

cleanenergy.org

Southern Alliance for  
Clean Energy



# Privatizing Bellefonte: The Good, The Bad & The Ugly

**October 2013**

# SACE's Response to Bottorff & Haney Nuclear Privatization Scheme

- **SACE strongly supports the retirement of TVA coal-fired power plants**
- **B&H nuclear privatization scheme:**
  - Simplistically constructed
  - Contains numerous factual errors
  - Offers unrealistic promises on rates and schedule
- **SACE strongly resists those who use uninformed political pressure in an attempt to benefit sub-regions of the TVA service territory and/or enrich former board members and political donors**

# Problems with Bottorff & Haney Nuclear Privatization Scheme

- **Privately financed nuclear power still unwise**
  - High risk, high cost to consumers
- **Current privatization conversations are driving up TVA's cost of borrowing now**
- **Natural gas pivotal to TVA, B&H concepts**
  - Scale of gas plants reflects supply-side preference
- **Industrial rate reduction is unfair**
  - TVA already has low industrial rates
  - B&H rate reduction amounts to \$1.8 billion transfer to direct serve industrial customers by borrowing on backs of all other customers
- **Lower risk choices: energy efficiency, wind, solar**

# B&H Nuclear Privatization Commits TVA To Unnecessary, Costly Bellefonte

- With Watts Bar 2, TVA has sufficient baseload thru 2023

- Bellefonte cost compares poorly with Watts Bar, NGCC

- \$575 M/yr Bellefonte
- \$250 M/yr Watts Bar 2
- \$140 M/yr NGCC

- Bellefonte is unlikely to qualify for Production Tax Credits

- Not a post-1993 “advanced nuclear power facility”
- Unlikely to be have an in-service date before January 1, 2021
- Facility must be owned by a taxpayer (TVA is not a taxpayer, it is a federal agency)
- John Sevier combined cycle style lease (TVA holds tax title) cannot be used to transfer benefits between TVA and a private nuclear plant owner

## TVA Major Resources



Source: TVA, Congressional Briefing (September 13, 2013).

# Rosy Scenario, Not Private Financing, Drives “Attractive” Results

- **Cost of Capital at 5%; equity share only 10%**
  - Assumes leaseback requires 50-75 bps premium over TVA rate
  - Sensitivity restricted to a 6% study, costs could easily go higher
  - Windfall to project finance team could be over \$250 million in fees
- **TVA privatization review is driving borrowing costs up**
  - Unclear if B&H proposal is linked to this larger issue
- **Project cost assumed lower than TVA**
  - TVA: Unit 1 @ \$8.1 billion by 2021
  - B&H: Unit 1 @ \$7 billion by 2018, Unit 2 @ \$4 billion by 2020, plus construction interest and \$0.8 billion for operations 2018-2020
  - B&H: Cost includes 40% contingency, but still appears low
  - B&H: O&M costs are today’s best-case costs, no forecasting
- **Project cost assumes no cost overruns or delays**
  - No sensitivity tests on scheduling delays, construction interest risk
  - Bellefonte unit 2 requires 500 kV transmission line with feasibility issues, 500 kV transmission lines generally require a decade to complete
- **Key contract terms aren’t spelled out**
  - Proposal doesn’t credit TVA with benefits of PTC; Would this represent a financial windfall for developers?
  - Who bears substantial financial risks associated with PTC?
  - Take-or-pay PPA provisions
  - PTC terms potentially in conflict with operational control
  - Failure to deliver due to an outage, replacement power
  - Failure to meet in-service deadline for reasons outside B&H control

## Rate Impacts of Resources

### Full-year impact after in-service

	\$ Million		
	Watts Bar Unit 2	Bellefonte Unit 1	Combined Cycle
In-service:	FY16	FY21	FY21
Construction Cost (with AF/UDC)	\$ 5,000	\$ 8,100	\$ 1,200
Debt Pay Down/Depreciation	125	200	30
Interest Expense	200	400	60
O&M and Base Capital	125	250	50
<b>Total</b>	<b>450</b>	<b>850</b>	<b>140</b>
Fuel Savings	(200)	(275)	-
<b>Net Impact</b>	<b>\$ 250</b>	<b>\$ 575</b>	<b>\$ 140</b>

WBV U2 construction cost without AF/UDC \$2.2 billion. B&H over-shoulder financing scenario. B&H cost above assumed PTC in scenario and is best case of \$7 billion based on WED experience (\$8.1 billion including AF/UDC). The in-service date is shown by PTC deadline and an expected outcome.

## Cost of energy support

Bellefonte – \$4 billion contribution from TVA / ~\$7 billion of Alternative Financing at 5%

	2014-2020						2021
	2014	2015	2016	2017	2018	2019	
Unit 1 Construction (gross)				2,000	2,000	2,000	2,000
Unit 2 Construction (gross)				2,000	2,000	2,000	2,000
Total Bellefonte (gross)				4,000	4,000	4,000	4,000
Total of power to TVA (1,000)				1,000	1,000	1,000	1,000
Less: O&M costs				200	200	200	200
Less: Fuel costs				1,000	1,000	1,000	1,000
Less: Fuel costs (contingency)				200	200	200	200
Less: Reserve costs				100	100	100	100
Less: O&M and fuel costs				1,200	1,200	1,200	1,200
Total cost				2,800	2,800	2,800	2,800
Bellefonte operating cost from before financing				2,800	2,800	2,800	2,800
Alternative financing				1,200	1,200	1,200	1,200
Alternative cost from before financing				1,600	1,600	1,600	1,600
Total cost				4,000	4,000	4,000	4,000
Alternative cost				1,200	1,200	1,200	1,200
Construction cost				2,800	2,800	2,800	2,800
Operating cost				1,200	1,200	1,200	1,200
Total cost				4,000	4,000	4,000	4,000
Alternative cost				1,200	1,200	1,200	1,200
Construction cost				2,800	2,800	2,800	2,800
Operating cost				1,200	1,200	1,200	1,200
Total cost				4,000	4,000	4,000	4,000

Sources: TVA, Congressional Briefing (September 13, 2013); Botthorff and Haney, *TVA Strategic Considerations* (September 2013).

# Flawed Scheme Overstates Opportunity: Coal Retirement Cost Savings

*While coal retirements would cut TVA costs substantially, this proposal may slightly overstate TVA's remaining cost savings opportunities.*

Plant (B – Baseload)	B&H Retain		B&H 39 Unit Retirement Scenario							
	Units	Capacity	TVA Idling Announced				TVA Hasn't Announced Idling			
			Units	Capacity	CapEx*	2021 O&M*	Units	Capacity	CapEx*	2021 O&M*
Allen							3	741 MW	\$ 54 m	\$ 71 m/yr
Bull Run <sup>B</sup>							1	872 MW	\$ 105 m	\$ 20 m/yr
Colbert			5	1184 MW	\$ 152 m	\$ 73 m/yr				
Cumberland <sup>B</sup>	2	2470 MW								
Gallatin							4	976 MW	\$ 96 m	\$ 103 m/yr
John Sevier			4	704 MW	\$ 102 m	\$ 35 m/yr				
Johnsonville	2*	282 MW*	8	924 MW	\$ 138 m	n/a				
Kingston	9	1398 MW								
Paradise <sup>B</sup>							3	2201 MW	\$ 55 m	\$ 210 m/yr
Red Hills <sup>B</sup>	2	440 MW								
Shawnee							9	1206 MW	\$ 150 m	\$ 111 m/yr
Widows Creek							2	938 MW	\$ 23 m	\$ 71 m/yr
<b>Total Units</b>	<b>13</b>	<b>4590 MW</b>	<b>17</b>	<b>2812 MW</b>	<b>\$ 392 m</b>	<b>\$ 108 m/yr</b>	<b>22</b>	<b>6934 MW</b>	<b>\$ 483 m</b>	<b>\$ 586 m/yr</b>

\* Notes: B&H presentation has a typo: the proposal discusses retirement of 39 units, not 29 units. B&H presentation indicates 2 Johnsonville units to be retained, even though TVA has announced idling for all Johnsonville units must be retired by 2017; presumably this relates to local service requirements for an industrial customer. All CapEx estimates are from B&H presentation. All MW are summer capability.

Sources: TVA public announcements; Bothorff and Haney, *TVA Strategic Considerations* (September 2013).

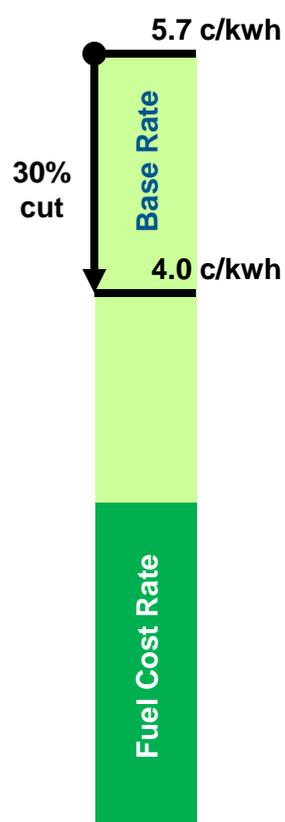
# Flawed Nuclear Privatization Scheme: Coal Retirement Opportunities

- **B&H analysis rests on prospect of:**
  - \$875 million in avoided CapEx expenditures,
  - \$694 million in avoided annual O&M costs, and
  - Assuming avoiding environmental controls at “29” TVA coal plant units representing 9737 MW of summer capacity.
- **The B&H analysis has several obvious flaws:**
  - The 39 units selected for retirement are not the result of a standard utility planning model analysis. TVA would likely identify a different set of priorities for retirement.
  - Several of the cited dates for idling and retirement are mistaken.
  - T&D costs would be substantial as plants are idled; proposed retirements aren’t optimized for reliability.
  - Johnsonville: Two units already scheduled for idling not included in B&H analysis; no O&M savings at all.
  - Double counting: 45% of CapEx and 15% of O&M savings opportunities estimated by B&H are associated with 17 units that TVA has already idled or scheduled for idling.
  - Implications of double counting: Remaining 22 units identified by B&H as good candidates for retirement represent only 6934 MW ... with estimated CapEx of \$483 million and 2021 O&M savings of \$586 million.
- **The B&H analysis rests on several uncertain assumptions:**
  - Environmental controls for coal plants assumed to cost \$24.7 per kW.
  - O&M savings basis is not explained. B&H estimate in context: Retiring nearly 60% of TVA’s coal capacity, which would otherwise be upgraded with environmental controls that would add O&M costs, represents less than 20% of TVA’s current O&M costs.
- **Bottom line on coal retirement opportunities:**
  - Mistakes in representing TVA’s current idling announcements **overstate** potential savings opportunities.
  - Assumptions about capital and O&M costs associated with keeping specific plants online may **understate** potential cost savings.
  - While coal retirements would cut TVA costs substantially, this proposal may slightly overstate the remaining cost savings opportunities.

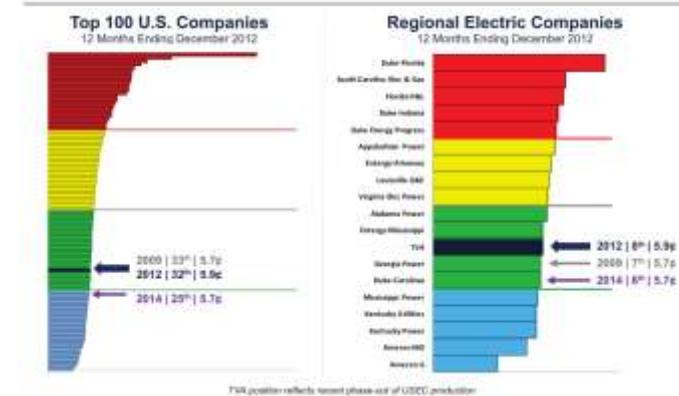
# Natural Gas: Growing Role at TVA

- **TVA's plans for additional natural gas generation**
  - Congressional briefing cites favorable costs for natural gas compared to Bellefonte
  - TVA also anticipates adding about 3-4 GW of additional capacity
  - Retirements drive needs for new power sources at key points on TVA transmission system ... that Bellefonte can't supply.
- **B&H discuss, but don't analyze, natural gas expansions**
  - Describe 3,160 MW of additional natural gas capacity
  - No financing assumptions included in B&H presentation
  - No reserve margin assumptions in B&H presentation (potentially understating capacity need)
  - Assumes 25 years for lifetime of capacity value (Duke using 35 years for CT unit)
- **TVA is making these decisions within a unified resource planning framework**

# Direct Serve Industrial Rate Reduction Would Be Unfair

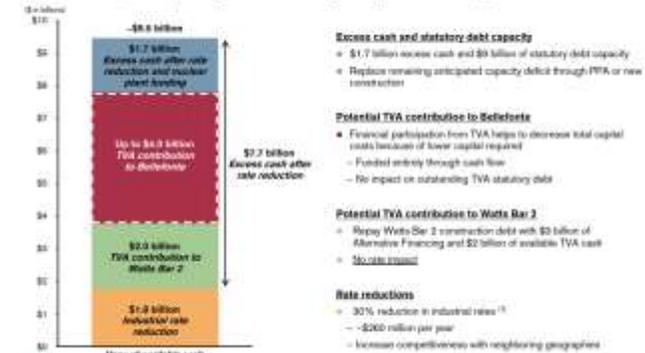
- 
- TVA has demonstrated that its industrial rates remain among the lowest in the US.
  - B&H propose 30% cut in industrial rates
    - Today: 5.7 c/kWh, (inc. 2.4 c/kWh fuel)
    - B&H proposal: 4.0 c/kWh
    - Equivalent to 50% base rate cut
    - Industrial customers contribution to fixed costs would be less than 1/3<sup>rd</sup> that of other customers.
  - B&H proposed \$1.8 billion direct serve industrial rate cut is not possible without well over \$14 billion in private financing
  - B&H financing to be repaid by other residential, commercial and industrial customers

## TVA Maintains Industrial Rate Competitiveness



## Recommended allocation of available cash

Alternative financing enables 30% rate reduction and up to \$6 billion contribution to development of nuclear fleet, while improving financial flexibility through lower statutory debt



Sources: TVA, Congressional Briefing (September 13, 2013); Bothorff and Haney, *TVA Strategic Considerations* (September 2013).

# Resource Planning Can Deliver Clean Energy Resources

- **TVA is starting its resource planning process.**
- **Resource planning considers energy alternatives in a comprehensive framework.**
- **SACE anticipates that a low carbon solution will focus on energy efficiency, wind, and solar.**
- **Efficiency is the least-cost fuel, drives down rates, takes pressure off generation build schedules**
- **Wind is an opportunity for retiring coal plants**
  - HVDC transmission offers the low-cost option
  - In-Valley wind will also compete favorably on cost
- **Solar can augment wind to provide compelling alternative to Bellefonte on cost, performance and risk**

# Energy Efficiency Could Mitigate Need to Build Gas Capacity

- **TVA appears to anticipate about 1,500 MW of EE/DSM on-peak capacity contribution by 2020**
- **A strong, well-funded EE/DSM program should be able to achieve over 3,500 MW by 2020**
- **Energy efficiency is the ONLY system resource option with the potential to drive down energy bills for the majority of customers**
- **SACE's study of Georgia Power showed that a program that reaches 50-60% of its customers over 10 years will reduce their bills by as much as 15-20% on average**

# Value of Energy Efficiency

- **Energy efficiency costs about the same as the cheapest power plant (\$850 per kW) ... with no fuel costs**

- **Benefit far exceeds cost**

*Southeast utility experience:*

- **EE Benefit: \$91-113 per MWh**
- **EE Cost: \$10-30 per MWh**

*B&H forecast costs:*

- **Bellefonte: \$45 per MWh**
- **Natural Gas: \$56 per MWh**

## Efficiency Benefit (\$ per MWh)

Duke Carolinas	97
Duke Progress	113
SCE&G	92
TVA (2010)	91
Pacificorp (Utah)	87
Avista (Washington)	88
<b>Average</b>	<b>95</b>

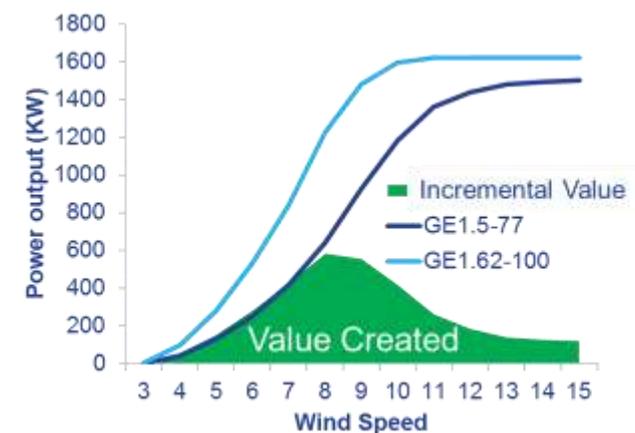
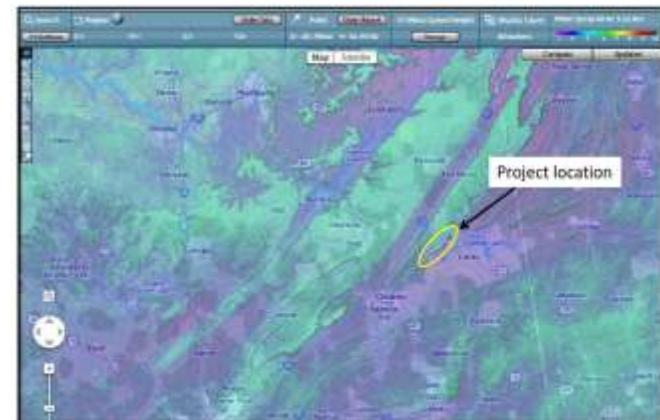
Sources: SACE analysis of PURPA rates filed by utilities, generally for 2012; SACE analysis of Duke Carolinas (2012) and Duke Progress (2012) IRPs; SC&G IRP (2012); Pacificorp IRP (2011); and Avista IRP (2011). Average excludes Georgia Power.



# In-Valley Wind Will Compete

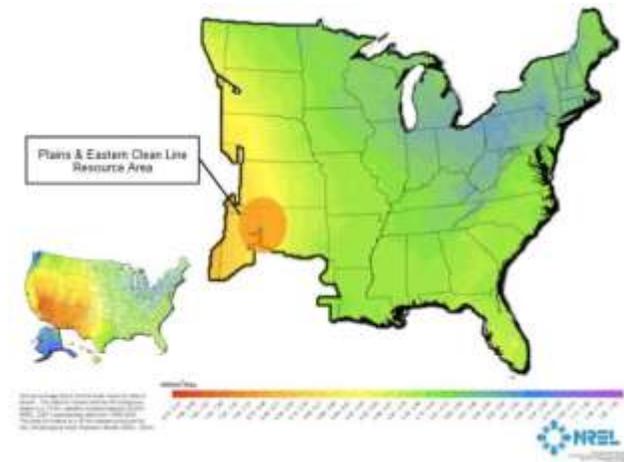
- **In-Valley wind at \$45-60 / MWh with 48% net capacity factor**
  - GE Wind & Pioneer Green Energy estimates
- **3,200 MW of opportunity in region, multiple developers waiting for customer interest**
- **Shinbone Wind Project already under development**
- **Developers are being enabled by new focus on turbines designed for lower windspeed areas**
  - Longer rotors capture lower winds
  - Turbine designs generate more energy & more on-peak capacity

Northeast Alabama Wind Resource

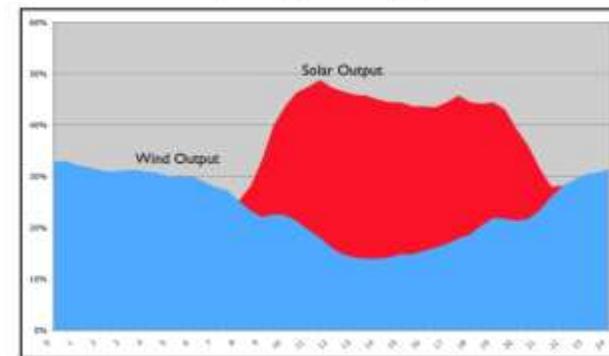


# How Solar Could Augment Wind

- **Solar price trends are headed way down ... virtually guaranteeing that In-Valley solar power will undercut Bellefonte costs**
- **Solar power in western Oklahoma or Texas differs from in-Valley solar in several respects**
  - Approximately 25% more electric production
  - Peak occurs approximately 1 hour later
  - 5% transmission loss penalty
- **Verdict uncertain: HVDC developers have not yet modeled economics of solar + wind option**
  - During on-peak resource periods, up to 1,000 MW of delivery capacity on HVDC lines should remain available at “no cost” (same project costs spread over a larger delivery)
  - However, when wind and solar are both peaking, power delivery would be constrained
  - Power delivery constraints should be balanced against benefits of western-sited solar load shape to determine viability



Combined Solar and Wind Output for Typical August Day  
(Hour of Day vs. % of Nameplate)

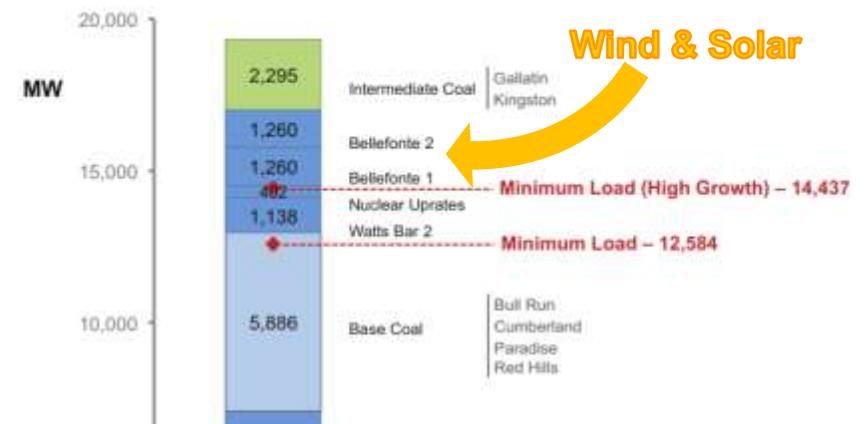


Source: US Department of Energy, National Renewable Energy Laboratory, PVWatts tool (for solar) and ERCOT (aggregate wind production for August 2009).

# Wind and Solar Offer Baseload / Intermediate Generation Flexibility

- HVDC Tx projects are superior alternatives to Bellefonte 1 & 2
- Similar on-peak capacity at a lower cost
- Enhancements include
  - In-Valley wind
  - Solar (In-Valley or HVDC)
- Advantages include
  - No water resource needs
  - Reduced risk of maintenance outages
  - Immediate availability for minimum load turndown
  - Private PPA development – no lease-back management responsibility

## TVA Major Resources



Source: TVA, Congressional Briefing (September 13, 2013).