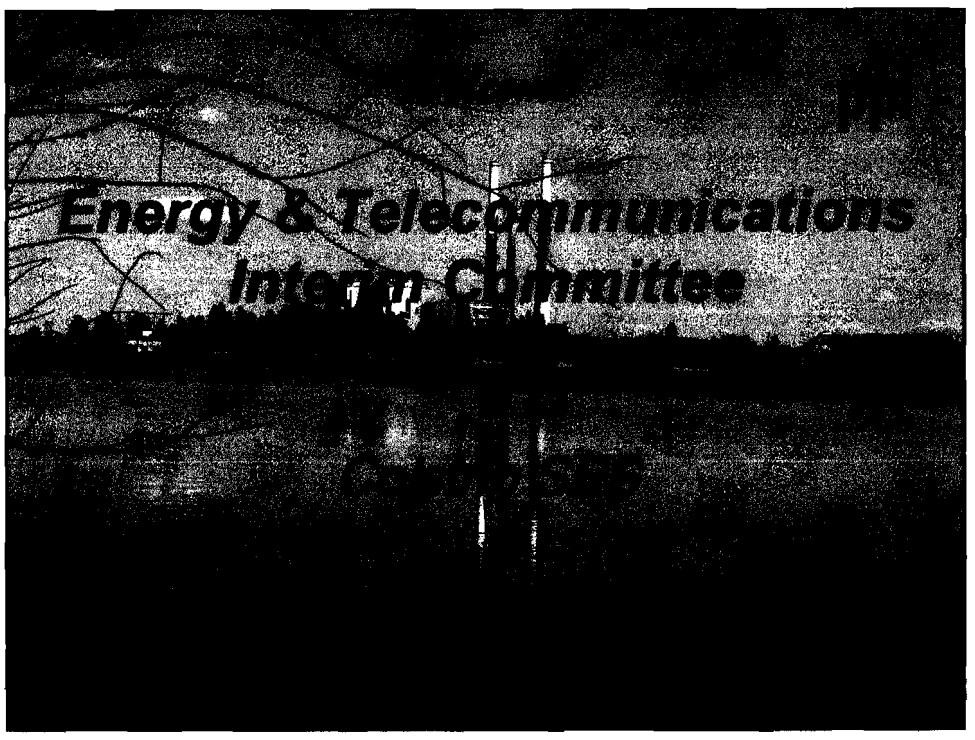

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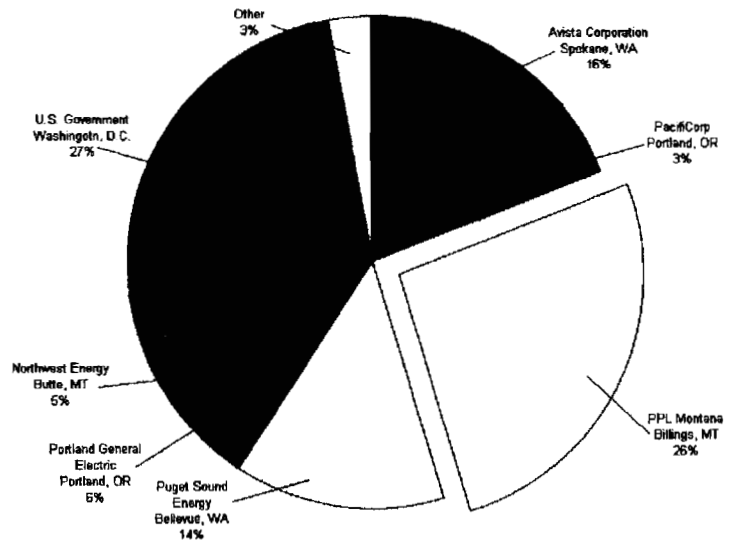
Colstrip SES

VPP is a Journey, not a Destination

VPP

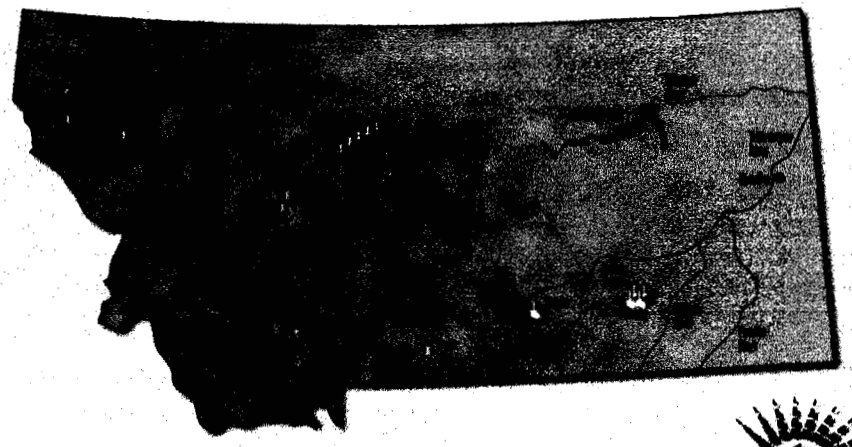
Teamsters

Electricity producers in Montana . . .



All generation capacity numbers based on summer capacity data for 2002 as published by the WECC

PPL Montana Generation. . .



PPL Montana Generation Resources

Hydro

11 Units; **577 MW**

Fossil (Coal)

2 Stations; 728 **MW**

Colstrip Ownership

	Unit 1&2	Unit 3&4	Total	Total MW
■ Puget	50%	25%	32%	736 MW
■ PPL	50%	15%	25%	575 MW
■ PGE		20%	14%	322 MW
■ NorthWestern Energy		15%	11%	242 MW
■ Avista		15%	11%	242 MW
■ PacifiCorp		10%	7%	161 MW

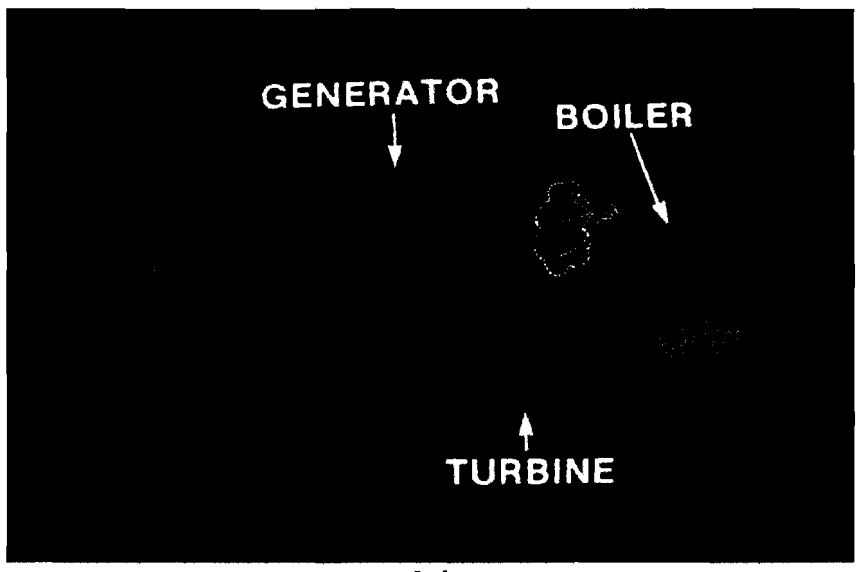
Page 5

Colstrip Plant . . .

- Total 2276 Megawatts
- 350 Employees
  - Annual payroll (Including T&B)-$38 million
- Consume 10 Million tons of coal per year
  - 274 cars to run one day
  - 1 carload fuels Colstrip for 5 minutes
- 2007 Budgets
  - O&M Budget-$97.6M
  - Capital-$52.6M

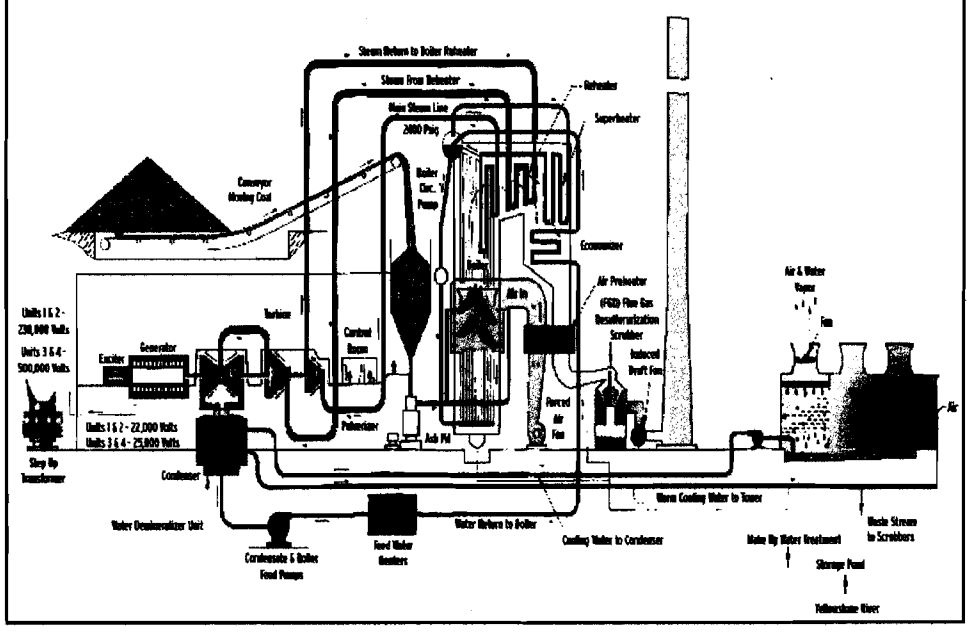
Page 6

How Fossil Electricity is Generated

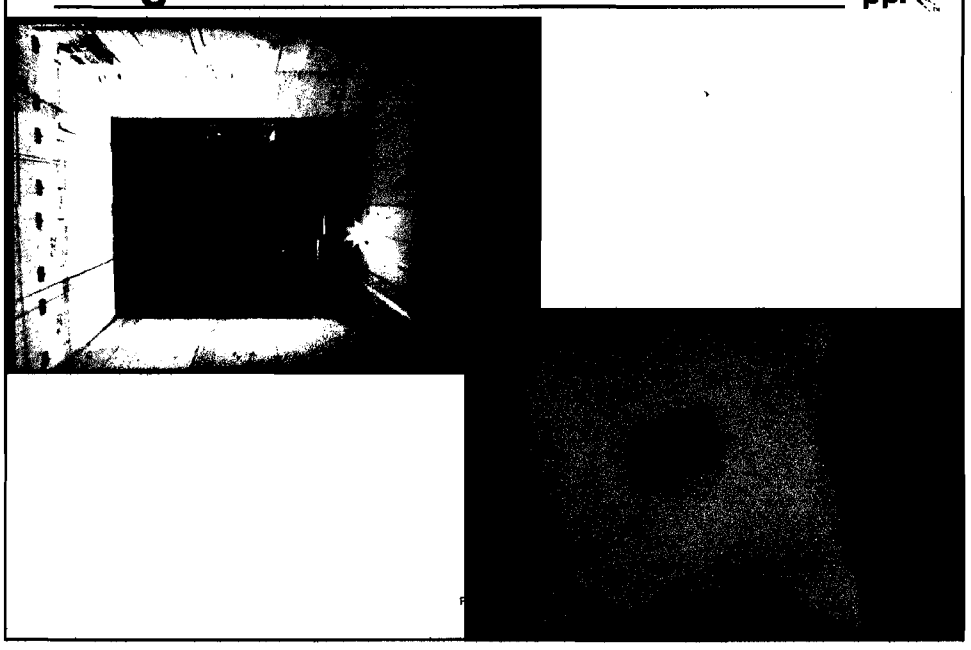


Page 7

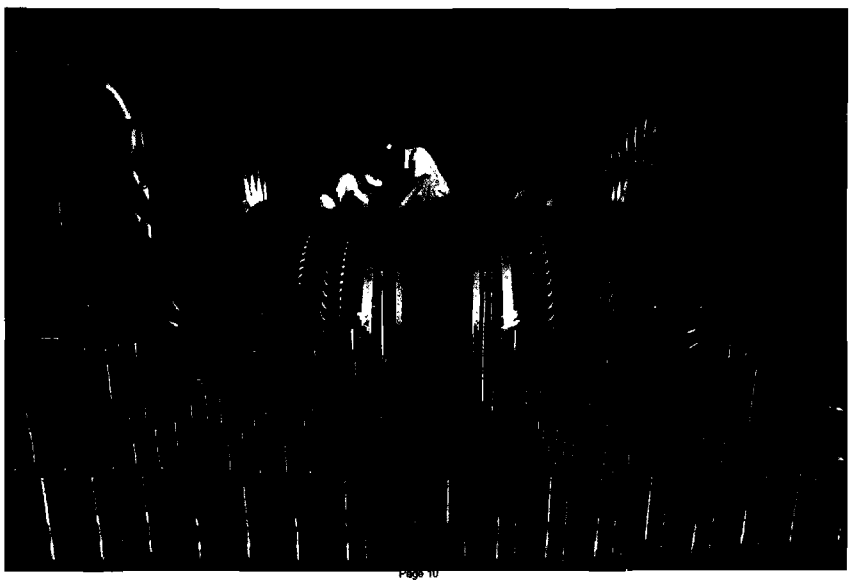
How Colstrip Generates Electricity



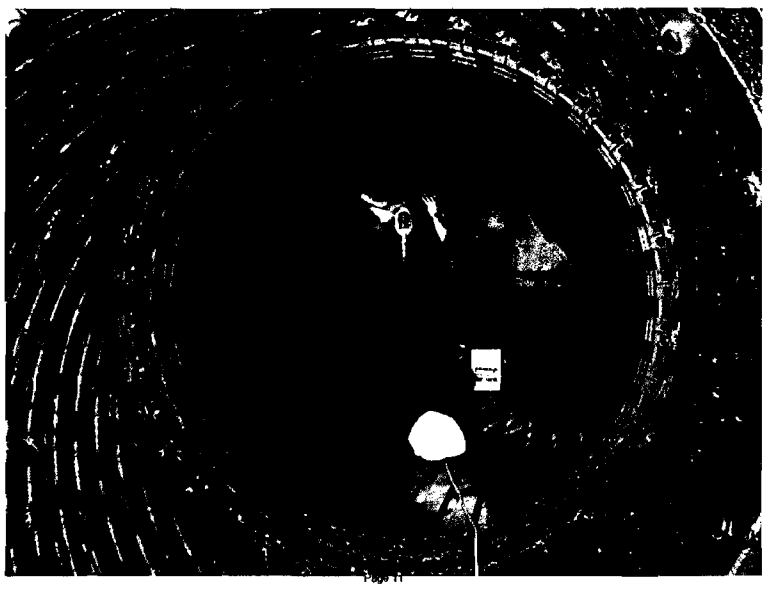
Tangential Fired Boiler



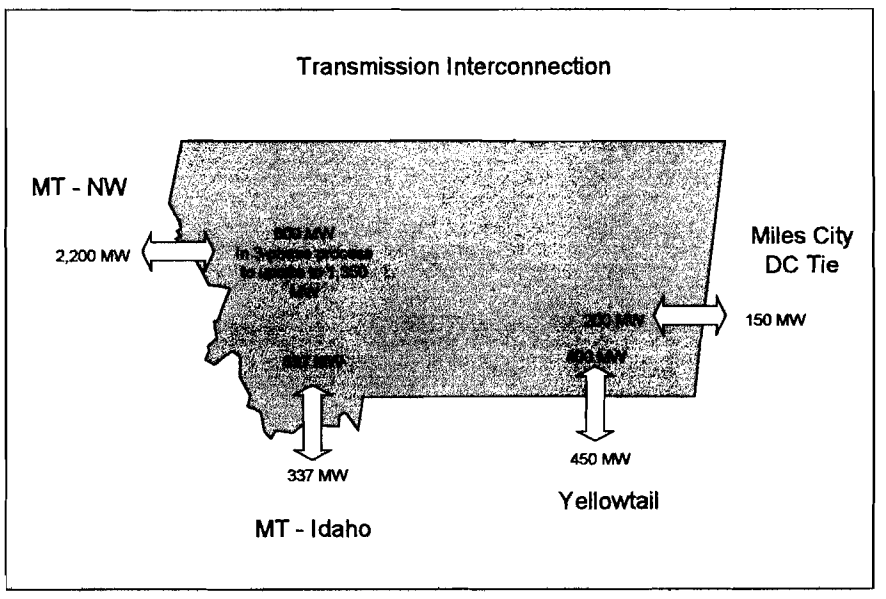
Steam Turbine



Generator

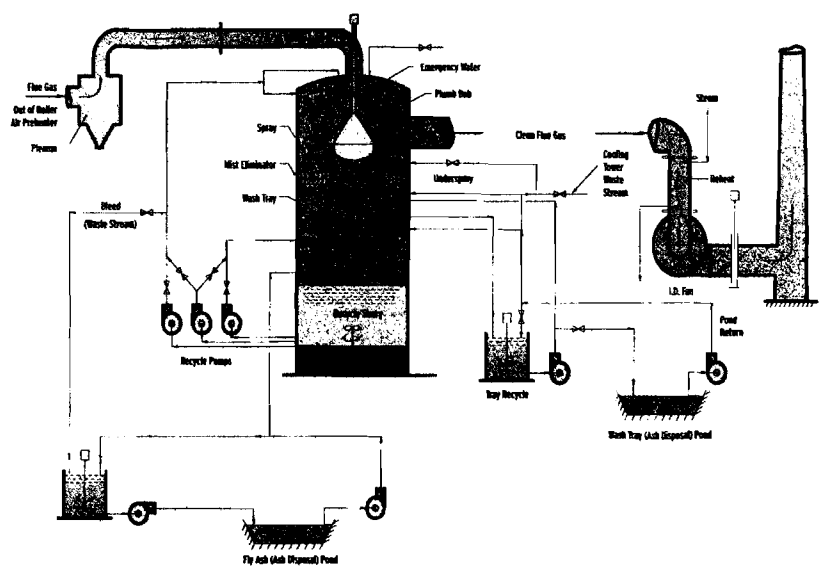


Transmission Capacity



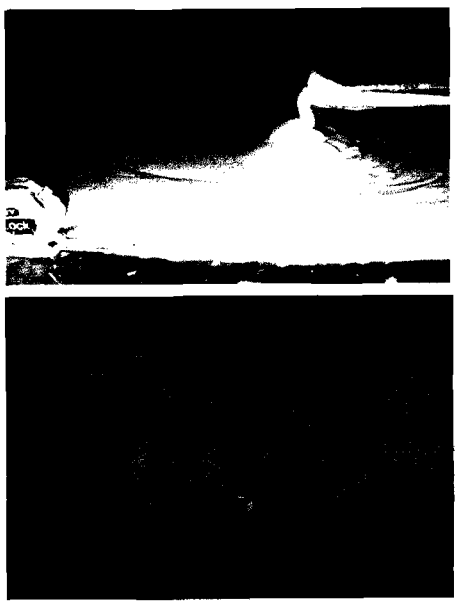
Simplified Flow Diagram

Scrubbers



Groundwater Protection

- Colstrip is a zero-discharge facility
- Wet scrubbers use surface impoundments for final disposal
- Ponds lined with clay, synthetic liners, or concrete wall
- Over 800 monitoring wells to help ensure protection of groundwater
- Current strategy to protect groundwater (~$34 million)
  - Paste disposal process (90% reduction in seepage potential)
  - Double-lined clearwater ponds with leachate collection
  - Forced evaporation/wastewater treatment



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SO2 Control

- Units 1&2 – limit of 1.2 lb/mmbtu
  - Normal control efficiency of 65-75%
  - Normal emission rate of 0.35 lb/mmbtu
  - 38th cleanest coal-fired power plant in country (~350 plants)
- Units 3&4 – limit of 0.10 lb/mmbtu
  - Normal control efficiency of 95%
  - Normal emission rate of 0.08 lb/mmbtu
  - In 2006, 9th lowest SO2 emissions from US coal-fired plants

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Particulate Control

- Units 1&2 particulate emission limit of 0.10 lb/mmbtu
  - Normal removal efficiency of 99.5%
  - Normal emission rate of 0.04 lb/mmbtu
- Units 3&4 particulate emission limit of 0.05 lb/mmbtu
  - Normal removal efficiency of 99.5%
  - Normal emission rate of 0.03 lb/mmbtu
- Continuous monitoring of Opacity to help ensure compliance with particulate emissions at all times

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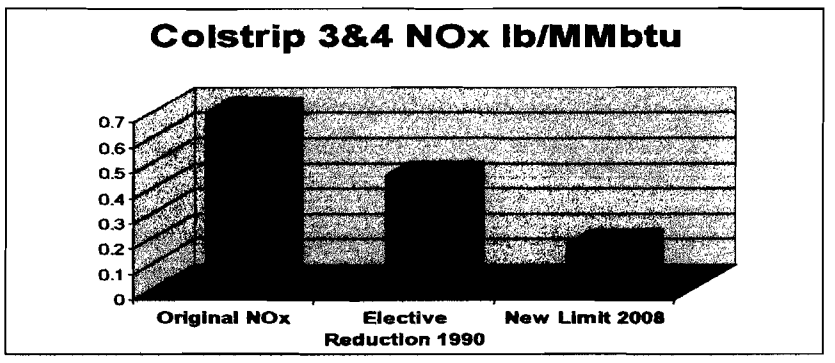
NOx Control



- **75% NOx reduction**
- **Low-NOx burners with a SOFA, $20 million**
- **Unit 3 in 2007, Unit 4 in 2009**
- **3&4 will rank ~60th out of 350 coal-fired power plants for NOx**

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Mercury Control

- EPA federal rule required 20% reduction by 2010 and 80% reduction by 2018
- 17 states have promulgated/proposed stricter limits than EPA Federal Rule
  - MT has second strictest rule (0.9 lb/Tbtu, 85-90% reduction by 2010)
- ~1% of mercury deposited in Montana is from Montana power plants, based on EPA models
- Colstrip currently emits 6-8 lb/Tbtu (use Astrodome analogy)
- Mercury control technology installed by 2010, ~$16 million capital, ~$4.5 million/yr O&M

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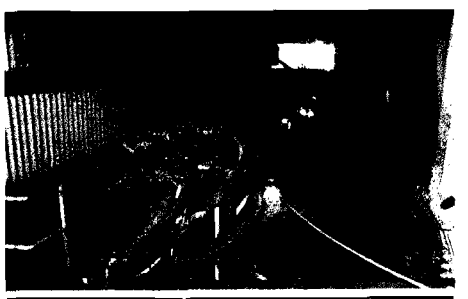
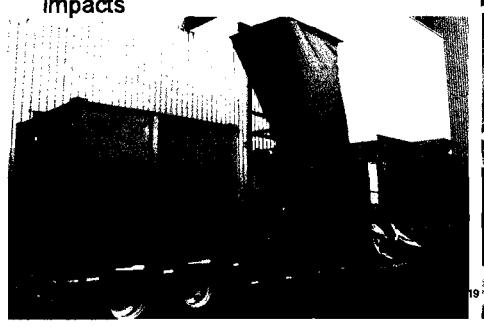
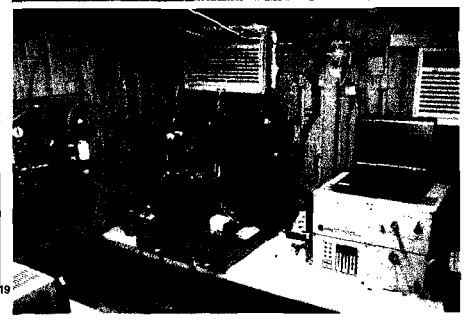
Recent Mercury Control Testing on Unit 3

- In September, conducted tests involving addition of calcium bromide and treated activated carbon to remove mercury
- Preliminary results are encouraging
  - Achieved about 90% reduction and an emission rate of about 1 lb/Tbtu
- Additional testing in 2008 to fine tune process and evaluate balance of plant impacts







PPL Climate Change Strategy

- PPL generated 39 percent of its electricity from non-fossil fuel power plants in 2006.
- PPL participates in the beneficial reuse of ash which offsets greenhouse gas emissions from the cement industry.
- PPL is decommissioning two coal-fired power plants in 2007, which will reduce annual carbon dioxide emissions by about 1.3 million tons.
- PPL has developed 12 megawatts of renewable energy projects; plans to invest at least $100 million in renewable energy projects over the next five years.
- PPL plans to expand generating capacity at existing nuclear and hydro plants

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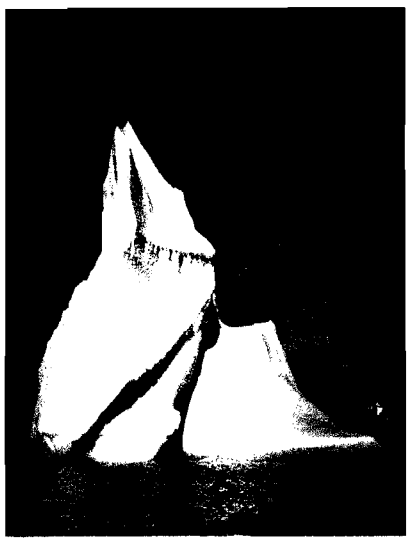
PPL Climate Change Strategy

- PPL is a member of the FutureGen Industrial Alliance, which is developing a near-zero emission power plant that can capture carbon dioxide for sequestration.
- PPL is a member of Big Sky Carbon Sequestration Partnership
- PPL participates in the Montana governor's Climate Change Advisory Council.
- PPL plans to participate in EPRI (Electric Power Research Institute) to evaluate technology options as they are developed, then support demonstration projects as appropriate at Colstrip

Page 21

Colstrip CO2 Control – Opportunities?

- Colstrip SES emits ~18 million tons CO2/yr
  - 18th largest power plant, rank ~50th for CO2 emissions
- Current technologies are in developmental stage
- Possible control technologies
  - Amine scrubber w/sequestration
  - Chilled ammonia w/sequestration
  - GreenFuel's Algae-to-Biofuel



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Amine Scrubber Process

- Basis:
  - Carbon capture from flue gas and geologic sequestration
  - Current status 1200 tpd, Colstrip 40,000 tpd
  - Study conducted on Wyodak power plant by Idaho National Laboratory, scaled up for Colstrip 1-4
  - Current technology, no improvements
  - Target 90% capture of CO2
- Following cost estimates are ballpark
  - Capital Cost: $430 Million
  - O&M Annual Cost: $900 Million
    - Includes "Energy Penalty" of 30% (625 MW)

Page 23 Source: Robertson, INL, 2006 (Wyodak study)

Amine Scrubber Process

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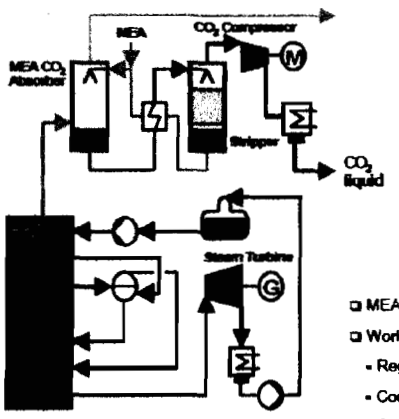
Amine-Based Absorption - CO2 Capture



SHADY POINT, OKLAHOMA, USA
An AES CFB power plant with
MEA CO2 separation

- MEA has demonstrated performance on coal based flue gas
- Work required to address:
  - Regeneration power
  - Compression ratio
  - Cost of solvent

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Chilled Ammonia Process

ppl

- Basis:
  - Carbon capture from flue gas and geologic sequestration
  - ALSTOM's 5mw pilot test at Pleasant Prairie
  - Scaled up for Colstrip 1-4 (2276 mw)
  - Target 90% capture of CO2
- Following cost estimates are ballpark
  - Capital Cost: $430 Million
  - O&M Cost: $650 Million
    - Includes "Energy Penalty" of 9% (189 MW)

Source: Alstom Power, November, 2007

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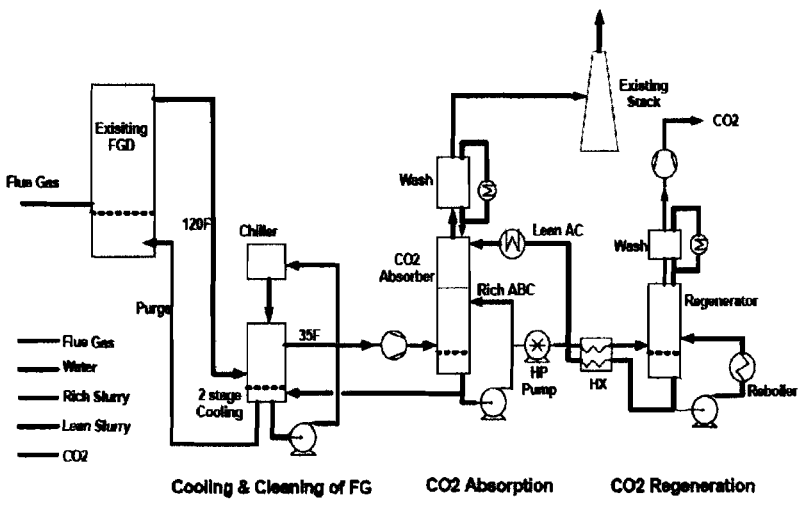
- Recent setback w/bioreactor system results in layoff of half the 50 person staff

Page 27 Source: Greenfuels Technology, Inc., 2006

Chilled Ammonia Process

Schematic of commercial Ammonia-based CO2 capture system retrofitted downstream of the FGD



Green Fuels Algae-to-Biofuel

- Basis:
  - Flue gas to 'feed' algae, then convert to bio-fuel
  - Use of Existing Technology without improvements
  - 40% capture of CO2
  - Scaled up for Colstrip 1-4, 26 sq. miles of algae fields
- Following cost estimates are ballpark
  - Capital Cost: $1.7 Billion
  - O&M Cost: $417 Million
    - Revenue Potential is $750 million
- Recent setback w/bioreactor system results in layoff of half the 50 person staff

Page 21 Source: Greenfuels Technology, Inc., 2006

Green Fuels Algae to Biofuel

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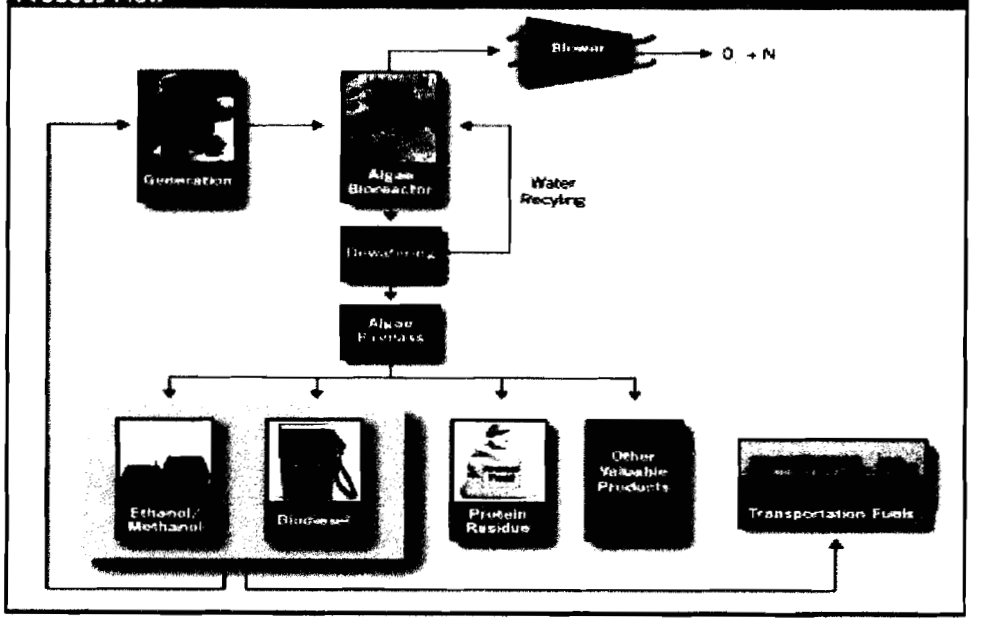
Process Flow



QUESTIONS?

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