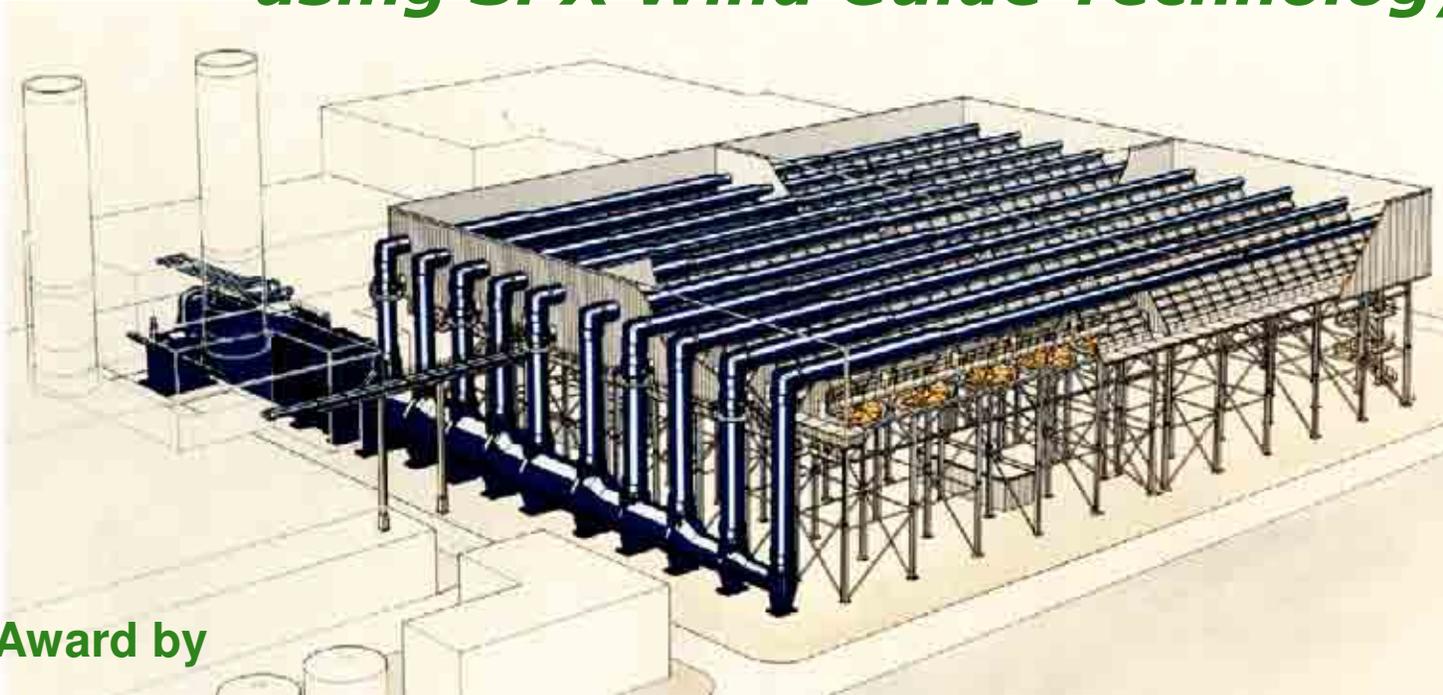


"Improved Performance of ACC using SPX Wind Guide Technology"

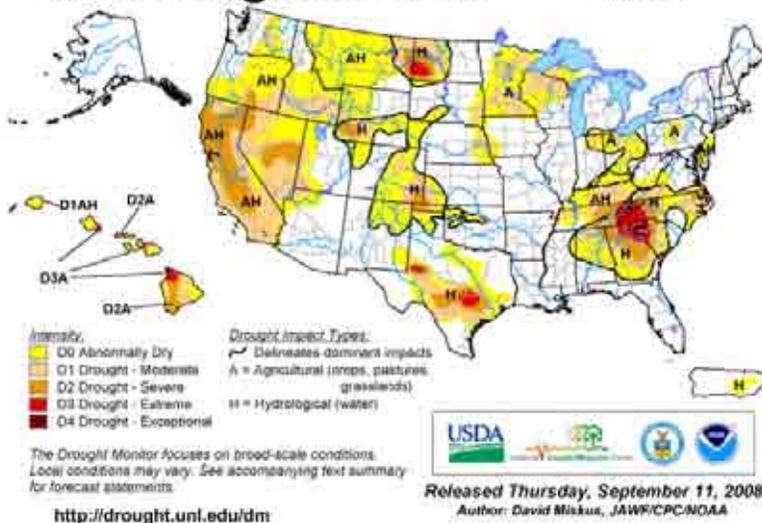


**Award by
National Energy Technology Laboratory,
Department of Energy**

October 27, 2008



U.S. Drought Monitor September 9, 2008
Valid 8 a.m. EDT



“Lake Mead is lower than it has been in 40 years.” “Lake Powell Reservoir is over 100 feet below its normal level.”

National Park Service 2003/2005

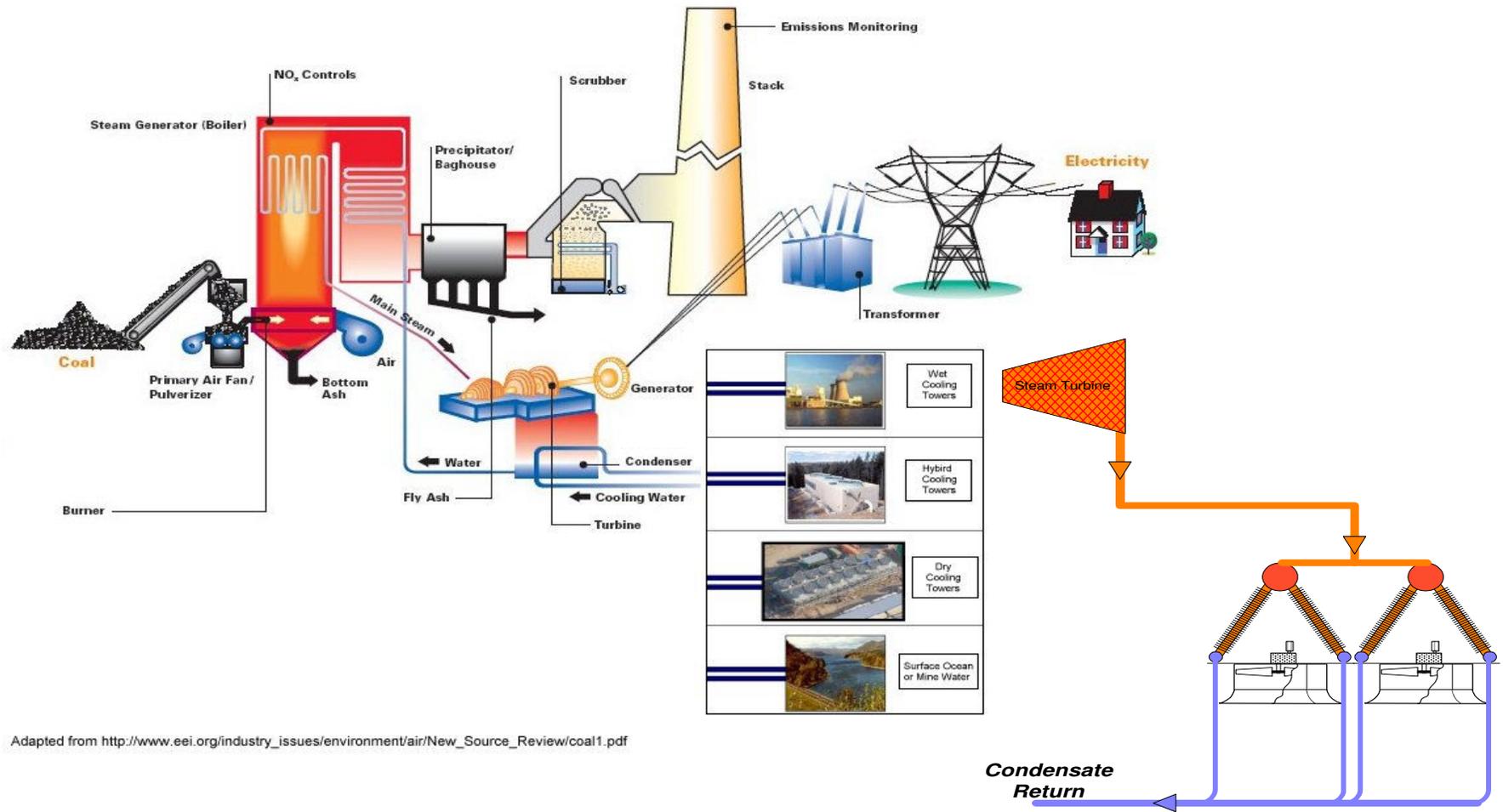
USES:

1. Agriculture, Livestock and Irrigation
2. Fossil Fuel Power Generation

Source: USGS Circular 1268, 2004

Cooling towers represent substantial water usage at power plants, “Producing a kilowatt-hour of electricity... takes about 3/5ths of a gallon of water.” Joey Bunch, Denver Post

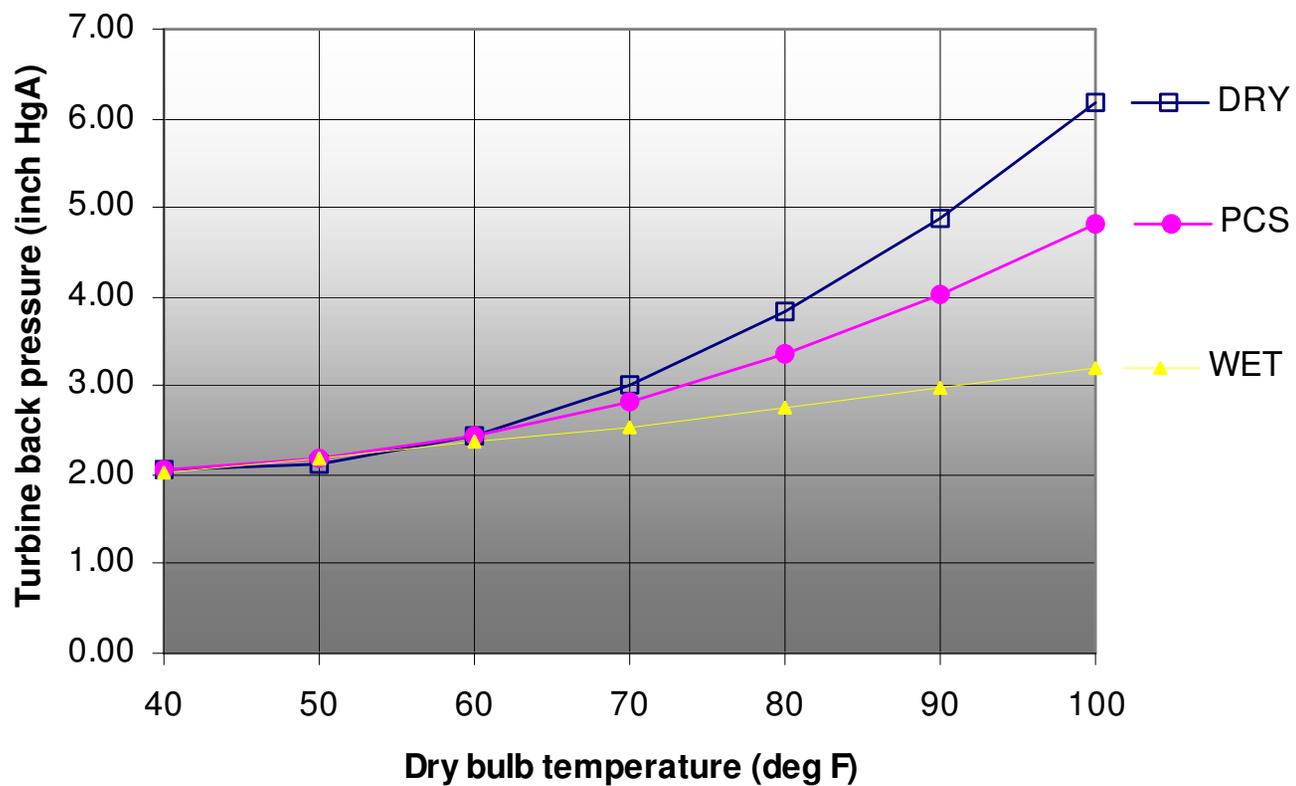
Water at Power Plants



Adapted from http://www.eei.org/industry_issues/environment/air/New_Source_Review/coal1.pdf

- > Grant Program Title is “Research And Development Of Advanced Technologies And Concepts For Minimization Of Freshwater Withdrawal And Consumption In Coal-Based Thermoelectric Power Plants”
 - “Research in this area is intended to develop technologies that improve performance and reduce costs associated with wet cooling, dry cooling, and hybrid cooling technologies.”
 - “DOE nearer-term target is to have advanced technologies ready for commercial demonstration by 2015”
 - “...when used alone or in combination, can reduce freshwater withdrawal and consumption”

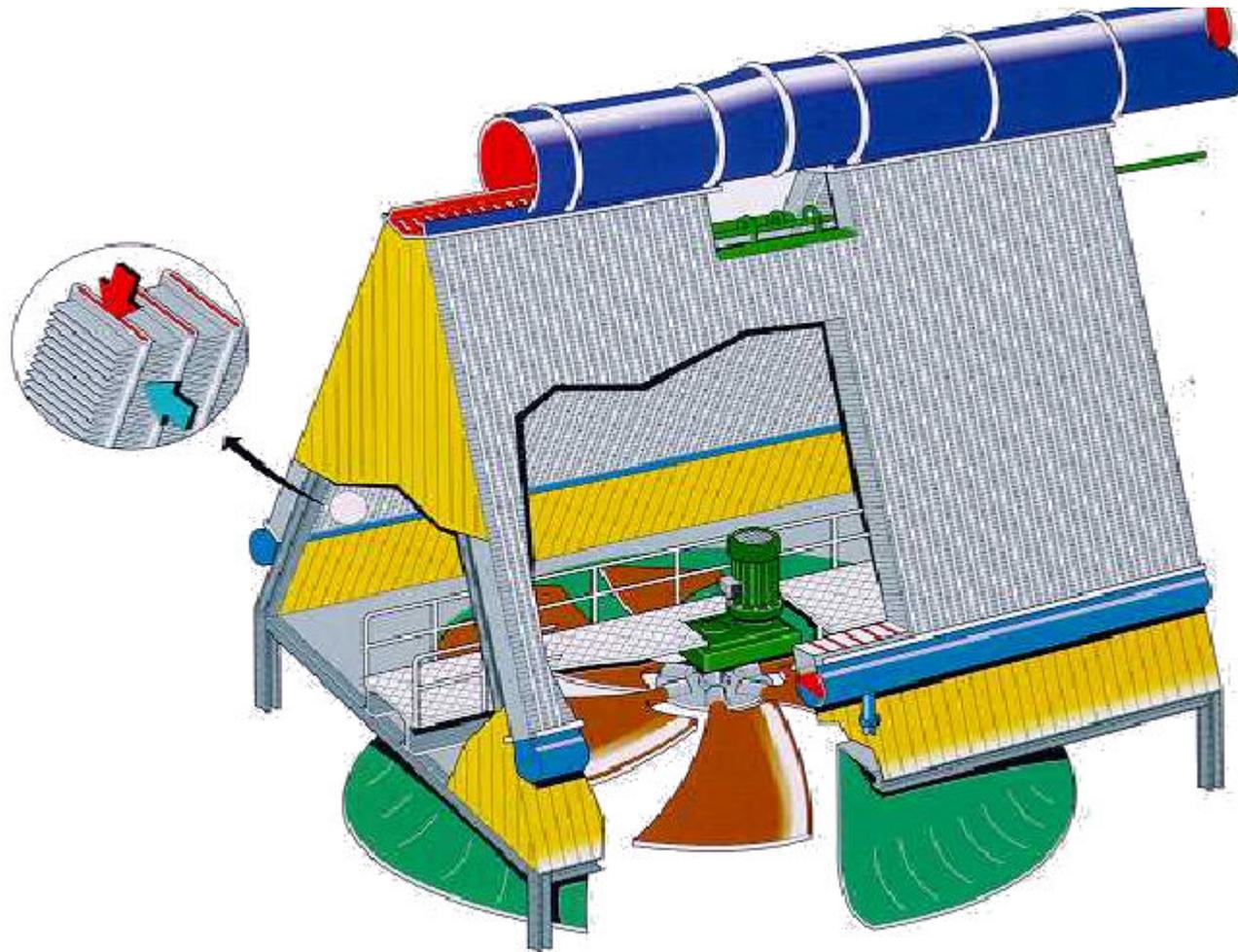
Cooling system performance comparison



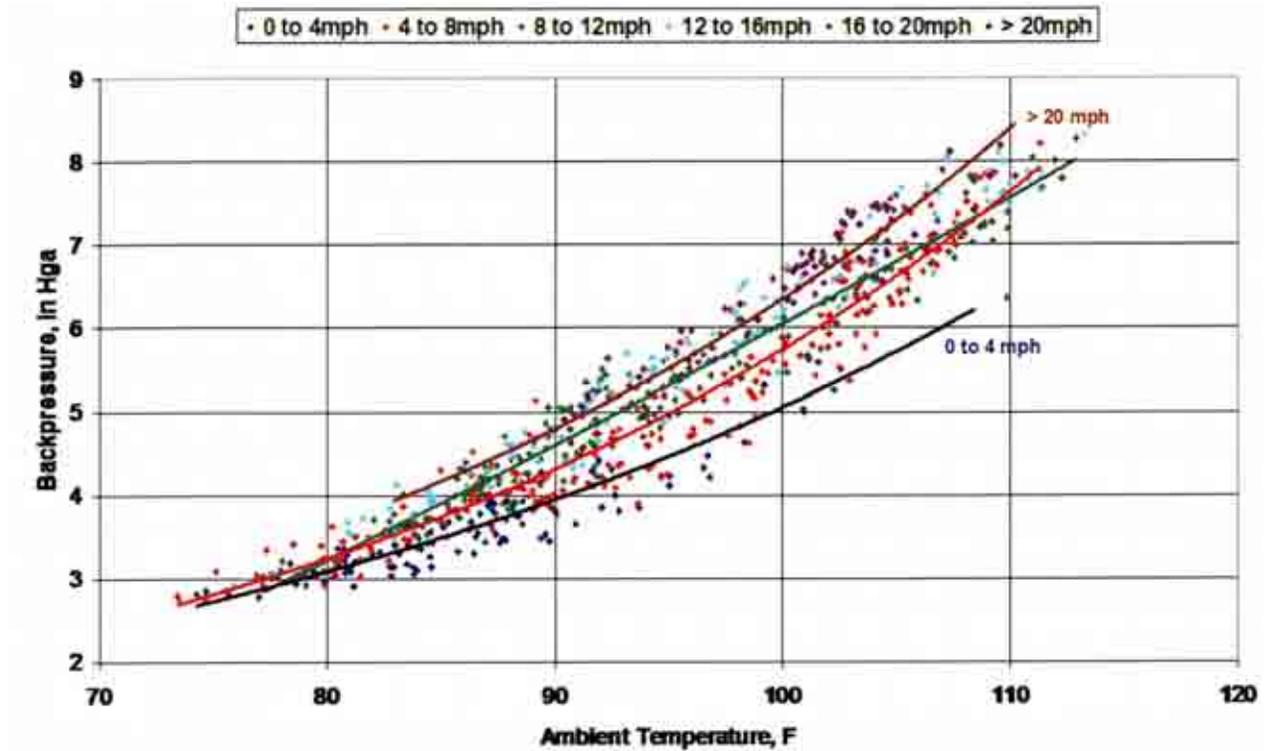




ACC Module



Wind Effects Performance

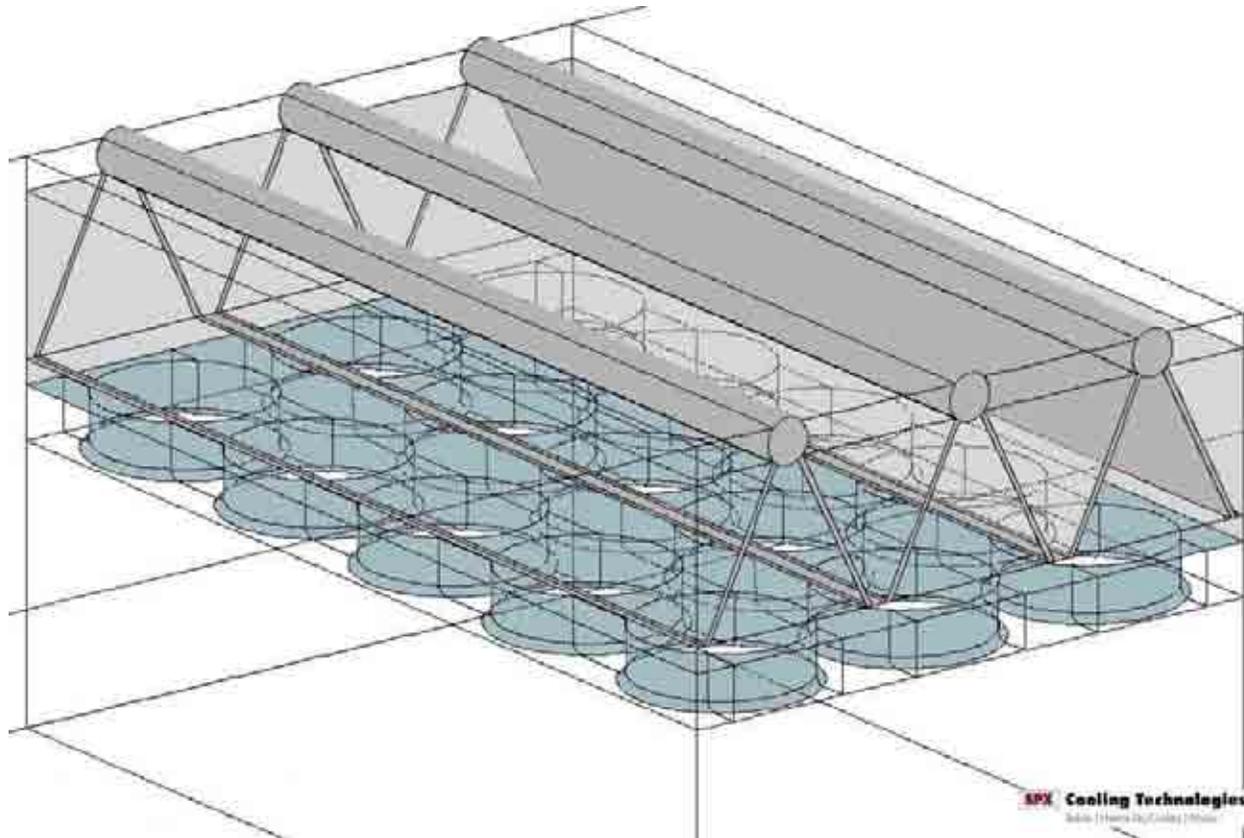


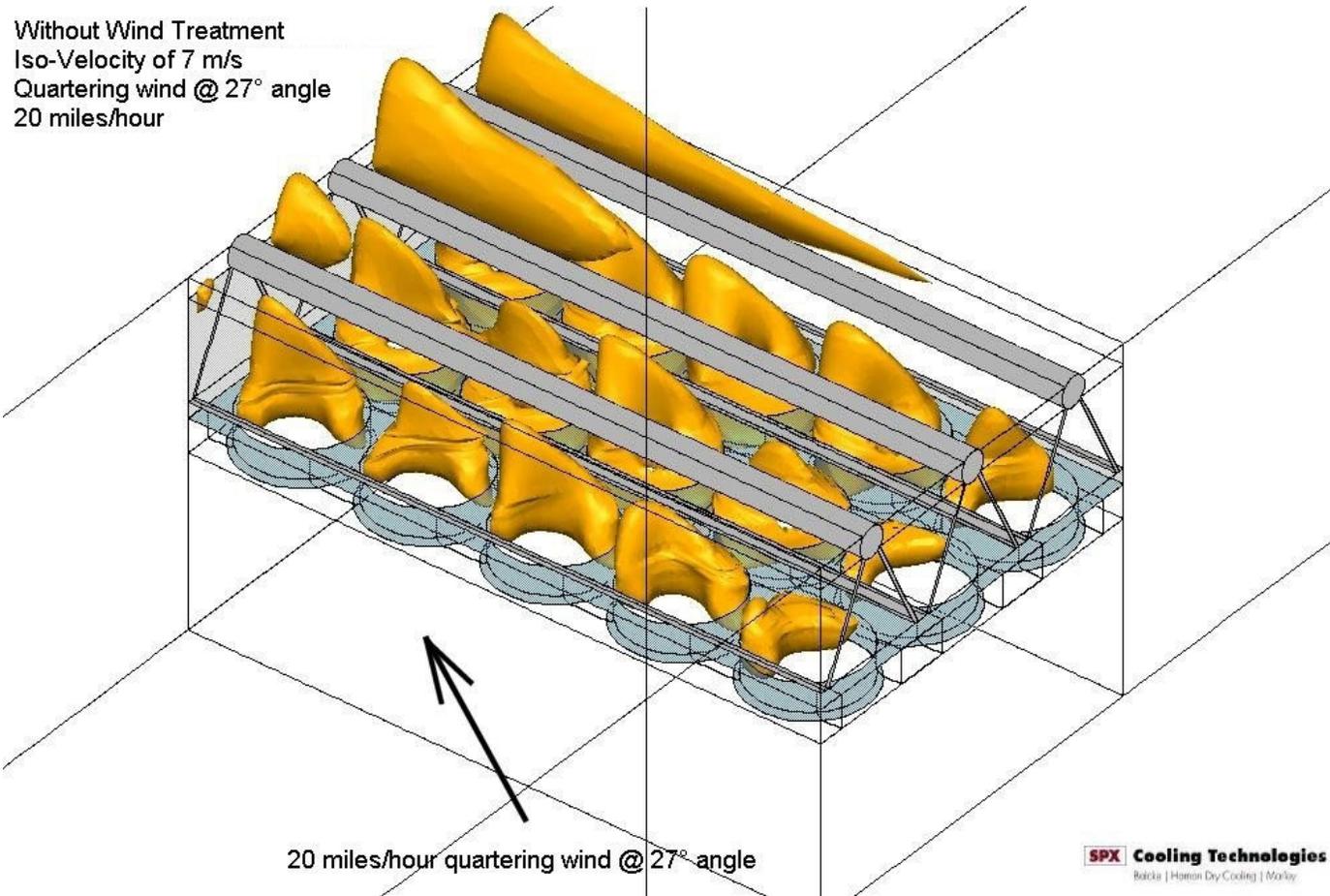
- Fan starving / Stalling
- Recirculation
- Site model testing or CFD analysis to predict performance effects
- Performance of most concern during summer

> Wind Effects – Mitigation

- Optimal orientation
- Reserve capacity
- Conservative design specifications
- **Wind Baffles / Screens / Diverters**
- Fan margin

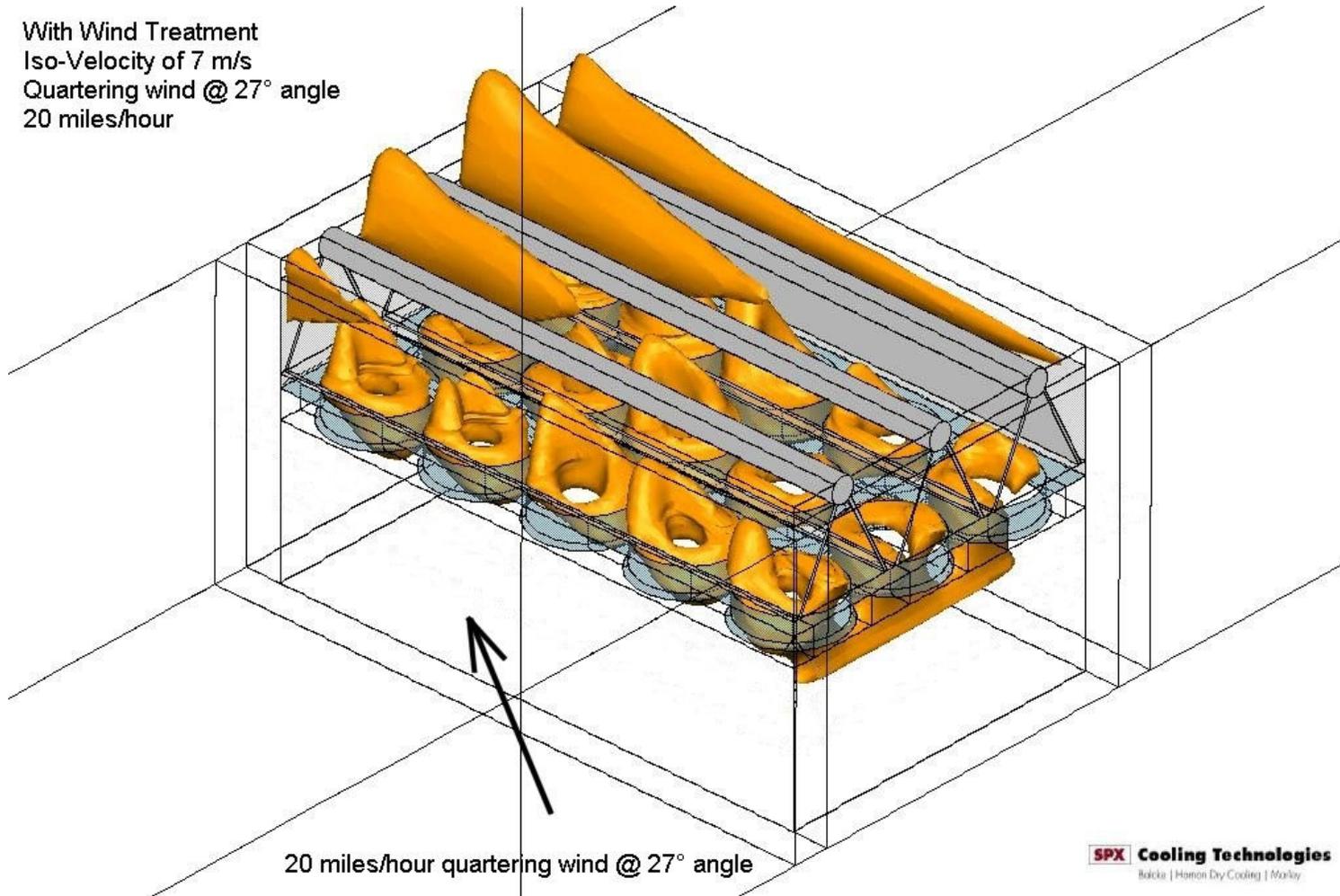
ACC Configuration – Base Design





CFD Modeling – Modified Design

With Wind Treatment
Iso-Velocity of 7 m/s
Quartering wind @ 27° angle
20 miles/hour



SPX Cooling Technologies
Rakola | Hamon Dry Cooling | Mankay

Patent Pending

| Item | Projected Milestone | Date |
|------|-----------------------------------------------|-------|
| 1 | Partner w/Utility: Host Site Agreement | 1/09 |
| 2 | Model Existing ACC Condition | 4/09 |
| 3 | Monitor the Existing ACC Performance | 9/09 |
| 4 | Install Modification | 3/10 |
| 5 | Evaluate Resulting ACC Efficiency Improvement | 9/10 |
| 6 | Reporting | 12/10 |

> Data for verification of an efficiency improvement:

- Exhaust steam pressure (turbine back pressure)
- Exhaust steam temperature
- Condensate flow rate
- Wind speed and direction
- Atmospheric pressure
- Ambient dry-bulb temperature
- ACC inlet/outlet dry-bulb temperature
- Fan motor horsepower

- > ACC Efficiency Improvement / Reduced Costs
 - Lower turbine backpressure
 - Less parasitic power
 - Better summer efficiency
 - Potential for improvement at no/low wind conditions

- > DOE/Industry Effort in an ongoing water conservation investigation



Thanks to the NETL/Department of
Energy for this Opportunity