



FENALCARBÓN®
Federación Nacional de Productores de Carbón

Mixtures, efficiency and emissions reduction

for a world that will continue to

**consume more coal
beyond 2050**



Coal Combustion, Inc.

Understanding the business of coal

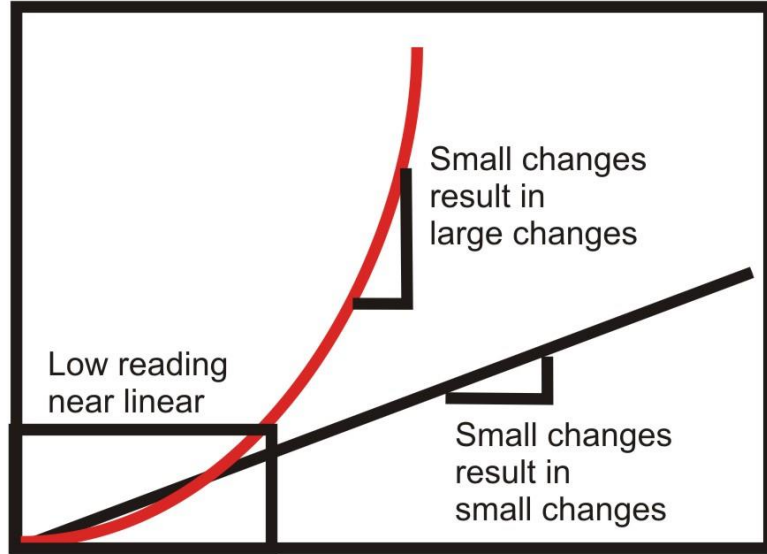
Rod Hatt

Chief Technical Officer

Wanted to tell you the truth!

Linear vs Exponential Functions or why we are fooled

Changes we get



Changes we see



Concerns

Future Coal Plants

Opportunity for future



CONCERNS

PHOTOSYNTHESIS

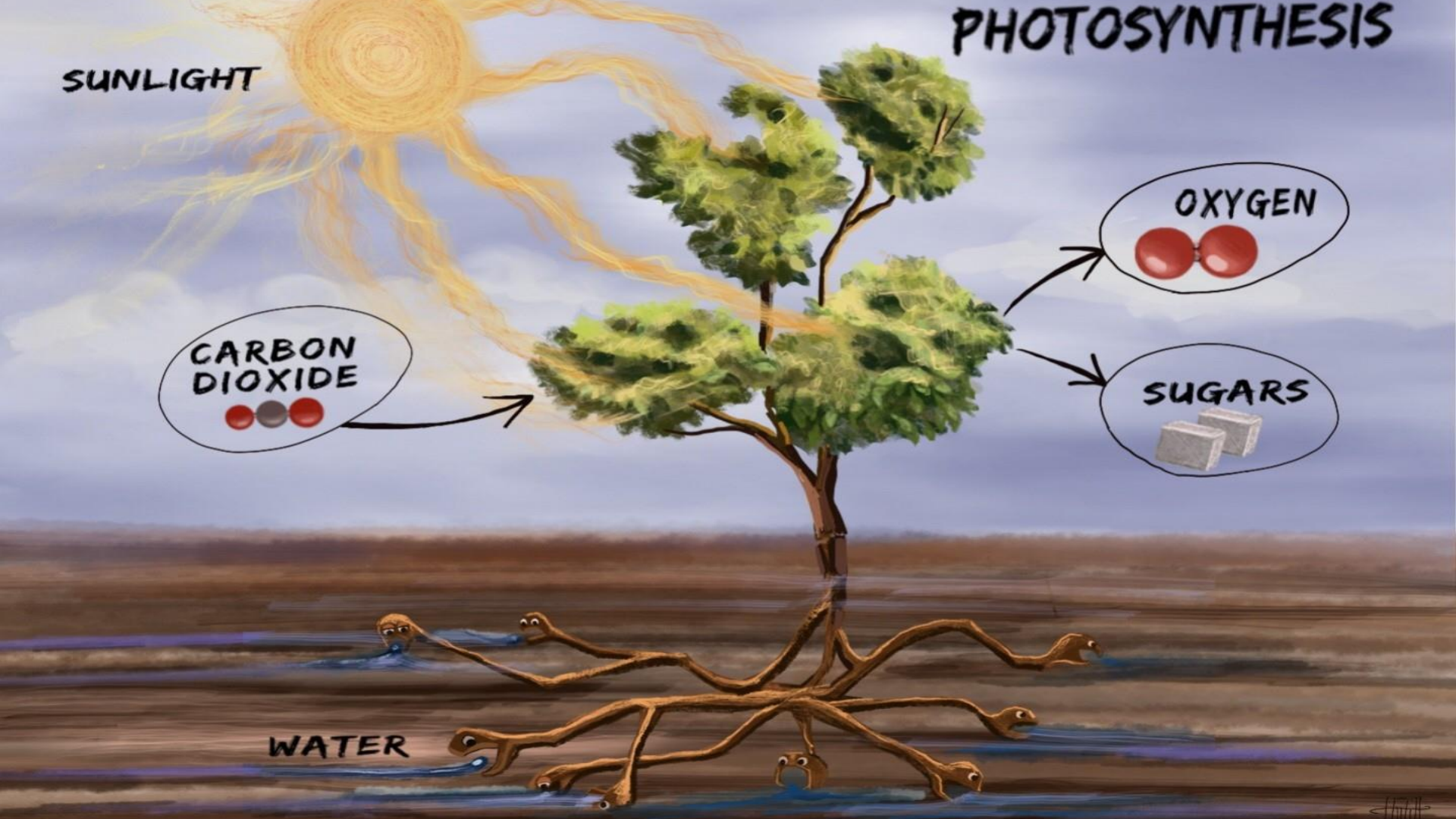
SUNLIGHT

CARBON
DIOXIDE

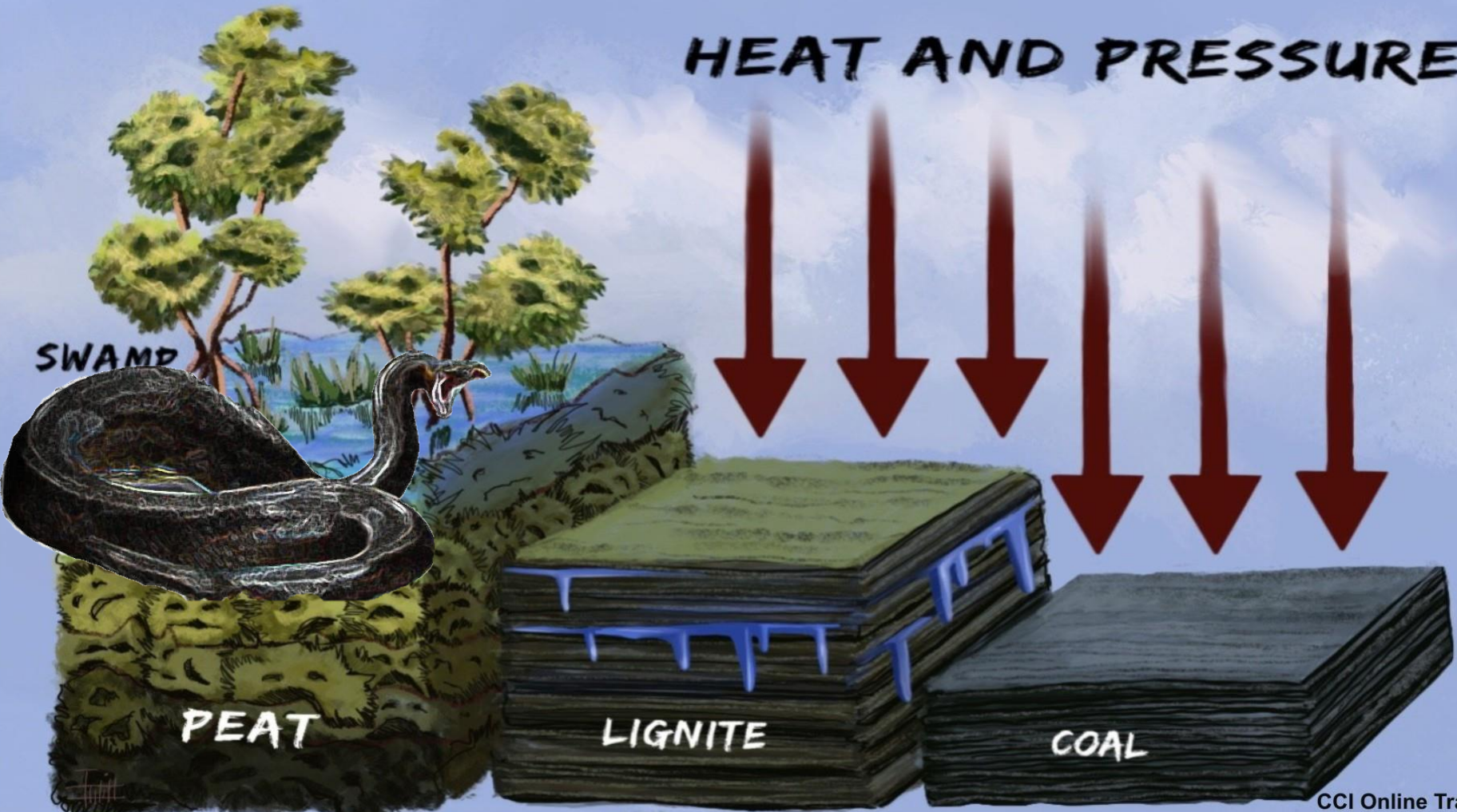
OXYGEN

SUGARS

WATER



HEAT AND PRESSURE





CO₂



Green House Gas



***Climate
Change***

CO2 Reduction - not there yet

Plants – Grow Graze – Burn Biofuels

Capture – Hard to do – OXY - solvent

Sequestration – put back in ground

Actual Uses – More oil – Carbonated beverages

ELEMENTS

9AM 12PM 3PM 6PM

Solar Power
Duck Curve

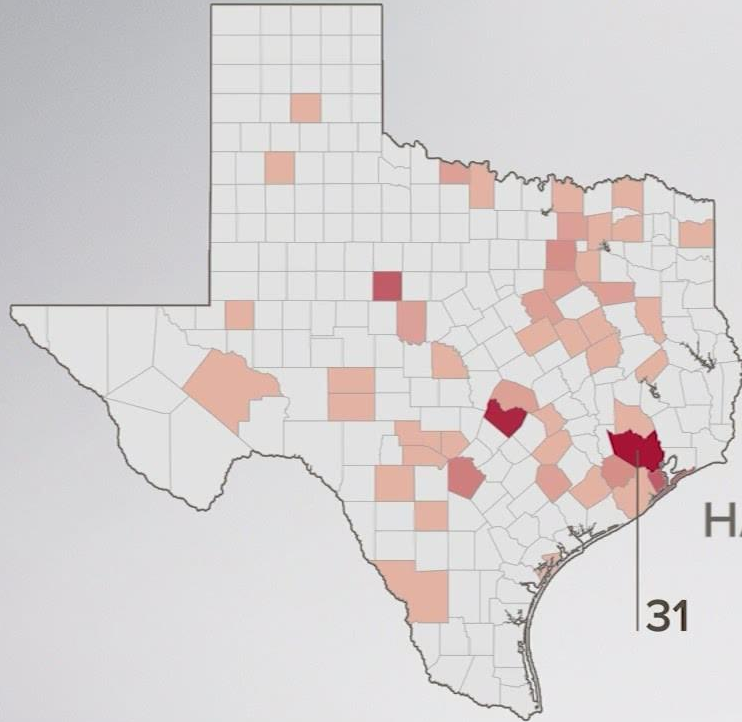
Electric Reliability Electricity Saves Lives Baseload and Reserve Power

Electricity Demand

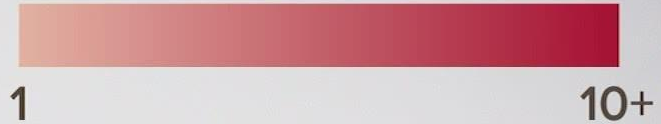
22,000
20,000
18,000



WINTER STORM-RELATED DEATHS IN TEXAS



TOTAL: 111



HARRIS CO

31

Green can be weather dependent

Coal and Nuclear **ONLY** reliable baseload sources

COAL - We know the issues

Nuclear - Still learning about nuclear risk, and long term storage

Mine Reclamation



BEFORE MINING



AFTER MINING



TURKEY

2006



2008





New Steam Plant

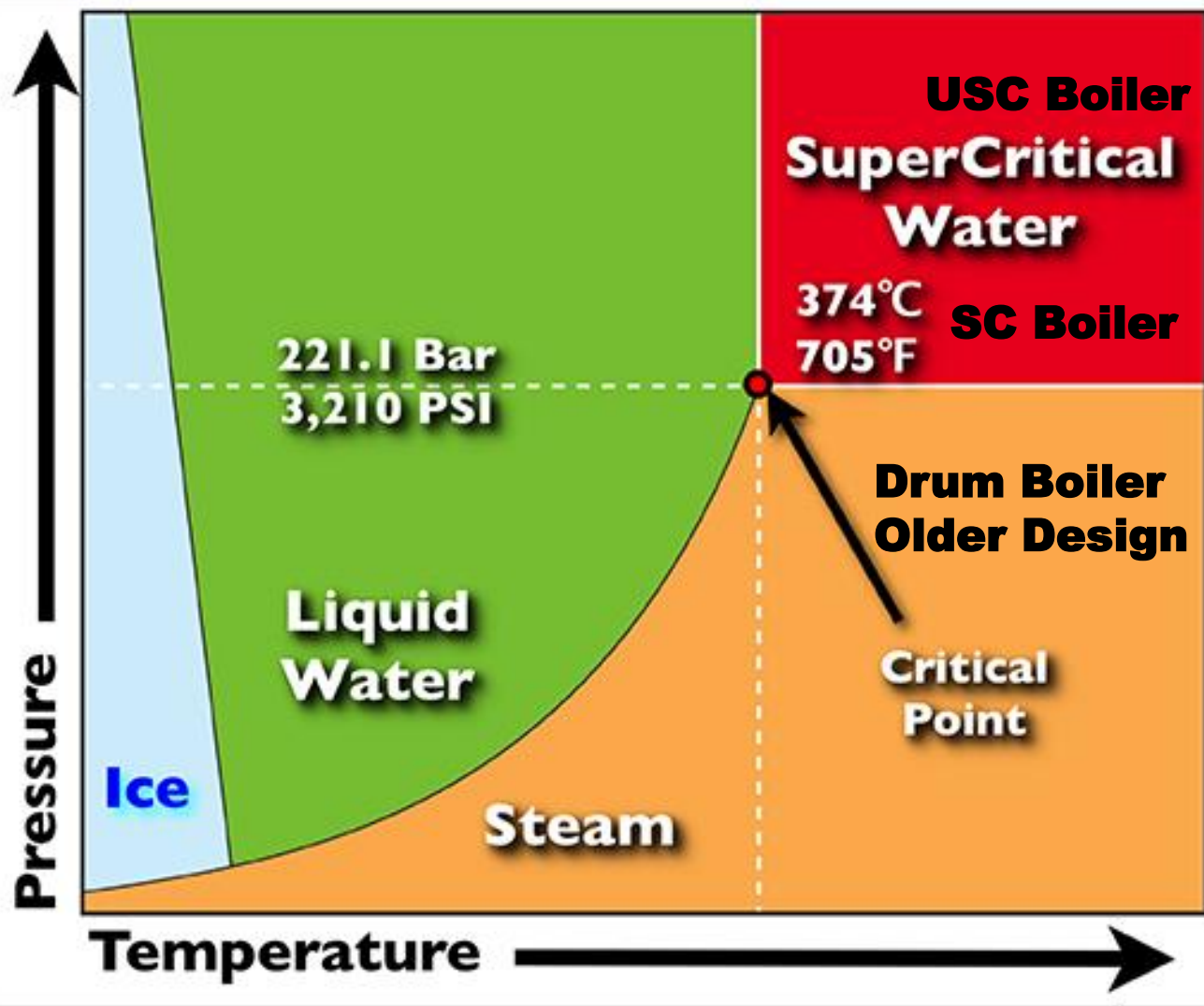
PULVERIZER C

PULVERIZER D

Efficiency Improves

Older plant Heat Rate	10,500 Btu/Kw
New supercritical plant Heat Rate	7,800 Btu/kw

**34% reduction in heat rate =
34% reduction in CO₂**



Reliability Improves

50% Forced Outage – Tube leaks

Can increase over time

Fatigue, Corrosion, Creep, ...

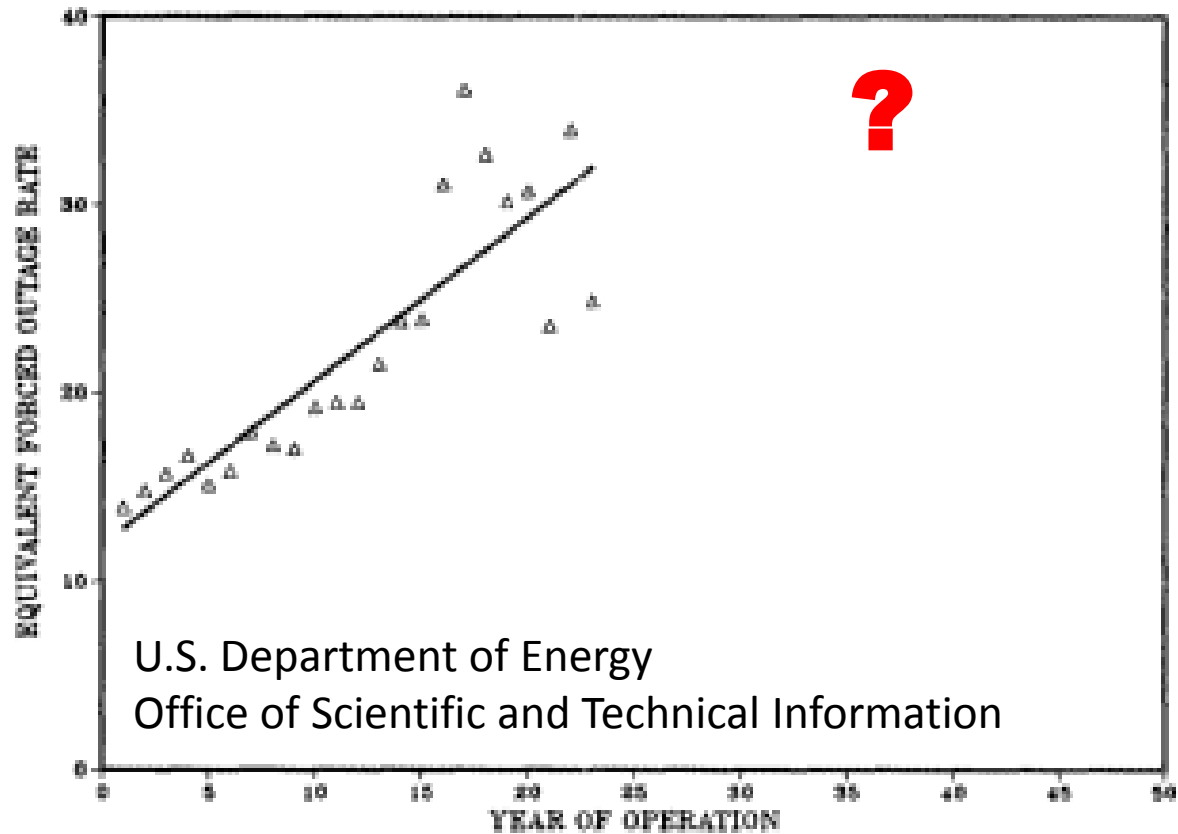


Fig. A.5. Average equivalent forced outage rate and equivalent availability factor as a function of year of operation for the 400-599 MW(e) size range.

Pollution Control

Options Increase

Particulate –

ESP or Baghouse

SO₂ -

LS Coal, Dry and Wet Scrubber

NO_x -

Low NO_x burner, OFA, SCR, Non SCR

Mercury -

ESP, Baghouse, Scrubbers, Additives

Opportunities for Future



New Coal Fired Power

Less CO₂

Better Pollution Control

More reliable

CFB for high ash or waste fuel

Including biomass

Provide Coal for Others

Low cost – surface near coast

Higher Quality ~6,000 CV

Low Sulfur

Low NOx

Rare Earth Elements

Found in coal – clays

Mine waste/prep fines

Power plant ash – encapsulated

Calculated worth \$50-\$250/tn coal



Export – the World Needs you

Low CV coal is lower \$

Many plant designs – High CV
Presently using lower CV due to \$
Looking for high CV blend coal to
recover performance

Domestic – New Plants are Better

New plants provide

Lower CO₂/kW

Less coal use

Lower emissions

Better reliability

Domestic – Opportunities

Rare Earth Elements

Mine Reclamation

Thank You