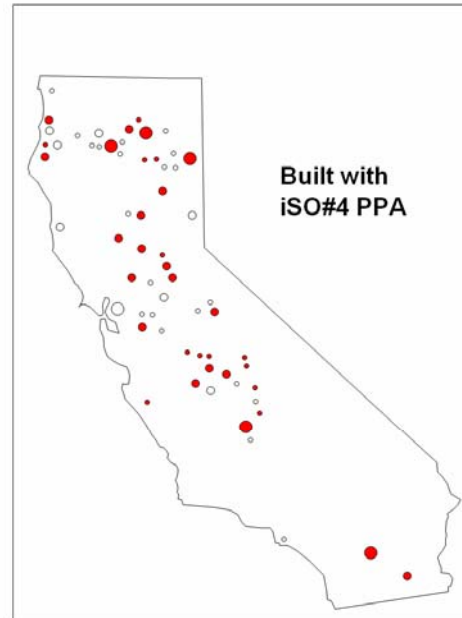
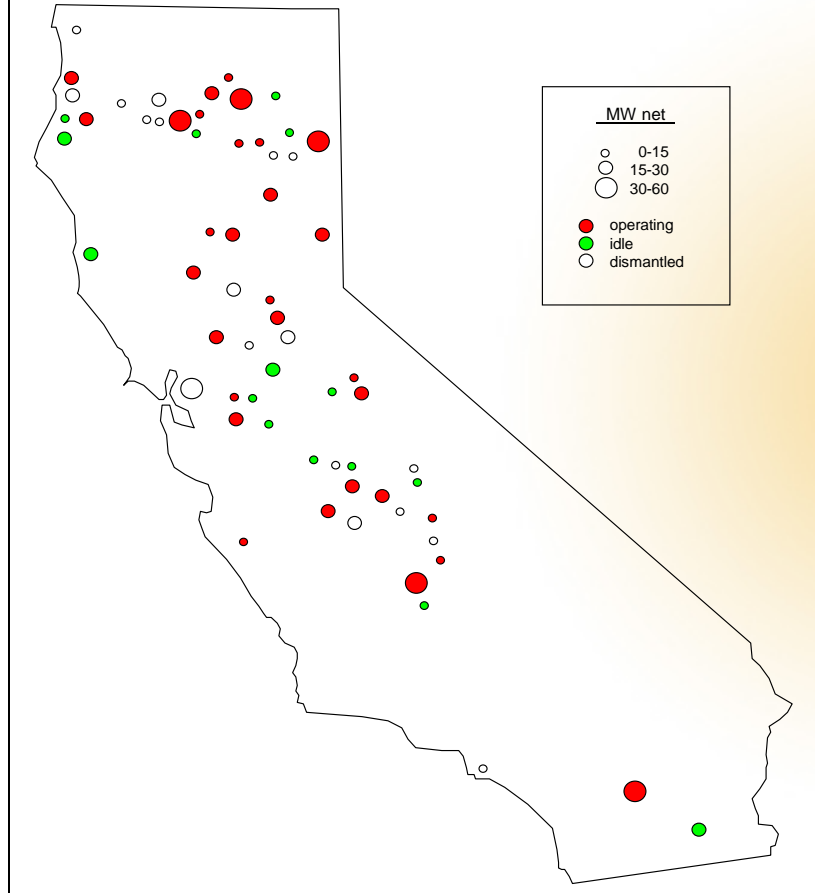


# Renewables Economics

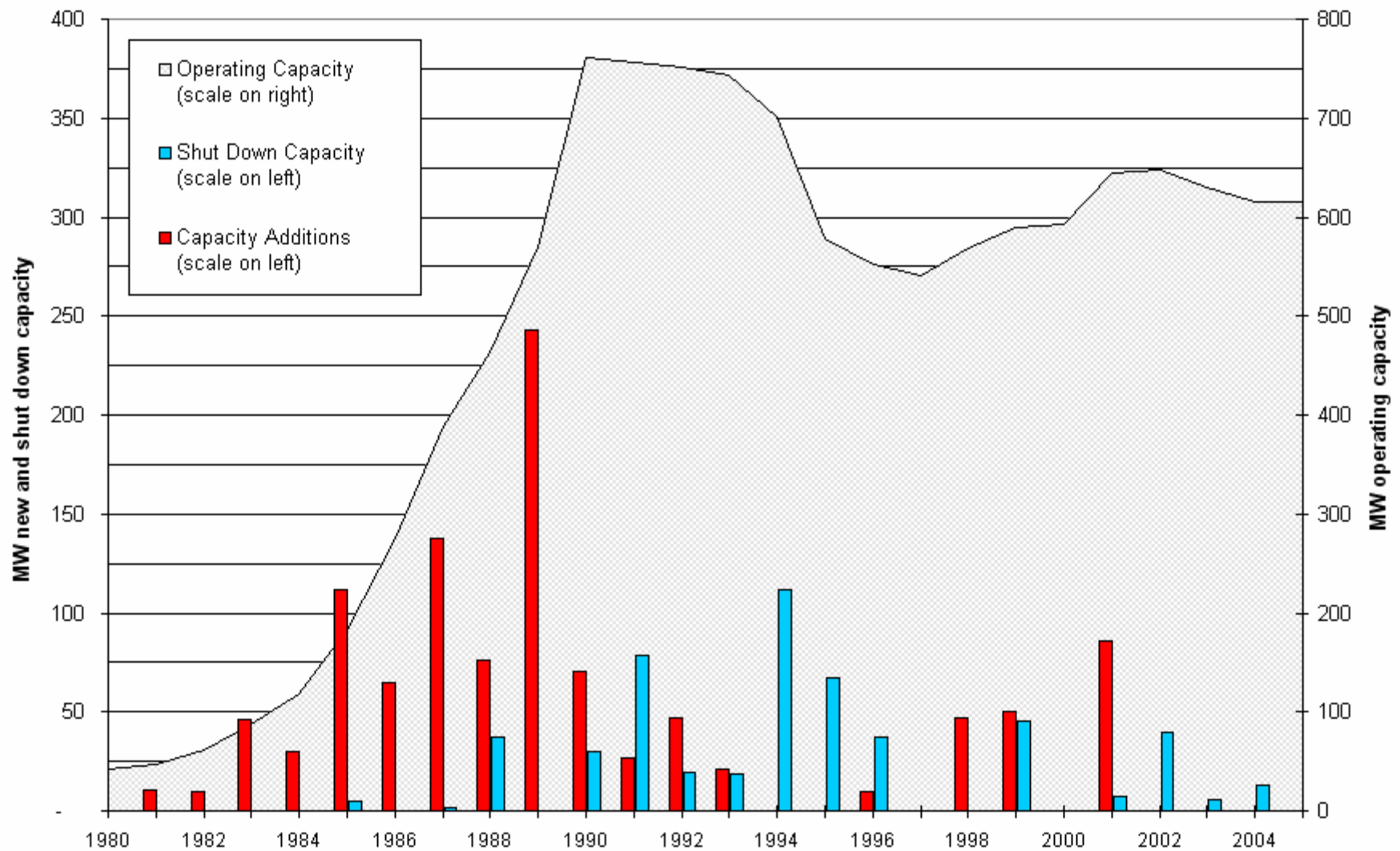
Biomass	7.4 ¢/kWh
Biogas	7.4 ¢/kWh
Geothermal	5.6 ¢/kWh
Hydro	5.8 ¢/kWh
Solar	12.8¢/kWh
Wind	5.9 ¢/kWh



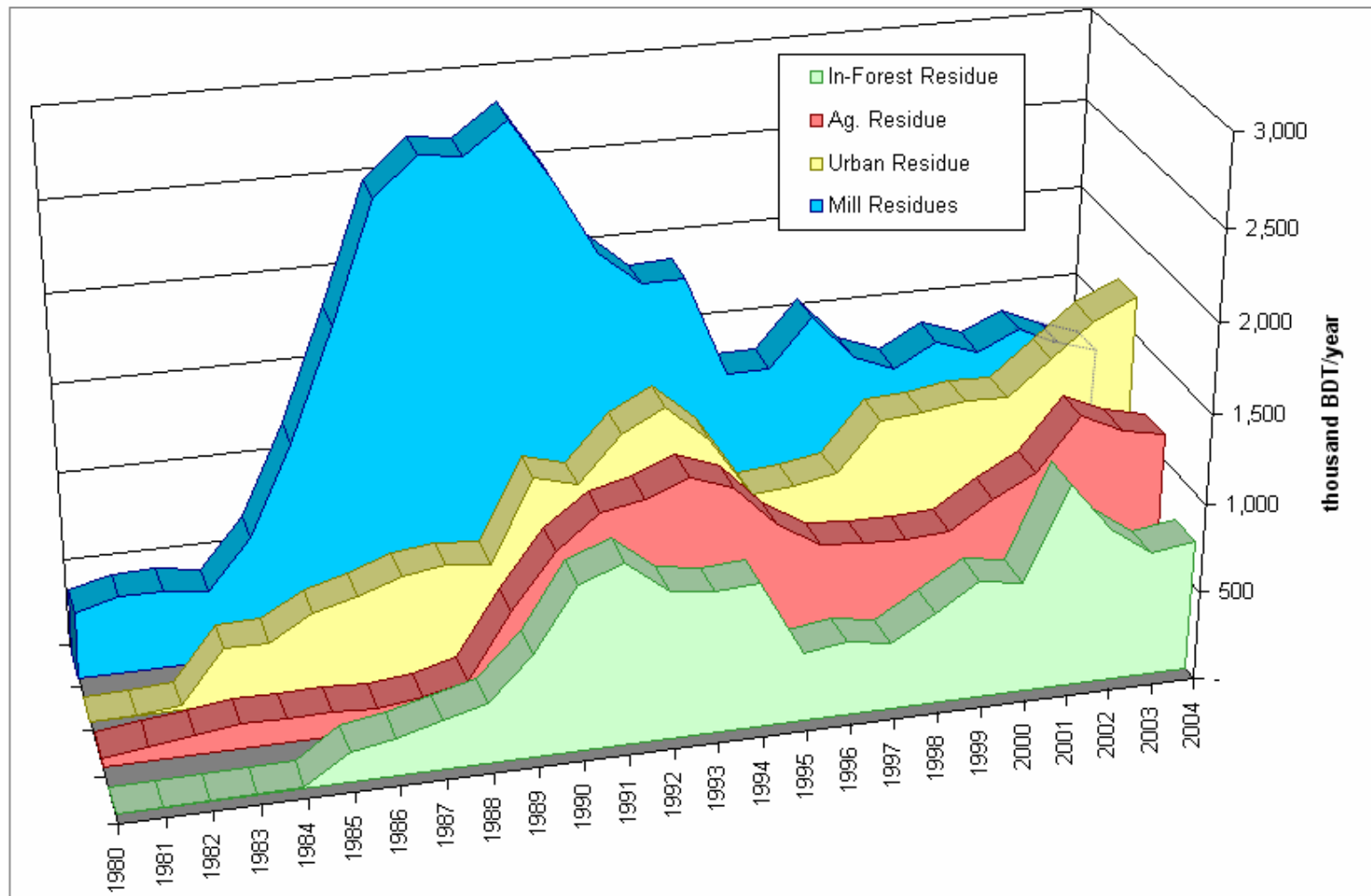
### California Biomass Power plants 2004



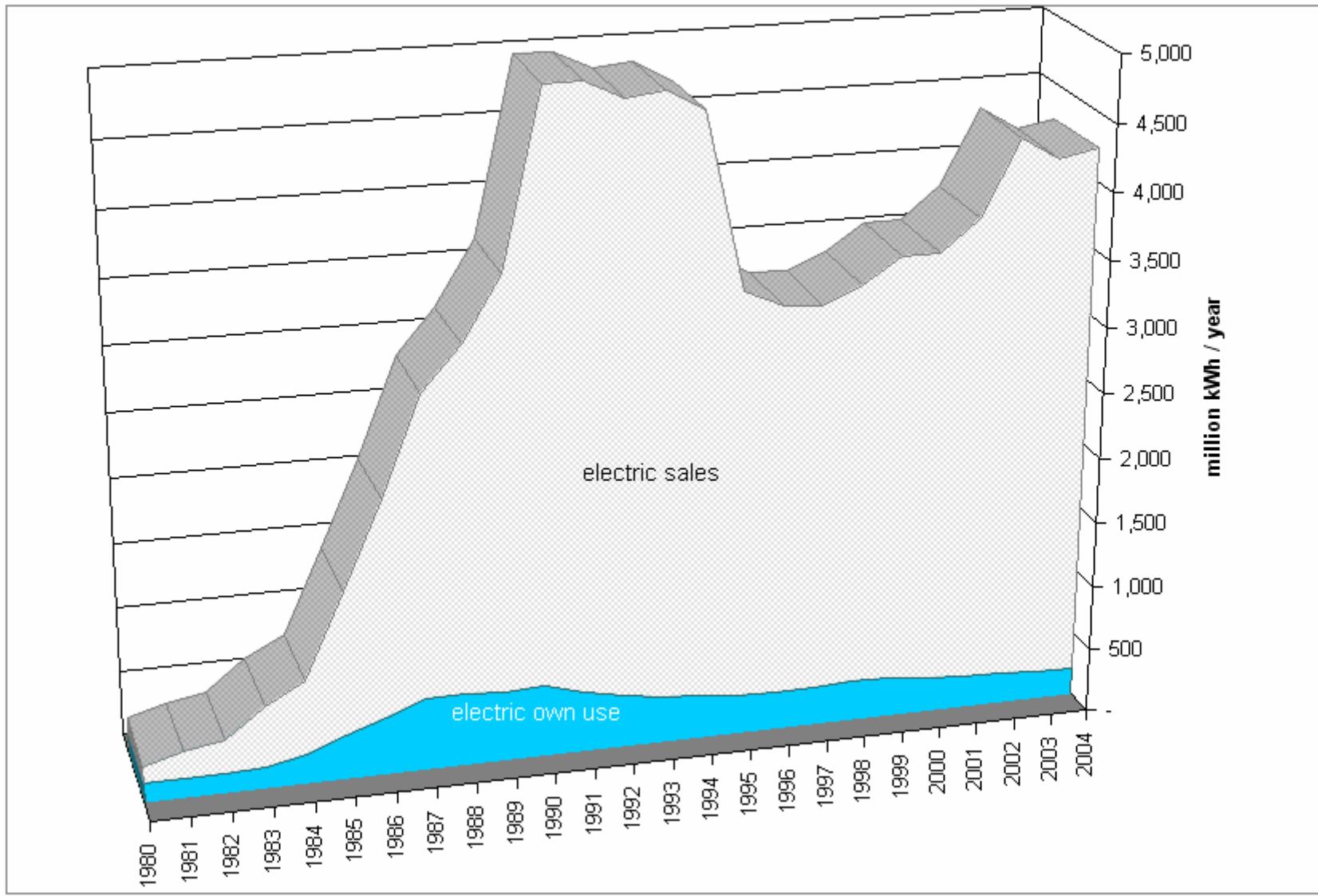
## California Biomass Power Capacity



California Biomass Fuels Market by Category



### California Biomass Electricity Production








Snowflake, Arizona  
20 MW Biomass Plant  
**WHY NOW?**







# The Project

- 20MW Biomass Plant using forest wastes and paper sludge from largest newsprint paper manufacturer in Southwest USA
  - Technology is a bubbling fluidized bed with staged gasification of biomass fuels... no fossil fuels to assist combustion.
  - Major cleanup of overgrown USFS forests, largest forest fire in Southwest from 2002, and waste paper landfill
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# The Project

- New 20MW Biomass Plant at Abitibi will:
    - Help Abitibi be more profitable
    - Help Biomass plant be profitable
    - Allow SRP and APS (Utilities) to get better rates while reaching Renewable Portfolio Standards
    - Clean up the National Forests
    - Create a new market for “dirty” chips and grindings
    - Stop the burning in our national forests and waste sites
    - Create jobs... over 75 new employees already
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# Our Biomass Fuel— BTU's per lb. Bone Dry

- 9,681 Pinion Pine
  - 9,292 Abitibi 10 year old chip pile
  - 9,232 Buckskin Fire Salvage chips from PP 5000 chipper
  - 9,064 Juniper from Renegy yard
  - 8,753 Pine chips/sawdust from our Sawmill
  - 8,700 Typical fresh Ponderosa Pine sample
  - 8,723 10 year old Pine Chips CBQ sample
  - 7,676 Green Waste from Phoenix
  - 7,605 Pecan tree chips from Phoenix
  - 7,062 Mulch (20% loss of BTU's...black dirt looking mulch...20 year old chips)
  - 5,200 Paper Sludge from Abitibi
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# Harvesting Fuel Old vs. New



Old Way



Skidders

Chipper



Chip Trucker



Log Trucker



New Way



Skidder and Forwarder



Grinder



Log Trucker



Chip Trucker





# Capital Costs/Financing

- Original Budget: \$22 Million
- Current Budget: \$30 Million
- Risk factor today: +/-15%
  
- Comerica Loan with 70% USDA guarantee
  - \$16 Million, ten year amortization






# The Perfect Storm

- Global concerns Kyoto Agreement, Clean Air Act, etc. to clean up the environment from Oil, Coal and Nuclear issues and a desire to increase Green Energy worldwide
- Widespread new EPS/RPS State Requirements for Green Energy
  - Current AZ EPS is 1.1% but within one year expected to increase to 15%
  - Biomass is only base load technology (wind, solar projects are intermittent and need natural gas to firm their power to the utilities)
  - AZ largest utilities...SRP and APS have both signed PPA's with us





# The Perfect Storm

- 2005 US Energy Bill
    - Extends Section 45 PTC until Dec. 2007 well after our plant will be running. Has the effect of a 12% revenue subsidy.
    - \$20 per green ton subsidy for USFS biomass from thinning for maximum of \$500,000 per applicant about a 25% reduction of fuel costs for the plant...expires in 2016.
    - Up to 7.5% of all future Federal Energy purchases will need to come from renewables.
  - Oil and Energy Prices Rising Precipitiously
    - Oil prices sharp rise in 2005 and the resulting natural gas increases are driving Utilities to look for sources of electrons other than Natural Gas, Coal or Nuclear fired power plants. Baseload solutions from renewable energy is a perfect fit.
    - Fear that we have hit the peak of world oil production and prices will rise until alternatives are found
    - 2000 California Energy Crisis, 2002 NE USA grid crisis, 2001 Enron fiasco and adverse impacts of the 2005 Hurricanes have all caused fears of traditional energy instability
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# The Perfect Storm

- 2004 Healthy Forest Bill
  - Made litigation from environmentalists more difficult and provided some federal money to clean up the forests.
- 2004 Stewardship Contract
  - Arizona was awarded the largest forest stewardship contract in US history awarded to Future Forests, LLC in Pinetop, AZ... about \$5 Million of Federal \$\$\$ being sent to fund this contract annually... focus on WUI (Wildland Urban Interfaces) where wild fires can destroy private property
  - We are currently working closely with Future Forests on over 100,000 tons of biomass already funded and in process of removal





# The Perfect Storm

- 2002 Rodeo Chediski Fire... largest wildfire in Southwest US history... burned over 475,000 acres
    - Contracted with USFS to remove over 15,000 acres of burned trees to clean up from the fire. There are over 50,000 more acres that are NEPA and EIS approved areas to clean up. Federal subsidies are being sought to clean up this area, but in the meantime we are removing the saw timber, milling it and selling enough lumber to pay for most of the removal of biomass.
  - Draught and Beetle Infestation in Arizona
    - Arizona is in the 5<sup>th</sup> year of a serious draught that lead to a beetle infestation that has killed over 1MM acres of ponderosa and pinon pine
    - As a result, there are dangerously high fuel loads in the forests that will likely cause another wild fire like the 2002 Rodeo Chediski Fire. Cleaning up the dead and dying biomass is particularly wise due to the low moisture content of the fuel.
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# The Perfect Storm


- Biomass energy production has been perfected in past 20 years with over 200 operating, successful and reliable plants in the USA and many more worldwide.
  - Certain biomass facilities have been idled with paper mills, lack of fuel or PPA's and their fixed assets are available for less than 50% of the cost of new plants... further enhancing the opportunity for success for a project with PPA and fuel resources.





# The Perfect Storm

- 1998 Abitibi Paper Mill conversion from Chips to 100% Recycled Paper
    - Resulted in 250 dry tons per day of paper sludge waste going into a landfill... Abitibi is looking for a solution since this is an environmental problem long-term.
    - Newsprint industry is suffering from Internet replacing newspapers... 30% reduction in reading newspapers worldwide. Cutting costs and incentive payments for running this biomass plant with existing Abitibi power plant workers is a \$1.5 Million savings to them... saving over 150 jobs that someday might be at risk as the newsprint industry reels in red ink.
  - Transmission Problems Solved
    - The grid in the target area is unstable and overtaxed due to lack of infrastructure upgrades since the 1970's which has been exposed by significant population growth in this rural area. FERC and APS both admit that this plant in this location solves a huge problem and will bridge improvements that are not planned for another 3-5 years that will finally stabilize this rural area's transmission system.
    - As a result a new 350 employee Tissue Plant is planning to locate their \$400 Million manufacturing and converting facility next door due to their confidence in grid stability and power availability.
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# Progress--Highlights

- Comerica and USDA Financing in place.
- Contractors bidding for work as we speak.





# Progress—Fuel Highlights

- Renegy is in full operations at the sawmill and in the woods with approximately 75 current employees. Daily removal of over 35 loads of fuel... twice the rate required to generate 20 MW.
  - USFS Rodeo Chediski fire salvage contracts ... approximately 18,000 acres in progress of being harvested.
  - Renegy has contracted with Future Forest, LLC to take USFS stewardship biomass WUI thinning activities that have already commenced... over 70,000 green tons of forest thinnings expected per year... 10+ loads per day have commenced.
  - Removing sawmill and log yard waste from local sawmills
  - Removing forest residue from slash disposal areas
  - Purchased a second small sawmill to process salvageable lumber
  - Now logging and decking over 3 MM bf per month of just saw logs... Biomass will be removed at rate of 3 times the saw log volume.
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# Progress—Fuel Highlights


- Renegy has acquired over \$4 Million of forest processing, heavy equipment from all over North America to chip and process biomass...equipment is deployed in the woods. Current list of equipment includes:

- 8 feller-bunchers
- 12 Caterpillar skidders
- 3 Caterpillar dozers
- 1 forwarder
- 4 whole tree chippers
- 3 whole tree grinders
- 11 logging trucks and trailers
- 13 Semi trucks and trailers
- 6 log loaders
- 1 rock truck 50 Ton
- 12 pickups for woods crews
- 1 mulching/chip Trommel Screen plant
- 3 large capacity forklifts
- 8 large front-end wheel loaders
- 3 lowboys (50 ton, 35 ton, 25 ton)
- 5 walking floor chip trailers
- 10 van trailers
- 2 drop deck trailers
- 7 roll-off trailers
- 2 bulldog trailers
- 1 Caterpillar backhoe
- 2 road graders
- 2 lube and fuel trucks
- 5 service trucks
- 1 water truck
- 1 delimeter
- 3 Bobcat skid steers with mower, grapple and shears
- 1 large power chip/mulch conveyor to load trucks
- 2 sawmills with 18 MM BF year capacity





# Progress--Lowlights

- Construction costs are increasing in almost every area due to cost of concrete, steel, electrical components, paving, freight and labor
  - Hurricane relief has tied up many contractors, lead times, etc. Costs at this point have climbed over \$10MM over budget.
  - Costs to stand up fuels business have been 3X greater than expected
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# Plans and Priorities

- ADEQ (EPA) Class 1 Permit by 1/06
- Interconnection Agreement to be done by 3/06
- Construction at Abitibi starts early 2006
- Construction ends mid 2007 and testing starts
- Begin commercial deliveries of power by mid 2007
- Stockpile over 2 years supply of fuel by startup date... maybe as much as 5 years supply!

