IGCC: Pipedreams of Green & Clean

Nancy LaPlaca, J.D.
Energy Consultant
www.bardwellconsulting.com

Carol A. Overland, Esq.
Utility Regulatory Attorney
www.legalectric.org

Alan Muller
Executive Director, Green Delaware
www.greendel.org

Coal: The Big Dirties

- The **fifty dirtiest power plants** in the U.S. emit large amounts of pollution - “grandfathered” by the Clean Air Act;
- These 50 plants provide 14% of electricity but **35-50% of all pollutants.**
  - Technology to reduce sulfur dioxides costs $300/ton. [1]
  - Fifty dirtiest plants create 50% of SOx, 42% Hg, 40% NOx

- April 2007 U.S.S.Ct, *Massachusetts V. EPA* said CO_2 is pollutant that can be regulated
- Aspen Ski Co. filed amicus brief due to decreasing snow

1. Source: Dirty Kilowatts, July 2007, The Environmental Integrity Project

Eleven IGCCs Cancelled/On Hold

- Since mid-2007, <u>eleven</u> IGCC plants have been cancelled or put on "hold."
- **Reasons**: increasing costs, risk, uncertain carbon policy, lack of performance guarantees, environmental opposition.
  - Estimated capital cost: at least **$3,500/kW**
- Two other plants are held up in the courts:
  - Taylorville IL: Sierra Club challenging on CO2 emissions
  - AEP-Ohio's IGCC: industrials challenging in state supreme court because of high cost

Source: Emerging Energy Research LLC, October 5, 2007, "TECO, Nuon Cancellations Underscore IGCC's Woes"

Eleven IGCCs Cancelled/On Hold

Each of us were instrumental in stopping IGCC plant

- Overland - Minnesota - Excelsior Energy Mesaba Project
  - Fought for disclosure of capital & MW/hr cost, emissions
  - MN Dept. of Commerce analysis showed very high cost
  - MPCA – emissions weren't significantly less than pulverized coal
- LaPlaca - Colorado – Xcel Energy
  - Decided not to build IGCC in Colorado, despite favorable state legislation exempting plant from "least cost" rules.
  - Was seeking $130-200 million in direct federal grants; federal loan guarantees; guaranteed revenue stream from ratepayers; wouldn't commit to % of CO_2 captured.
- Muller - Delaware – NRG
  - RFP – level playing field of IGCC, wind, and gas
  - Costs and emissions exposed, PSC chose wind/gas combo
  - State still struggling with "how" and "if" but coal plant is history

“Clean” Coal is an Oxymoron

- “Clean” coal = IGCC - Integrated Gasification Combined Cycle
- Most coal power plants are “pulverized coal” or p.c.
- Industry selling gasified “clean” coal as substitute ~40 of ~150 new plants
  - Integrated Gasification Combined Cycle (IGCC).
  - Differs enormously from PC plants
  - Coal is fed into gasification unit under high pressure
  - Resulting synthetic gas is burned to turn turbines
  - Only **TWO** IGCC plants in the U.S. produce electricity, small one gasifier plants (200-300MW) – most produce chemicals

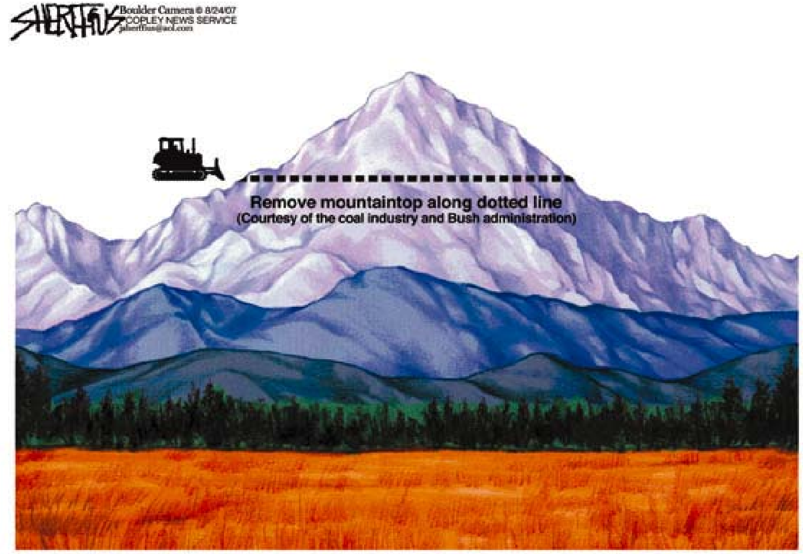
<u>No</u> U.S. IGCC plants currently capture CO2!

IGCC: Costs?

- Third party financing shifts risk from owners to ratepayers and public.
- 600 MW Mesaba: initial estimate $1.3 billion; final DOE cost estimate **$2.15 billion or** $3,593/kW

Other costs to consider:

- CO_2 capture
- CO_2 compression
- CO_2 transportation
- CO_2 long-term sequestration
- CO_2 independent monitoring & verification



Purple mountain travesties

Sources: www.mncoalgasplant.com, Department of Energy funding notice.

CCS: Carbon Capture and Storage

- Several elements to CCS:
  - Capture
  - Compression
  - Transportation – usually pipeline
  - Re-pressurization ~100 miles
  - Sequestration or Enhanced Oil Recovery (EOR)

- No currently operating U.S. IGCC plants capture CO2.
- No CO2 capture on commercial scale

Process	Cost	Notes
CO_2 Capture	~20% of plant output[1]	Large amount of CO_2; very stable molecule; Every pound of carbon = 3.66 pounds of CO_2 Every pound of coal = ~2 pounds of CO_2
CO_2 Compression	$17/ton[2]	6 million tons CO_2 x $17/ton = $102,000,000; Costs vary greatly, depend on process, coal type, emission levels.[1]
CO_2 Transportation	$25,000-60,000 per inch-mile (for example, $25,000 x 12 inch pipe x 100 miles)	Pipeline from Beulah ND Gasification plant to Saskatchewan is 204 miles long, cost $122 million or ~$50,000/in-mile. Also pipeline re-pressurization, parasitic load estimated 1-4 MW each
CO_2 Sequestration	CO_2 sequestered in different sites, such as beneath the sea; consider leakage, explosion, all risks	Statoil in Norway sequesters ~1 million tons CO_2/year, pays $125,000/day or ~$45,000,000/year. Because Norway has a carbon tax, it would pay a similar amount to release the CO_2.
Overall efficiency	Coal plants lose 2/3 of energy as heat	Adding CCS decreases IGCCplant efficiency from 38.5% to 31.2%[1]

1.Howard Herzog, CO2 Capture and Storage: Status…,July 23, 2007, NREL.

2. Aaron Koopman, Ramgen Power Systems, Western Governor's Association, Oct. 23, 2007; http://www.westgov.org/wga/initiatives/cdeac/index.htm

3. Business Week, Putting CO2 to Good Use, August 27, 2007. http://www.businessweek.com/investor/content/aug2007/pi20070824_605776.htm

CCS: Carbon Capture and Storage

- Capture:
  - 30% fairly easy, but with efficiency loss
  - 85-90% capture is difficult & costly
  - Efficiency loss at least 25+%
  - 600MW becomes 450MW
  - Capitol cost increase of 45+%
- No currently operating U.S. IGCC plants capture CO_2.
- No CO_2 capture on a commercial scale

CCS: Carbon Capture and Storage

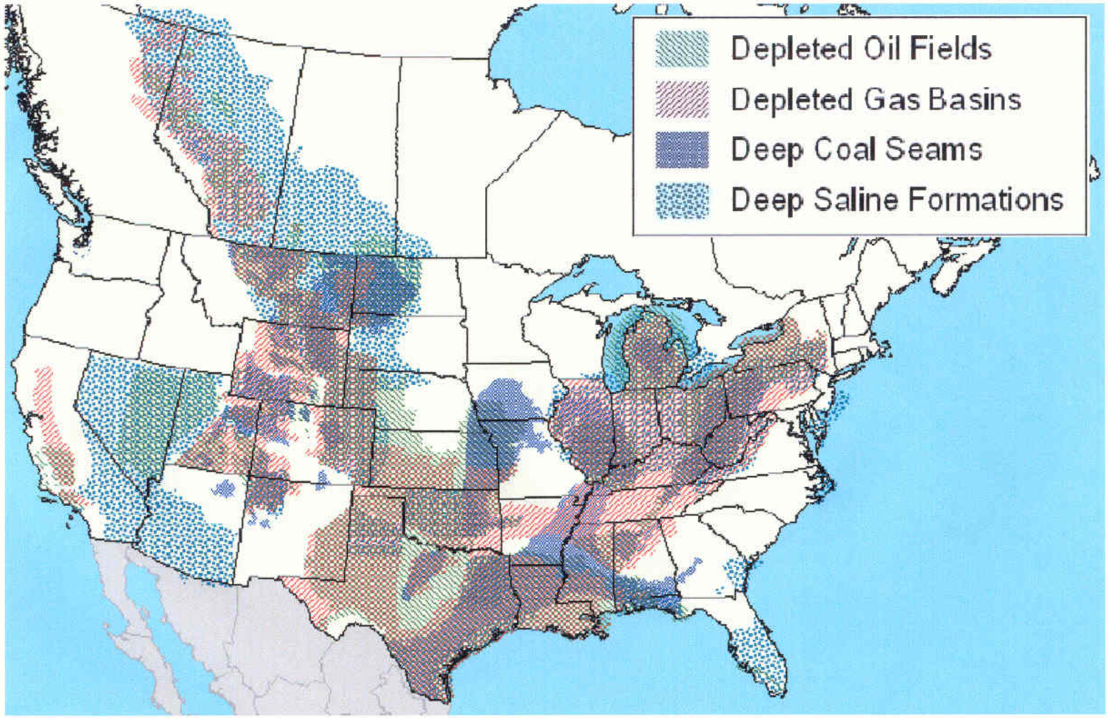
- Only 3 locations in the world capture and "store" CO_2
  - Weyburn Canada – from ND synfuels plant
  - Norway – Statoil Corp. beneath the North Sea
  - Algeria
- Several small demonstration projects are starting in the U.S.

CO2 CSS Cost?

Where to sequester?

- Deep saline best
- Most IGCC plants proposed long distance from potential storage

Potential CO_2 reservoirs: not a constraint most places.



Source: J. Dooley et al, "A CO2 Storage Supply Curve For North America and its Implications for the Deployment of Carbon Dioxide Capture and Storage Systems," GHGT-7, September 8, 2004

Process Energy Solutions
Tomorrow's Value - Today

CO2 CSS Cost?

Sequestration – identify, characterize and obtain site; pump in, monitor forever

- DOE Addendum to Gilberton, PA coal-to-liquids plant shows it's not feasible and CO2 volume far exceeds potential available storage
- DOE's EIS for Mesaba Project says CSS isn't realistic option
- Cost estimates range from \$3-10/ton to \$260 Dr. Sally M. Benson, Testimony 11/6/03, House Science Committee: To answer your fourth question, estimated costs for geologic sequestration of CO2 range from about \$3 to \$10 per ton, depending on site specific considerations such as how many injection wells are needed, surface facilities, economy of scale and monitoring requirements. As the technology matures, uncertainties in costs will be reduced. These costs are small fraction of the cost of CO2 capture and consequently have not been the focus of much attention.
- Hydrological issues – like plunger in toilet
- Seismic issues – impact of millions of tons of CO2
- Migration issues – see "Gas Migration," the tome of underground storage

CCS: Carbon Capture and Storage

- Each test location stores ~1 million tons CO_2/year
- Total of test sites ~3 million tons CO_2/year.
- Mesaba Project would emit 5.4 million tons annually
- *Compare with **total** U.S. coal plant emissions of ~2.5 BILLION tons/year.*

No currently operating U.S. IGCC plants capture CO_2.

CCS: Risks?

- In 1986, CO_2 released from underneath volcanic lake in Lake Nyos, Cameroon - over 1,700 people and 1,100 head of cattle suffocated.
  - CO_2 is heavier than air therefore displaces air;
  - All living things within 15 miles of the lake died.
  - http://news.bbc.co.uk/onthisday/hi/dates/stories/august/21/newsid_3380000/3380803.stm for BBC report
- 1960's: the U.S. Army Corps of Engineers injected 165 million gallons of toxic wastewater under the Denver basin; inducing 1,500 seismic "events" between 1962-67, including 3 earthquakes at or above Richter magnitude 5.
  - High Country News article, September 7, 2007 by Valerie Brown titled *A Climate Change Solution?*
  - Link: http://www.hcn.org/servlets/hcn.Article?article_id=17188#

Who will bear risk/liability for thousands of years?

CCS: NOT Ready for Prime Time!

- Carbon Capture and Sequestration (CCS) *is* technically feasible, but *commercial availability* is in question.
- The problem is **scale**: with only 3-5 million tons/CO_2 being sequestered each year, and at least **2.5 BILLION** tons of CO_2 from U.S. power plants, it's not a large scale solution, it's a niche.
- Doubters include **Dominion Virginia Power** witness James K. Martin, Virginia Corporation Commission Case No. PUE-2007-00066, July 13, 2007 testimony, p. 7.
- CCS adds greatly to cost:
  - 60-80% increase estimated by EPA for **pulverized** coal, less for IGCC (EPA Final Report, *Environmental Footprints and Costs of Coal-Based IGCC and Pulverized Coal Technologies,* July 2006, p. ES-6)
  - MIT estimated ~$28/ton to capture and store CO_2 for IGCC; and ~$40/ton for p.c. plants (MIT, *The Future of Coal,* 2007, p. xi)

Cost of IGCC!

Cost of Mesaba (shhhh, it's a secret):

- $2,155,680,783 for 600MW
- $3,593/kW

That's about <u>twice</u> the $1.2 billion cited in the press in AP articles across state just before public hearings on cost!!!

(took 3 weeks to get a correction)

If you don’t need it…

Utilities routinely overestimate need!

Example - Minnesota’s proposed IGCC is based on a legislative initiative that was part of a deal to allow extension of life of nuclear plants, and there’s no shutdown of any fossil fuel!

- Xcel IRP found first Xcel “need” is 375MW in 2015 – and now they’ve withdrawn request
- Excelsior is trying to force PPA on Xcel at 2-3 times price of other generation – the amount and timing is off
- Is it the same song and dance in your area?

How is IGCC financed?

- Demonstration-stage technology
- Not ready for commercial deployment
- Deemed by DOE to be “too risky” for private investment
- Assumed at least 20% more expensive than conventional coal

  (reality is a LOT higher)

A financing scheme…

"IGCC is not perceived in the U.S. to have sufficient operating experience to be ready to use in commercial applications."

Harvard designed circumvention around financial barriers and market forces:

- 3 Party Covenant
  - Federal Government
  - State Government
  - Equity investor or IPP with PPA for equity

A financing scheme…

Purpose of financing scheme is To transfer risk & burdens and lower IGCC's cost of capital:

- Reduce cost of debt to developers
- Raise debt ratio in proportion to equity
- Minimize construction financing costs
- Shift financial risk off of developers

A financing scheme…

- Federal provides grants, tax credits and guaranteed loans
- State provides assured revenue stream (PPA) where state finds need for baseload; regulatory free passes (see, e.g., MN, IN)
- Utility or IPP provides... well...not much... IPP provides only a Power Purchase agreement, and equity ratio is shifted from typical 45% to 20%; in PPA risks are unreasonably shifted off of developer onto ratepayers, utility, taxpayers

A financing scheme…

IGCC’s best chance of success under the Harvard scheme:

- Take existing federal and state perks and always grab for more!
- Distressed gas generation assets
- Tout emissions “benefits” of IGCC
- Sites with existing infrastructure
- Conversion of coal or natural gas plants
- Cogeneration opportunities, i.e., chemical, hydrogen

A financing scheme…

The industry latched onto 3 Party Covenant.

Booz Allen report – same scenario with more detail of cost and carbon aspects and similar recommendations

- We now know cost estimates are WAY low
- Based on IGCC as alternative to high-priced natural gas, but coal price spikes (tripled in Dec. 2005) and transport woes are problem
- Recognized that point is get plants built and then to demonstrate commercial viability

Financing scheme crashed

Primary objection to Excelsior's PPA:

It's overpriced power that we don't need

Some other financial issues:

- Transfer of risk to Xcel unacceptable
  - Shareholders would take hit because Xcel would have to carry on balance sheet as debt
  - Ratepayers would take massive hit – too many variables, i.e., no coal contract (~1/3 PPA cost), EPC cost wouldn't be nailed down until after PPA
- Transmission interconnection and network upgrades unidentified, could be very high, and Xcel and Minnesota Power would take hit

What perks are there?

Federal benefits are lined up

- Grants
- Guaranteed loans
- Tax credits

What does your state offer?

- Check your state's perks
- Track utility attempts to use 3 Party Covenant
- A little attention can stop their efforts – bills pass because legislators don't understand

A small MN success story

Mesaba is first IGCC plant reviewed by state

- Costs disclosed – more so than in any other project
- Emissions disclosed – more so than in any other project
- Cannot bear scrutiny of high capital cost in constrained market
- Cannot secure PPA because cost too high
- Difficult to permit because of CO_2 and other emissions

What does IGCC cost?

- $2,155,680,783, not $1.2 billion
- $3,593/kW (600MW), not $1,800/kW (Wolk)
- Doesn't incorporate:
  - Infrastructure - $55 million+ paid by public
  - Transmission – $28-280 million - varies wildly
  - DOE guaranteed loans; $36 million DOE; $21 million DOE to PCOR to "study sequestration;" $9.5 million MN IRR; $10 million Renewable Development Fund.
  - Fed 48A tax credit; state utility tax exemption

What does IGCC cost?

From MN Dept. of Commerce analysis (Dr. Amit):

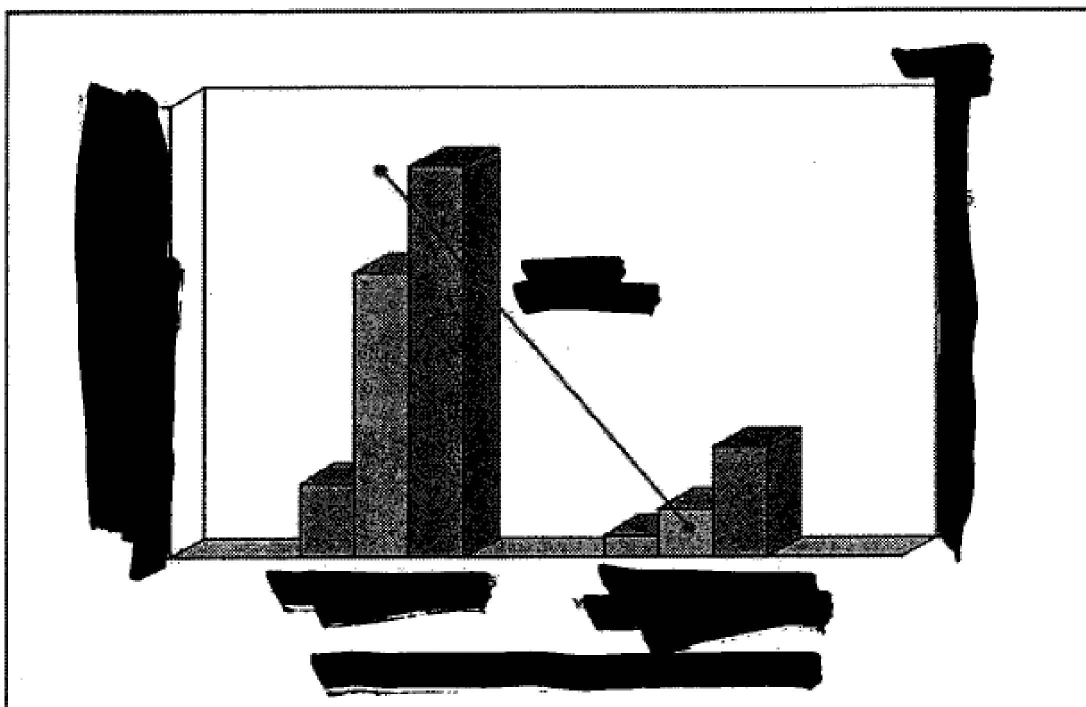
All levelized costs:

	/c emissions /s xmsn	Xmsn $/MWh	Cost /c Xmsn	Sequestration $/MWH	TOTAL $/MWh
West 603MW	96.04	9.21	105.25	50.02	155.27
East 598MW	104.91	9.21	114.12	50.02	164.14
West 450MW	120.87	9.21	130.08	50.02	180.10
East 450MW	130.76	9.21	139.97	50.02	189.99
BS II	73.02	2.74	75.76	----	75.76
Sherco4	72.54	2.79	75.33	----	75.33

Environmental costs of IGCC

What NRG's application said about emissions:

Figure 1-9 Air Emissions Impact Reduction



Environmental costs of IGCC

How NRG presented water use:

Table 5-10 Historical Average Annual Water Use and Future Water Use Comparison

Unit	[redacted]	[redacted]
Indian River Plant Site (MGD)	[redacted]	[redacted]
Indian River IGCC (MGD)	[redacted]	[redacted]
Total Water Usage (MGD)	[redacted]	[redacted]
Gallons Per Day per MW	[redacted]	[redacted]
% Total Decrease		[redacted]

MGD – millions of gallons per day

Environmental costs of IGCC

How NRG presented costs of energy and capacity:

Table 1-3 Proposed Project Pricing For Energy and Capacity

	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Environmental costs

Excelsior's comparative emissions, Table RSE-1:

Emission	ICF Modeled Rate for Mesaba (lb/hr)	Mesaba Project PSD Permit Application (lb/hr)	ICF SCPC Plant (lb/hr)	CFB South Heart (lb/hr)
Sulfur Dioxide, SO_2	123	158	431	259
Nitrogen Oxide, NO_x	339	321	377	598
Carbon Monoxide, CO	274	257	809	996
Particulate matter, MP10	48	51	108	153
Volatile organics, VOC	16	17	22	17
CO_2 (not modeled, but provided for information	N/A	616 tons/hour	618 tons/hour	720 tons/hour

Environmental costs

	NOx		SO2		PM		Hg		CO2	
	lb/MWh	lb/MMBtu	lb/MWh	lb/MMBtu	lb/MWh	lb/MMBtu	lb/MWh	lb/mmBtu	lb/MWh	lb/mmBtu
Mesaba IGCC subbituminous (a)	0.536	0.057	0.24	0.03	0.085	0.009	4.70E-06	5.00E-07	2005	213.34
EPA "generic" subbituminous IGCC (f)	0.326	0.044	0.09	0.01	0.052	0.007	3.58E-06	4.20E-07	1818	213.34
Wabash (Illinois coal) (actual) (b)	1.337	0.150	0.89	0.10	0.107	0.012			203.74	203.74
EPA "Generic" subbituminous ultra-supercritical (f)	0.450	0.060	0.75	0.10	0.090	0.012	3.42E-06	4.20E-07	1738	213.34
existing subcritical pulverized coal with BACT controls (c)	0.730	0.070	0.94	0.09	0.146	0.014	5.21E-06	5.00E-07	2211	212.14
Sithe Global Energy Desert Rock Supercritical PC (d)	0.597	0.060	0.60	0.06	0.100	0.01	1.89E-05	1.90E-06	1984	199.29
SWEPCO Hempstead Co. Ultra SuperCritical PC subbituminous (e)	0.665	0.070	0.95	0.10	0.143	0.015	3.99E-06	4.20E-07	2015	212.14
EPA "generic" subbituminous supercritical (f)	0.500	0.060	0.54	0.07	0.100	0.012	3.78E-06	4.20E-07	1920	213.34

	Net Thermal Efficiency % HHV	Net Heat Rate Btu/kWH	Gross Power MW	Internal power MW	Heat input mmbtu/hr	fuel required lb/hr	Net Power MW
Mesaba IGCC subbituminous (a)	36.3%	9,397	740	143	5616		598
EPA "generic" subbituminous IGCC (f)	40.0%	8,520	575	75		484,089	500
Wabash (Illinois coal) (actual) (b)	39.7%	8,910					192
EPA "Generic" subbituminous ultra-supercritical (f)	41.9%	8,146	543	43		460,227	500
existing subcritical pulverized coal with BACT controls (c)	32.7%	10,423			3355		350
Sithe Global Energy Desert Rock Supercritical PC (d)	34.3%	9,956	1500		6800	800,000	2 @ 683 net
SWEPCO Hempstead Co. Ultra SuperCritical PC subbituminous(e)	35.9%	9,500			6000 (b)	750,000	600
EPA "generic" subbituminous supercritical (f)	37.9%	9,000	541	41		517,045	500

(a) Mesaba Energy I air emissions permit application, June 2006, p. 48. Excelsior Energy December 2005 Filing, Section IV, p. 51 Also, Robert Evans Rebuttal Testimony, October 10, 2006 p. 18.
(b) Wabash performance from www.clean-energy.us/projects/wabash_indiana.htm accessed on October 10, 2006
(c) Minnesota Power Boswell 3 retrofit, August 2006 permit application
(d) Desert Rock efficiency, heat rate calculated from PSD permit application accessed 10/9/06 at www.epa.gov/region9/air/permit/desertrock/index.html

(e) SWEPCO permit application indicates the boiler to be a supercritical boiler with a heat input rate of 6000 mmbtu/hr; AEP contact indicates the plant is being designed as an ultra supercritical plant, and design heat input rate is 5700 to 5800 mmbtu/hr, net electrical output 600 MW. This difference affects the net heat rate calculation and total boiler efficiency.

(f) EPA generic expected plant performance characteristics EPA-430/R-06-006 July 2006

Environmental costs

How Delaware PSC staff rated proposals:

Table 2.1.3
Overall Non-Price Scores

Non-Price Factor	Maximum Points	Conectiv	Bluewater	NRG
Environmental Impact	14.0	9.9	11.3	5.7
Fuel Diversity	3.0	0.0	3.0	2.0
Technology Innovation	3.0	0.0	3.0	3.0
Operation Date and its Certainty	3.0	1.3	0.5	0.0
Reliability of Technology	2.0	2.0	1.5	1.0
Site Development	5.0	4.8	2.4	3.8
Bidder Experience	5.0	5.0	1.0	2.0
Project Financeability	5.0	4.0	2.0	2.5
Total	**40.0**	**27.0**	**24.7**	**20.0**

Where are we now?

Current Coal-Fired Capacity Projects *(quarterly change)*

Table 1

		Number of Plants			Capacity (MW)		
	General Status	October 2007 Report	Current Report	*Change*	October 2007 Report	Current Report	*Change*
Progressing Projects	*Under Construction*	24	28	+4	12,506	14,885	+2,379
	Near Construction	8	6	-2	4,565	1,859	-2,706
	Permitted	13	13	0	6,169	6,422	+253
	SUB TOTAL	45	47	+2	23,240	23,166	-74 (-0.3%)
Uncertain Potential and Timing	*Announced (early stages of development)*	76	67	-9	48,440	42,394	-6,046 (-12.5%)
	TOTAL	121	114	-7	71,680	65,560	-6,120 (-8.5%)

Where are we now?

Tracking New Coal-Fired Power Plants

National Energy Technology Laboratory

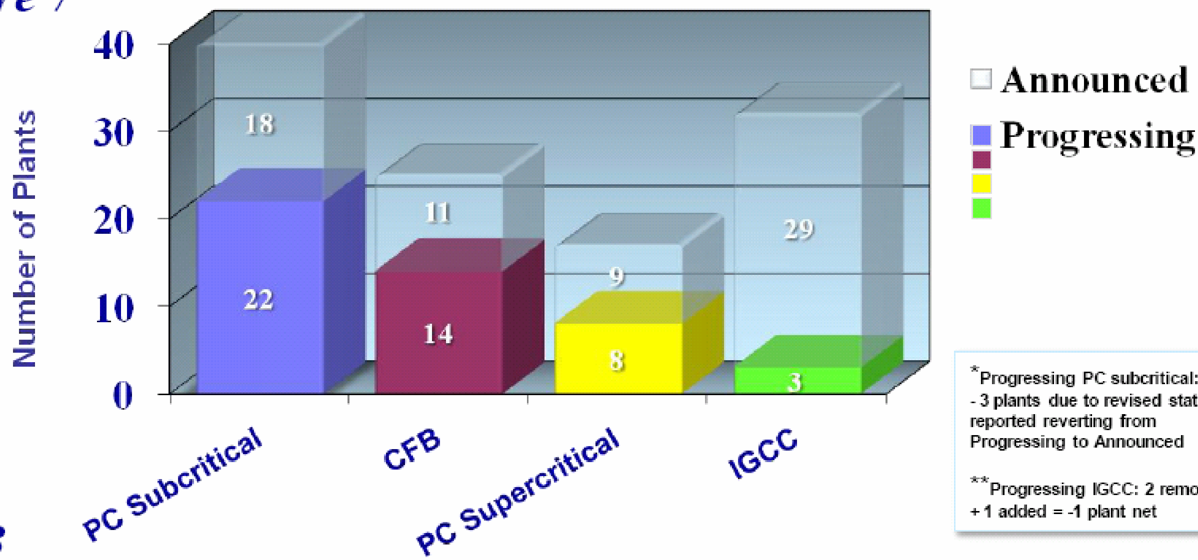
Office of Systems Analyses and Planning
Erik Shuster

February 18, 2008

Where are we now?

Proposed Technologies of New Plants *(quarterly change)*

Figure 7



*Progressing PC subcritical:
- 3 plants due to revised status reported reverting from Progressing to Announced

**Progressing IGCC: 2 removed + 1 added = -1 plant net

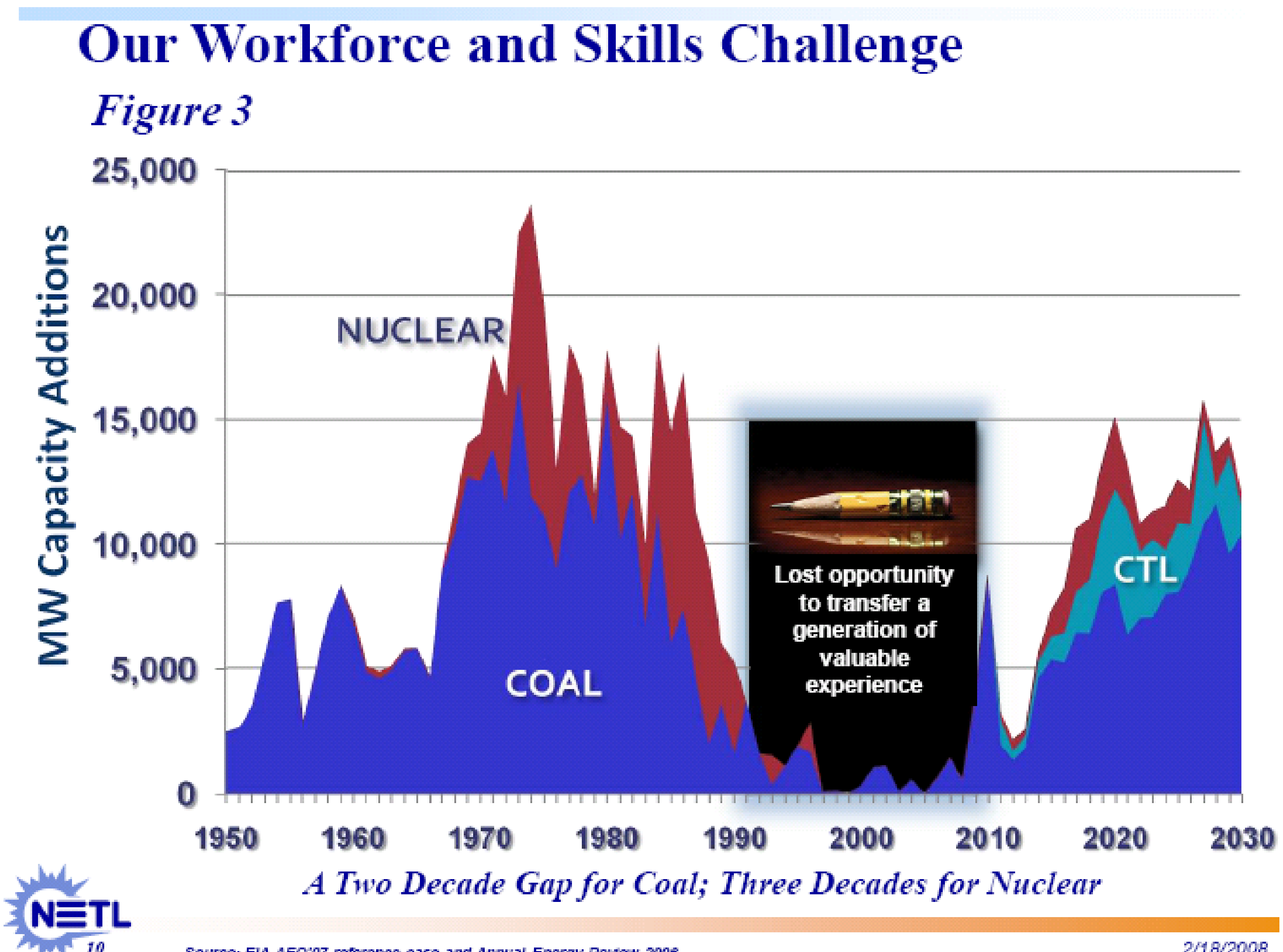
Table 3

Technology Listings	*Operational (Since 2000)*	*Progressing (Permitted, Near-, and Under Construction)*		*Announced*		Total Proposed	
		October	Current *(Change)*	October	Current *(Change)*	October	Current *(Change)*
PC Subcritical	10	25	22 *(-3)**	26	18 *(-8)*	51	40 *(-11)*
CFB	8	12	14 *(+2)*	12	11 *(-1)*	24	25 *(+1)*
PC Supercritical	1	4	8 *(+4)*	9	9 *(0)*	13	17 *(+4)*
IGCC	1	4	3 *(-1)***	29	29 *(0)*	33	32 *(-1)*

Source: Global Energy Decisions – Velocity Suite
October Report data collected (9/20/2007); Current Report data collected (12/31/2007)

NETL

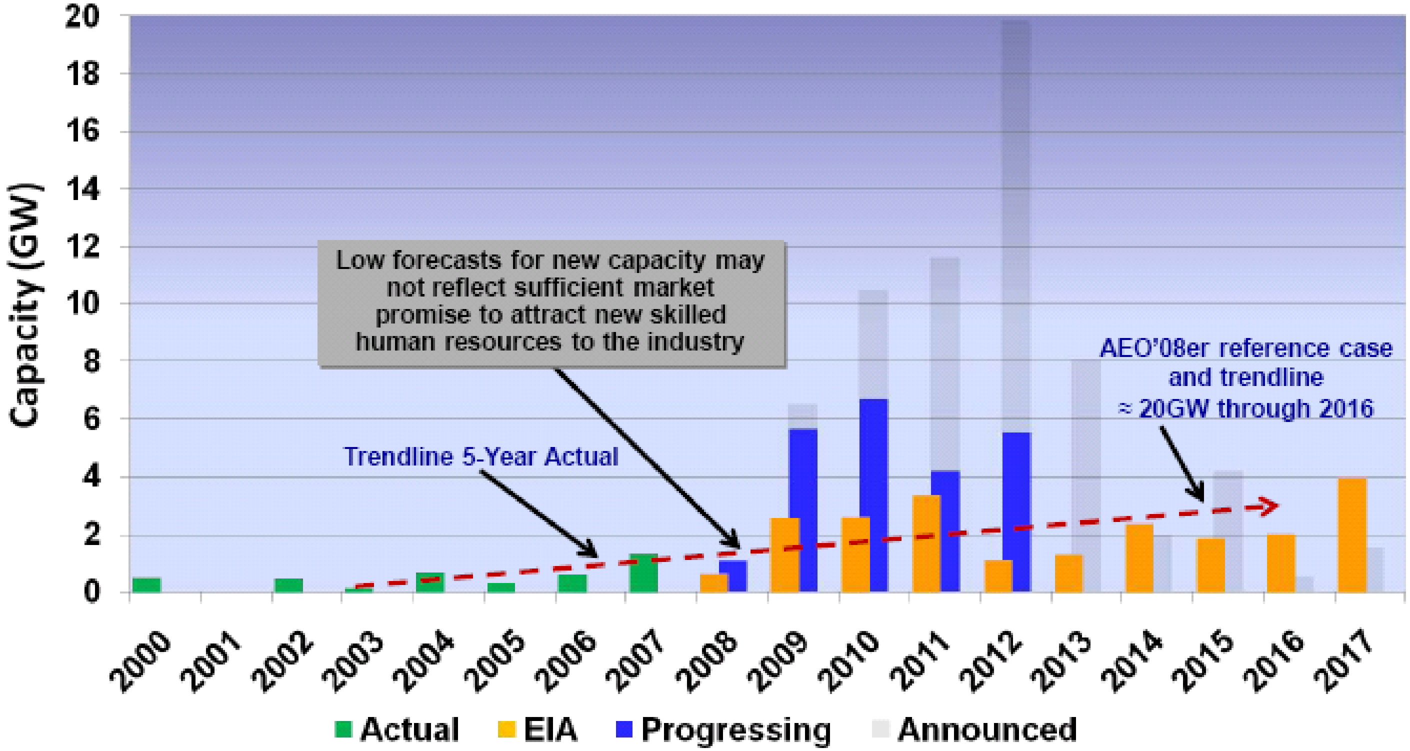
Where are we now?



Where are we now?

Development Activity vs. EIA AEO'08er

Figure 12



Actual Installation Trend and EIA AEO'08er Reference Forecast Correspond; A Significant Surplus of Developments Exists Above EIA's Forecast Demand

NETL

Source: EIA, AEO 2008 Early Release, December 2007; Global Energy Decisions – Velocity Suite (12/31/2007)

2/18/2008

Biomass - Texas

Biomass energy is produced from converting garbage to methane, burning materials to produce heat to generate electricity, and fermenting agricultural waste to produce ethanol. Half the lumber companies and three-fourths of the paper companies in Texas burn wood waste to generate power. Texas generates huge amounts of plant and animal waste that could be used for thermal power generation. There are four projects in Texas that utilize the combustible waste gases escaping from landfills. Such cities as San Antonio, Dallas, Garland, Waco, and Austin are developing projects. Every year, Texas produces some two quadrillion BTUs of energy in the form of agricultural wastes, municipal waste, and energy crops.* If all that energy could be recovered, it would be enough to generate two-thirds of all the electricity used in Texas. The 2002 Farm Bill provides incentives for on-farm energy projects, which, if used, will increase the amount of biomass energy created in the state.

"Texas Environmental Profiles"
(http://www.texasep.org/html/nrg/nrg_3rnw.html)

Comparative cost of fuel sources

Appendix - Raw Data

Raw Count of All Fuel Sources and Other Criteria Contained in Examined RPSs

Energy Type/Criteria	Tally
Fuel Source	
Biomass	27
Specifications on Biomass	23
Wind Power	26
Solar Generation	25
Any solar application	18
Solar photovoltaic	8
Solar thermal	8
Solar hot water	2
Geothermal Energy	19
Landfill Gas*	19
Landfill gas	19
Unspecified waste	3
Resource recovery	3
Solid Waste Conversion	4
Hydropower (with or without other restrictions)	18
Hydro	3
Hydro <100	1
Hydro <30	3

Biomass

- Some of the things considered “renewable:”
  - Garbage
  - sewage sludge
  - “waste wood”
  - “clean wood”
  - “C&D”
  - coal waste
  - landfill gas
- These are very high-polluting and undesirable activities
  - heavy metals
  - particulates--”nanoparticles”
  - criteria air pollutants
  - ecological damage—land clearing, etc

Biomass

- Example: Proposed “clean wood” burner in St. Paul, Minnesota (from an action alert air permit):
  - ***o Put about ONE MILLION POUNDS of health-damaging air pollutants into the air every year via a 140 foot smokestack, including mercury, dioxin, arsenic, lead, ammonia, sulfuric acid, and formadehyde (details below).***
  - ***These pollutants cause or contribute to asthma, bronchitis, cancer, heart disease, birth defects, reduced intelligence in children, and other health problems.***
  - ***o Burn up to THREE HUNDRED THOUSAND TONS per year, causing***
  - ***o About TEN THOUSAND heavy truck trips a year, hauling in waste fuel and process chemicals, and hauling out ash.***
  - ***The diesel exhaust from these truck trips would threaten people's health, especially the health of our children. This health hazard from the trucks in not really considered by the authorities responsible for permitting the burner.***

Biomass

Support clean energy--

wind, solar, conservation and efficiency.....

NOT “renewables”