

Surviving the Power Sector Environmental Regulations

with apologies to Bear Grylls and Discovery Channel

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The Bipartisan Policy Center's
National Commission on Energy Policy (NCEP)

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Regulations

– the challenge!

- Transport Rule
 - NO_x (SCRs, SNCRs)
 - SO₂ (some FGD, some DSI)
 - Not a big stretch after the NO_x SIP Call and CAIR Phase I
- MACT
 - Hg, HCL, metals, etc.
 - Emission rates TBD
 - Of greater concern for coal fired utilities
 - Less flexibility
 - Data not evaluated yet

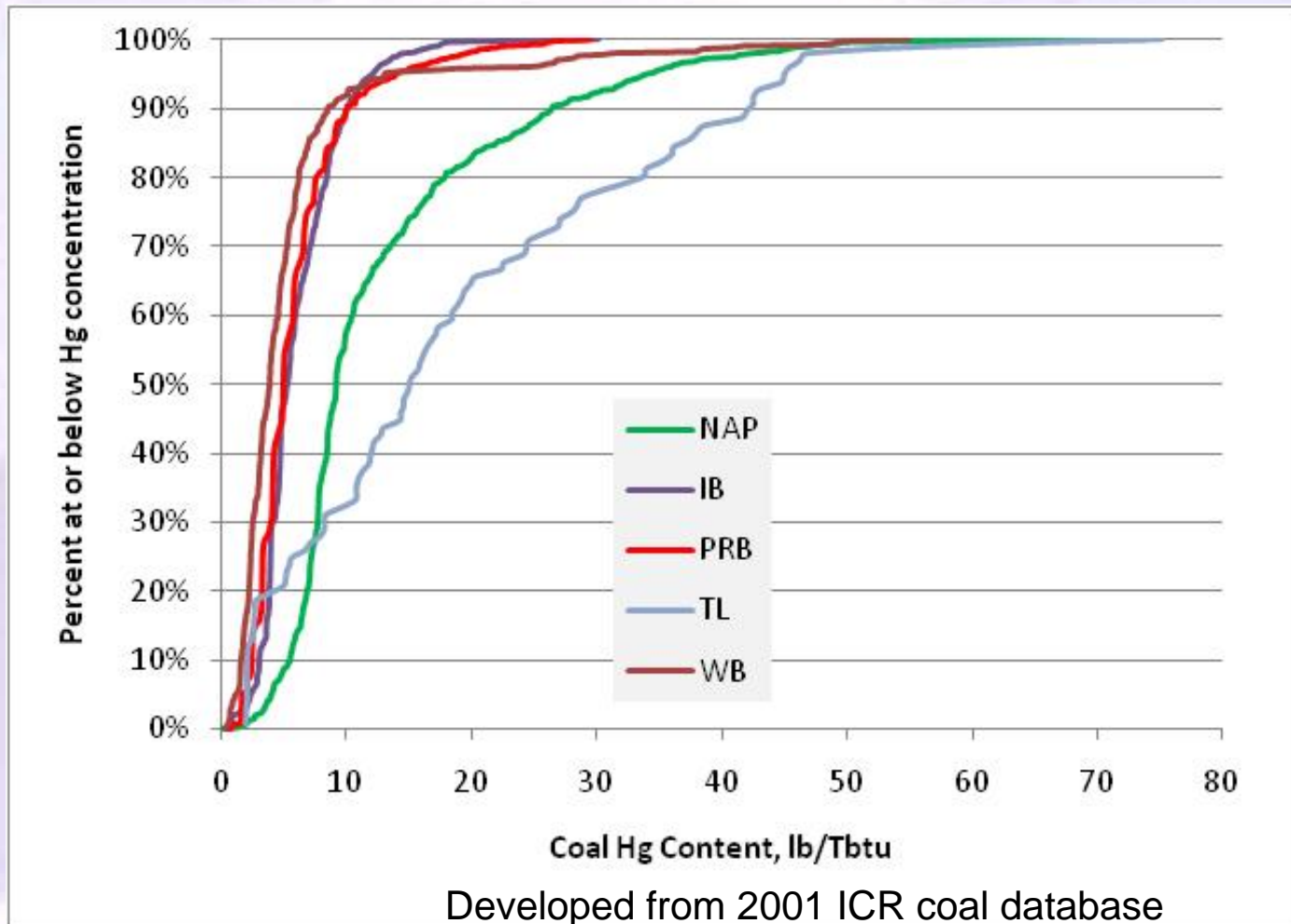
MACT

– know your environment!

- Emission rate, not percent removal
- Average of best 12%, plus an allowance for variability
- Necessary level of removal to achieve emission rate will vary by coal
 - High removal needed for some coals
 - Less removal needed for others

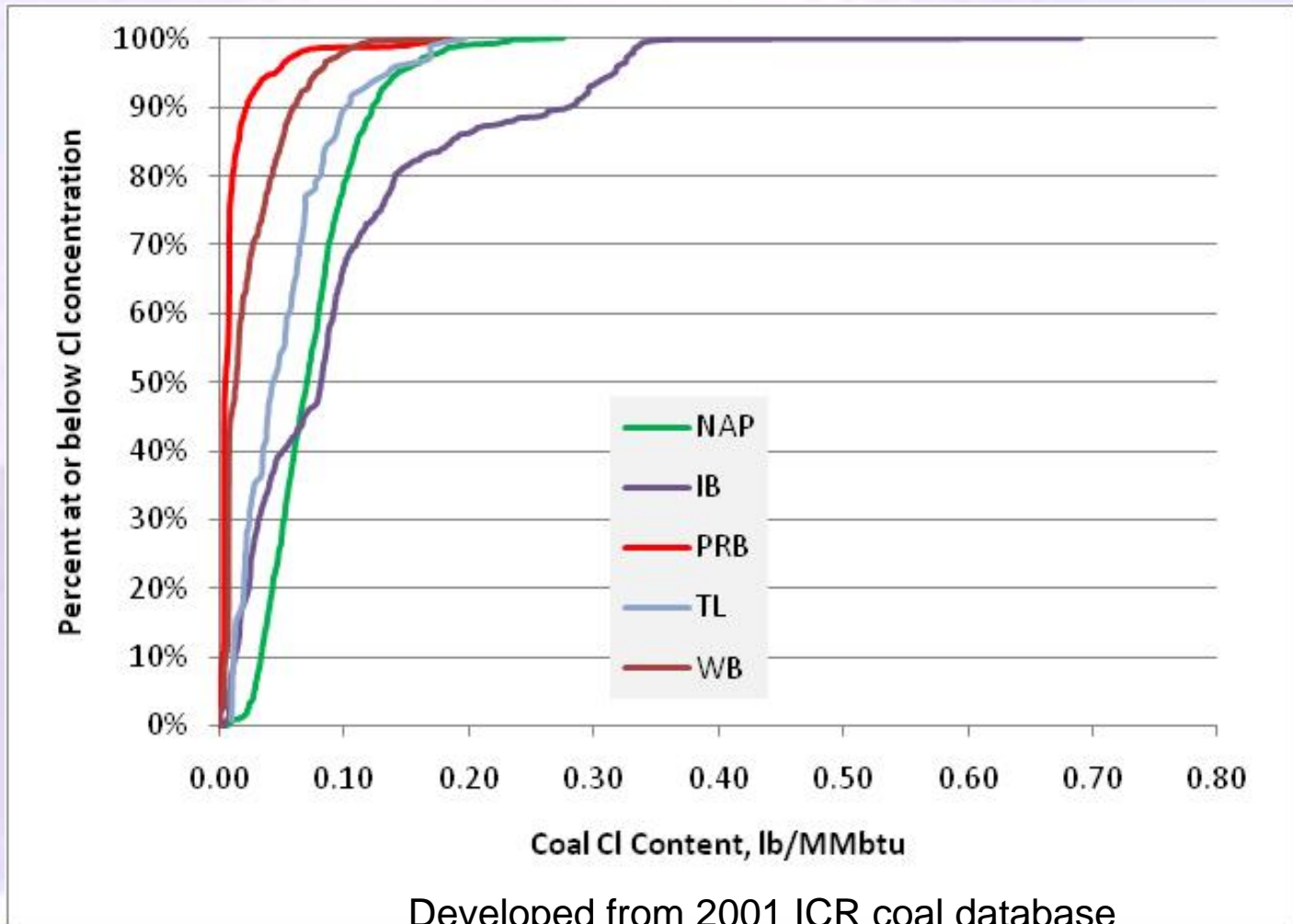
Variability of Coal Hg Levels

some terrain is harder than others



Variability of Coal Cl Levels

some terrain is harder than others



Scrubbed Units

– *easier terrain*

- Likely in good shape for acids (ie., HCl)
- May or may not achieve 90% or more Hg removal without “help”
- Depending upon coal, 90% Hg removal
 - may not be necessary, or
 - may not be enough

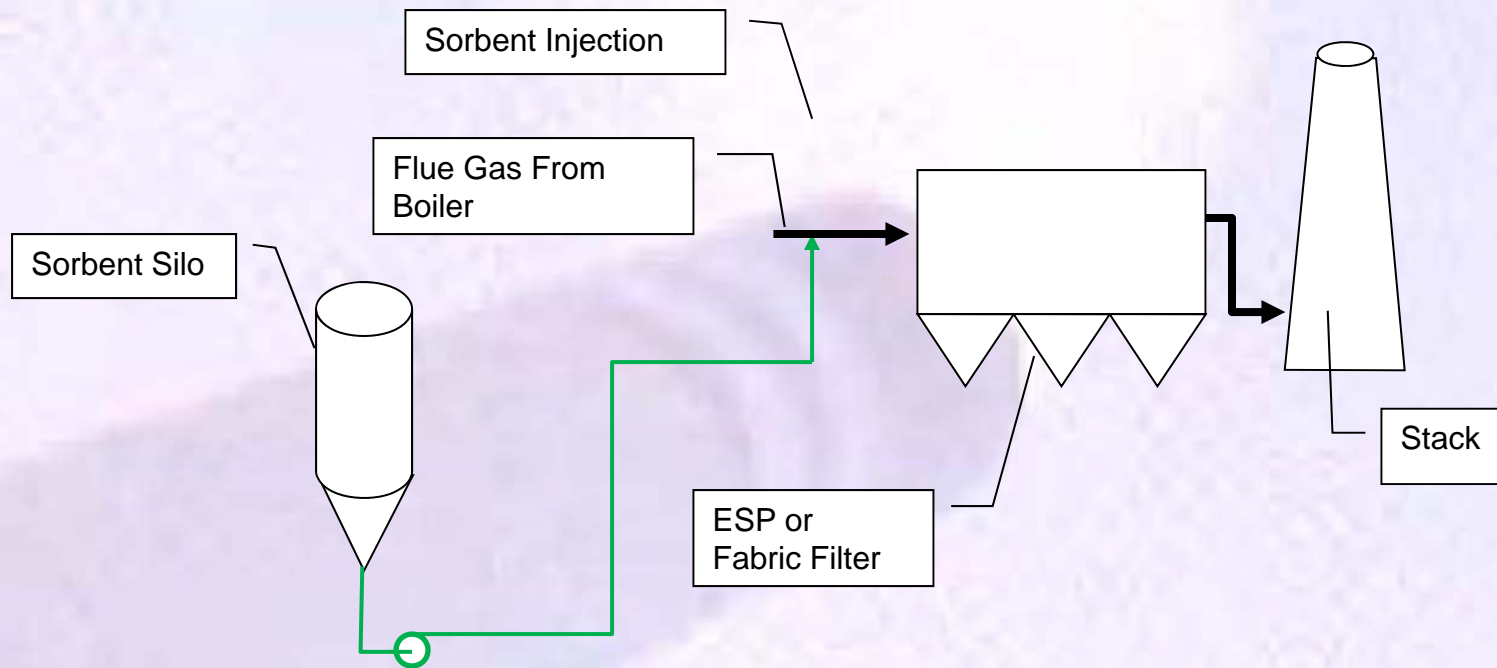
Options for Unscrubbed Units

– harder terrain, but no need to eat bugs

- For PM – ESP upgrades, FF conversions, or polishing baghouse
- For Hg – Activated Carbon and/or Halogen Addition
- For strong acids: HCl, HF, - Dry Sorbent Injection
 - Trona, Sodium Bicarbonate, or Hydrated Lime

DSI Equipment

Key survival equipment for some



Capital Cost (PIPP study)

More expensive than a knife and flint

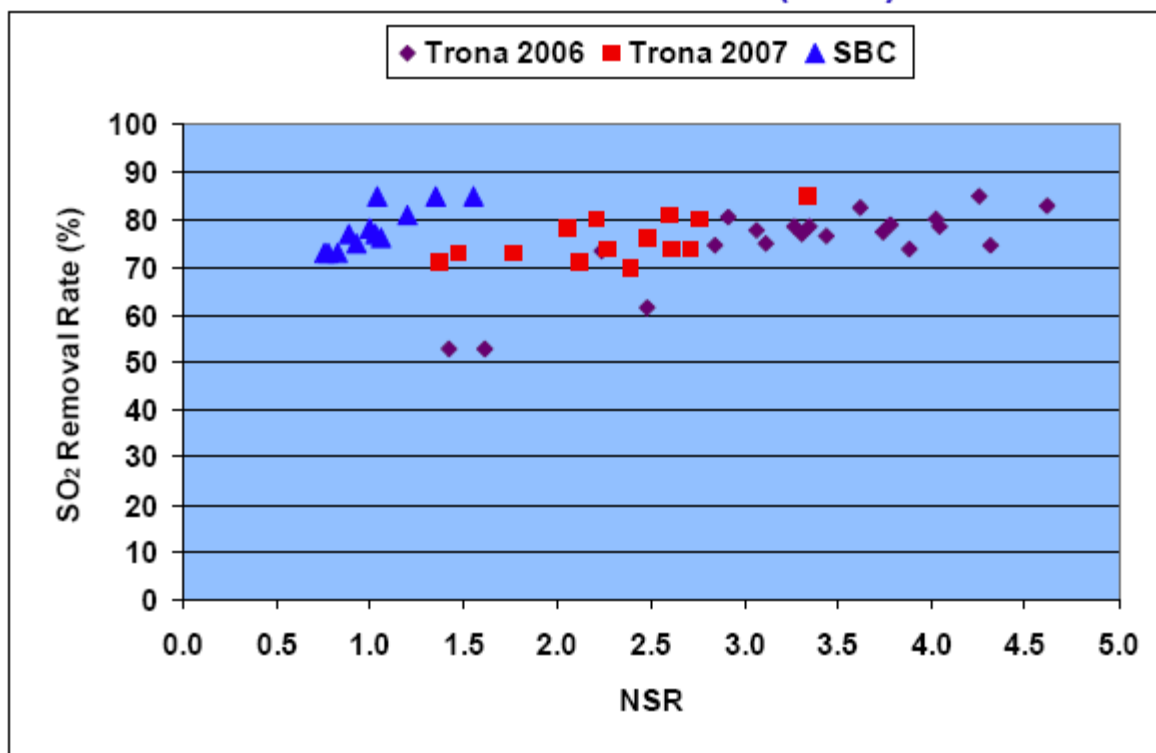
- From Presque Isle Study DSI for SO₂ control
 - One 75 ton silo (one full load day)
 - \$10/kW
 - Three 75 ton silos (three full load days)
 - \$16/kW
- Does not include additional storage capacity or material handling equipment

Considerations with DSI

Cross the glacier with care

- Impact on PM control
- Incremental NO_x removal with Trona/SBC
 - Some conversion to NO₂
- Disposal of by-product
- Impact on Hg capture

SO₂ Removal At Mirant Potomac Station



- The 2006 data was obtained during a test using a temporary set up.
- The 2007 data was generated from a permanent installation
- Unmilled trona Select 200: $d_{90} = 140 \mu\text{m}$, $d_{50} = 30 \mu\text{m}$

Kong, Y., et al, "Dry Sorbent Injection of Sodium Bicarbonate for SO₂ Mitigation", Power Gen 2008

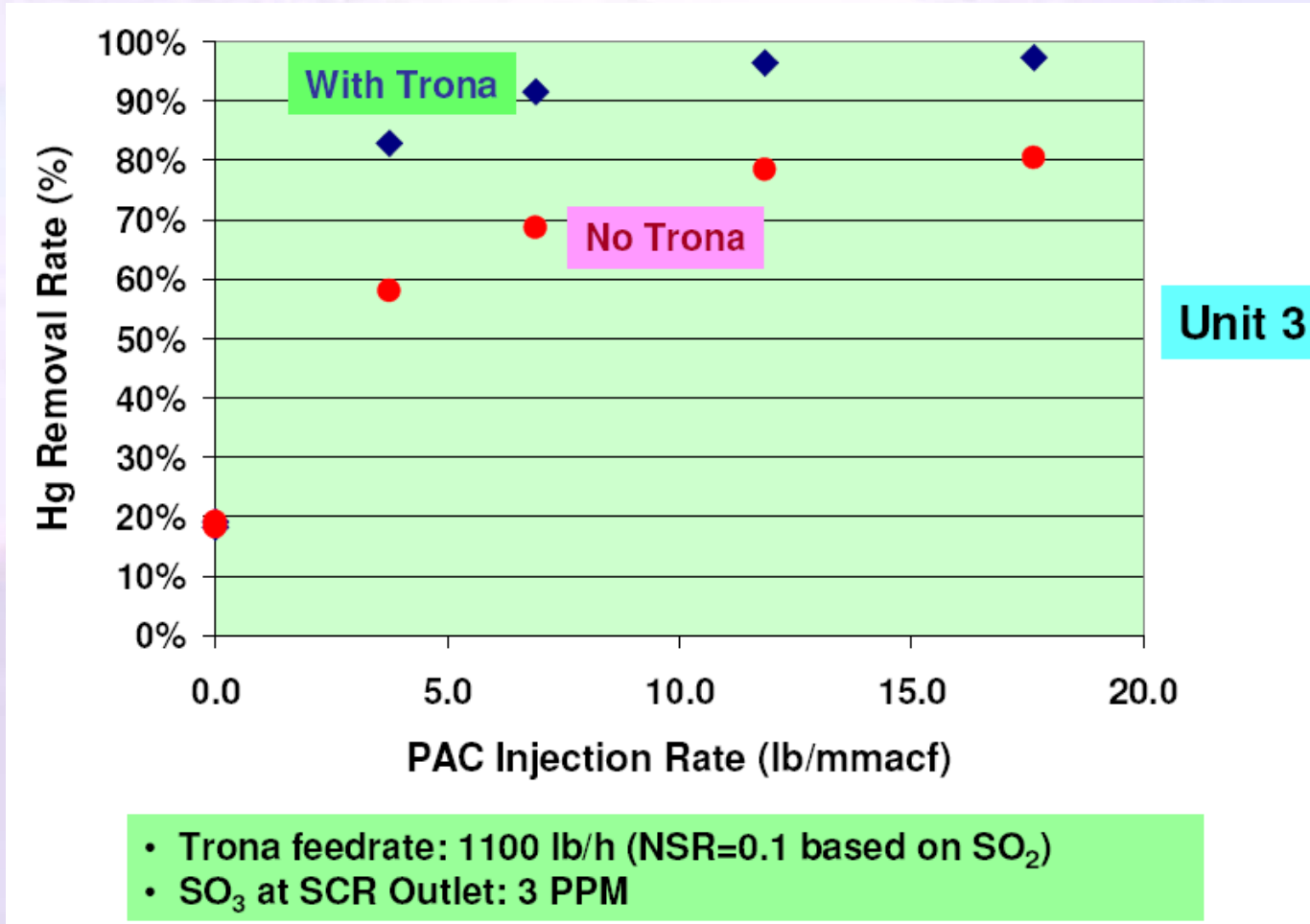
HCl and HF removal at Mirant Potomac Station

Removal of HCl and HF

	Trona Injection	SBC Injection
HCl (%)	98.8	97.8
HF (%)	78.4	88.0

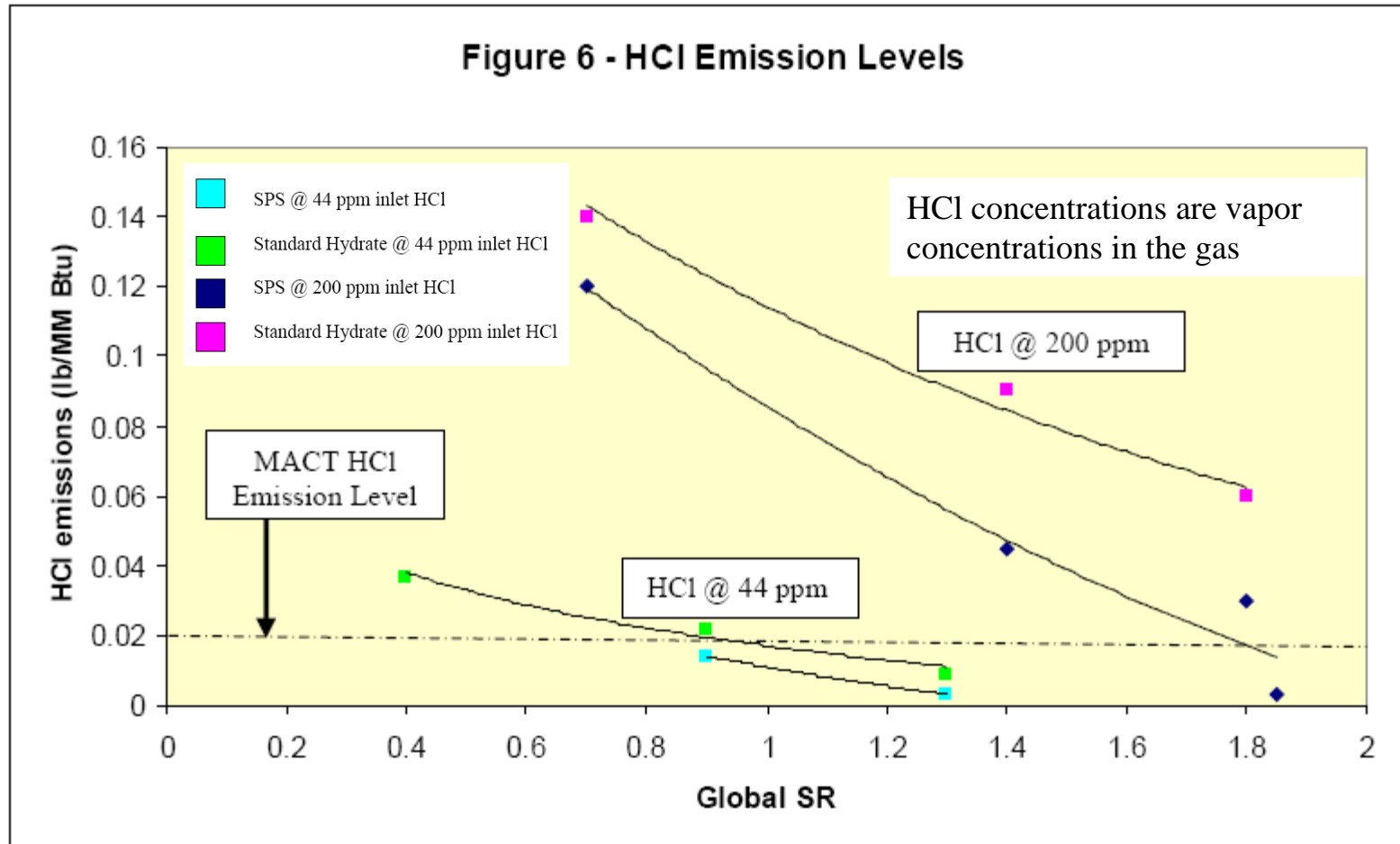
Kong, Y., et al, "Dry Sorbent Injection of Sodium Bicarbonate for SO₂ Mitigation", Power Gen 2008

Hg Removal At Constellation Wagner 3



Kong, Y., et al, "Dry Sorbent Injection of Trona and Sodium Bicarbonate for SO₂, SO₃, NO_x and Mercury Mitigation", Power Gen 2009

Pilot Tests - Hydrated Lime



Dickerman, J., Gambin, A., "Low Capital Cost Acid Gas Emission Control Approach", Mega Symposium (Poster Session), 2010

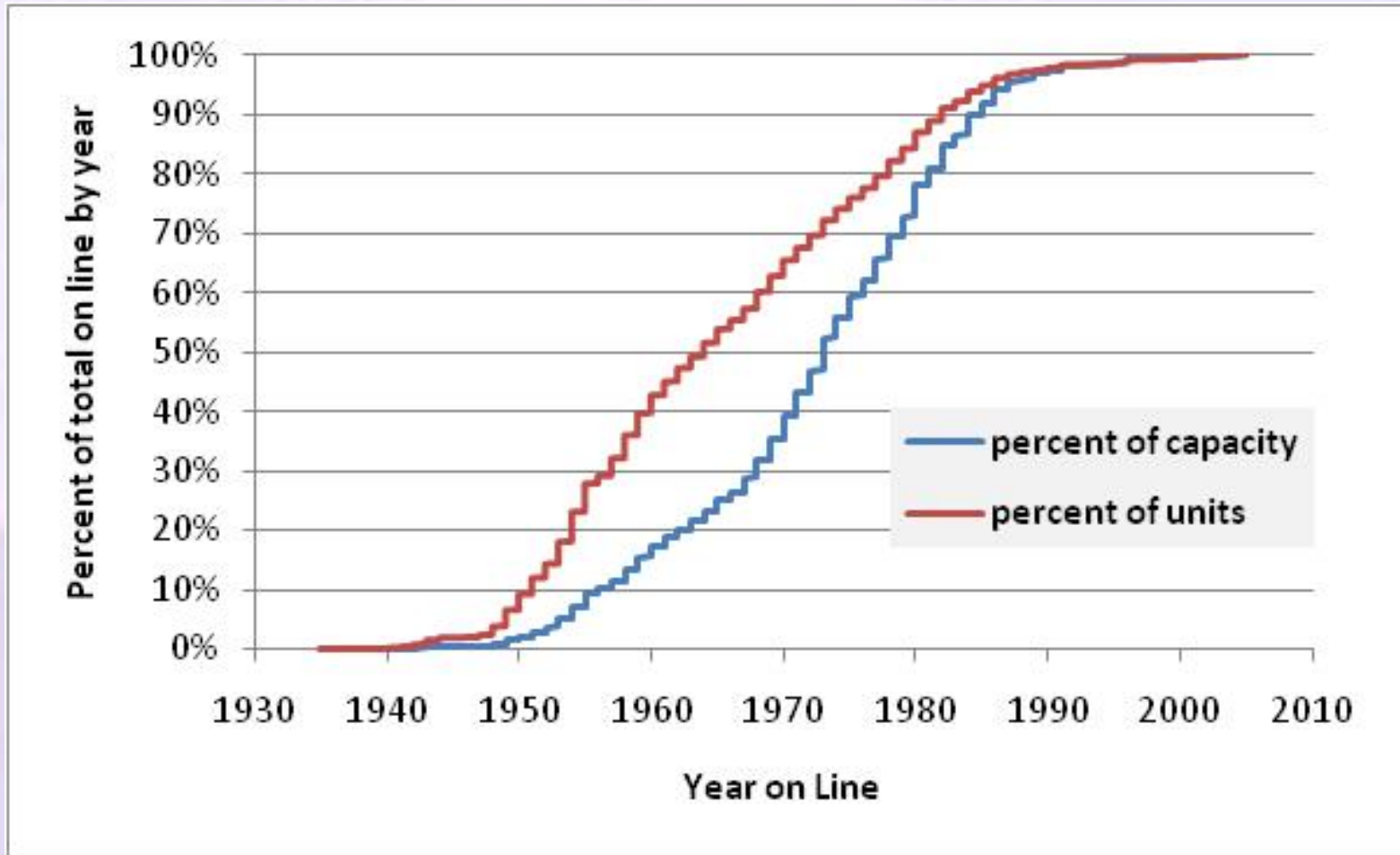
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Regarding Small Plants

Survival of the fittest

- Many Older Small Plants
 - Nearly 40% of units over 50 years old
 - About 15-20% of capacity over 50 years old
- Many are economically on the margin
 - Hard to justify capital improvements
- Some retirements inevitable regardless of regulations

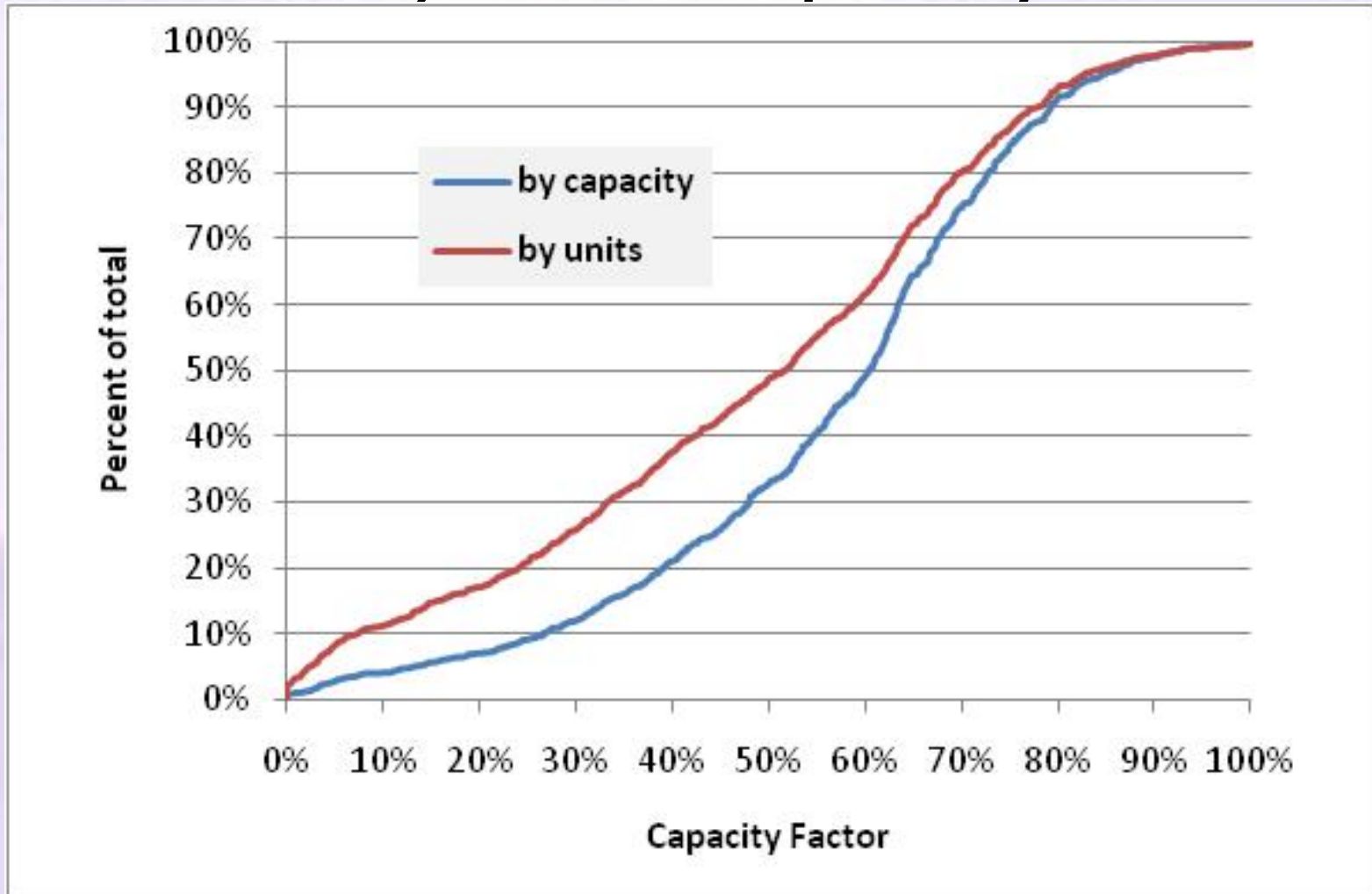
Coal EGUs, year on line



Developed from EGRID.

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Coal EGUs, 2009 Capacity Factors



Developed from 2009 emissions data.

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Thank You!

- For Questions or Comments
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