



WESTERN RESOURCE
ADVOCATES

Modeling Scenarios

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Modeling Scenarios

- Where things are today
- How various futures might look
- Tri-State in the future



Assumptions: Today and Tomorrow

- Tri-State has presented many of the data they'll use to construct a “base case”.
- WRA and others may have alternate views regarding some of these input assumptions.
- WRA will want to create an alternate reference case, partly using data presented today.



Alternate Inputs for WRA “Data Case”

- Fuels price forecasts
- “Most Likely” Carbon Adder
- Technology costs and performance, and additional renewable technology options
- Integration cost assumptions for variable renewable generation
- WAPA hydro availability assumptions
- Environmental cost assumptions (SO₂ credits, NO_x costs, water value, mercury)
- Tri-State will satisfy current requirement for renewable energy



Data Case Changes, cont.

- Data Tri-State has not yet presented, unknown if WRA wishes alternate values:
 - Electrical storage costs
 - Intended Level of DSM
 - Integration Costs for intermittent renewables
 - Additional renewable technologies



Modeling Scenarios

	WRA Data Case (WRADC)	WRADC + High Carbon Costs	WRADC + Low NatGas	TSGT Ref Case
WRA Data Case (WRADC)	X	X	X	
High DSM	X	X	X	
High Renewables	X	X	X	
High DSM + High Renewables	X	X	X	
Gov's Climate Plan	X	X		
Member have 5% DG	X	X		X
HB 1418	X			X
High Coal Costs	X			
TSGT Exports Renewables				



Modeling Scenarios, details

- “High DSM” = Max Achievable from Nexant Study
- “High Renewables” = Colorado HB 10-1001 (30% renewables by 2020)
- HB 1418 = Tri-State purchases 100 MW of distributed generation by 2014
- Governor’s Climate Plan = 20% reduction (from 2005 levels) of Greenhouse Gases by 2020



How Fuel Price Forecasts Effect Unit Dispatch

(Data based on K. Cox presentation)	CT: 100 X 4 simple cycle	CC: 1 X 1 combined cycle	600 MW Super-Critical PC
Heat Rate (Btu/kwh)	8930	6715	9300
2021 Fuel Cost (approx)	\$8.00/MMBtu	\$8.00/MMbtu	\$2.00/MMBtu
Fuel Cost per MWh	\$71.44	\$53.72	\$18.60

Using current Tri-State assumptions, a carbon tax would need to be near \$35/MWh before a combined cycle unit would be more economic (based solely on fuel cost) to run than a coal unit.

(Other variable costs and capital costs are not included in this example.)



How Fuel Price Forecasts Effect Unit Dispatch, part 2

	CT: 100 X 4 simple cycle	CC: 1 X 1 combined cycle	600 MW Super- Critical PC
Heat Rate (Btu/kwh) (Per KC)	8930	6715	9300
Alternate 2021 Fuel Costs	\$6.50/MMBtu	\$6.50/MMbtu	\$2.50/MMBtu
Fuel Cost per MWh	\$58.05	\$43.65	\$23.25

In this example a carbon tax of around \$20.00 would make natural gas powered combined cycles economically competitive as baseload units. (Other variable costs and capital costs are not included in this example.)



Future Modeling Scenarios

- WRA would like to propose a “Tri-State We’d Like to See” scenario, but can’t propose details until we see results from the current scenario runs.
- This scenario should include (among other things) “Achievable DSM” and removing PC units without CCS from the model options.