

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
Total	450	850	140
Fuel Savings	(200)	(275)	-
Net Impact	\$ 250	\$ 575	\$ 140

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 (with AF/UDC)	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Unit 2 Construction (with AF/UDC)	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Total Construction (with AF/UDC)	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Unit 1 O&M (with AF/UDC)	100	100	100	100	100	100	100
Unit 2 O&M (with AF/UDC)	100	100	100	100	100	100	100
Total O&M (with AF/UDC)	200	200	200	200	200	200	200
Unit 1 Fuel (with AF/UDC)	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Unit 2 Fuel (with AF/UDC)	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Total Fuel (with AF/UDC)	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Unit 1 PTC (with AF/UDC)	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Unit 2 PTC (with AF/UDC)	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Total PTC (with AF/UDC)	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Total (with AF/UDC)	10,200	10,200	10,200	10,200	10,200	10,200	10,200

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 ^B							1	872 MW	\$ 105 m	\$ 20 m/yr
Colbert			5	1184 MW	\$ 152 m	\$ 73 m/yr				
Cumberland ^B	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 ^B							3	2201 MW	\$ 55 m	\$ 210 m/yr
Red Hills ^B	2	440 MW								
Shawnee							9	1206 MW	\$ 150 m	\$ 111 m/yr
Widows Creek							2	938 MW	\$ 23 m	\$ 71 m/yr
Total Units	13	4590 MW	17	2812 MW	\$ 392 m	\$ 108 m/yr	22	6934 MW	\$ 483 m	\$ 586 m/yr

* 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).

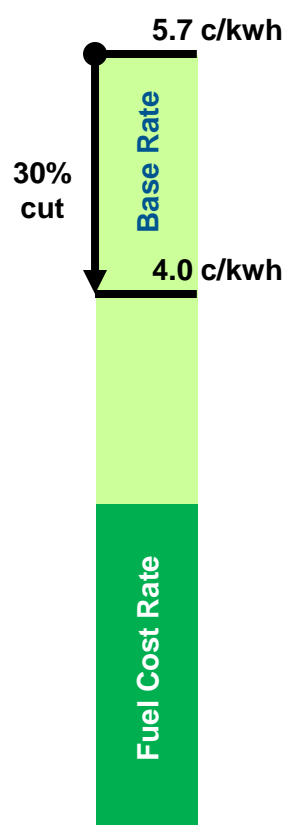
Flawed Nuclear Privatization Scheme: Coal Retirement Opportunities

- **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.

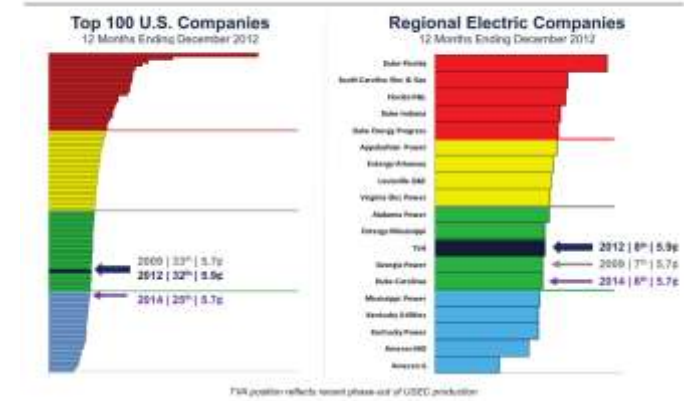
Natural Gas: Growing Role at TVA

- **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**

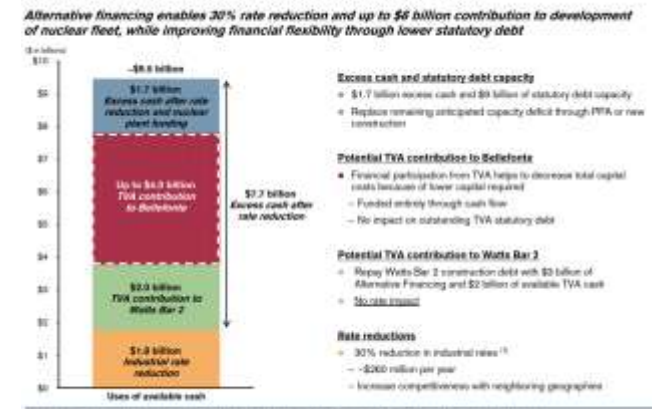
Direct Serve Industrial Rate Reduction Would Be Unfair

- 
- 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 1/3rd 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



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
Average	95

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.

Wind: The Real Opportunity for Retiring Coal Plants

- **B&H best-case private finance scenario offers power at \$48 / MWh**
 - Project delivers 2,520 MW on-peak
 - Baseload is unnecessary (see slide 4)
 - Unrealistic assumptions (see slide 5)
- **HVDC wind offers power at \$44 / MWh**
 - Clean Line P&E offers power at \$44 / MWh
 - Declining market price for wind suggests bulk of cost estimate is low risk (assumes cost of capital of 9%)
 - Cost assumes meeting PTC deadline
 - Even if 20% of energy goes unsold due to minimum load (turndown capability), price only increases to about \$55 / MWh (Clean Line)
 - Clean Line can deliver effective on-peak capacity of 2,205 MW (4375 x 50.4% on-peak EC)
 - Southern Cross can deliver on-peak capacity of 1500-3000 MW (3000 MW in bi-directional mode)

Plains and Eastern Clean Line will deliver 4,375 MW of Oklahoma wind to the Southeast

Capacity
3,500 MW of transmission
4,375 MW of wind

In-service date
2017 - 2018

Estimated cost
\$2 billion

Technology
High voltage direct current transmission

Estimated losses
6.5%

Length
750 miles



Development updates

- Received FERC rehearing on authority
- Public utility status in OK
- Southwest power purchase contract to the DOE
- DOE and EPA completing cost cap study under Section 1002 of 2012 DOE NEPA planning meeting (scheduled 01/2018)
- Draft EIS/EIS Impact Study from FERC
- Congress's 100-hour window approved by 90%
- \$120,000,000 for PTC development support
- \$420,000,000 General Collateral
- Held 2017/2018/2019 3 major business opportunity meetings and 20 other meetings for stakeholders in OK, AR, and TN/VA/DC

Submitted prices demonstrate cost-competitiveness of Plains & Eastern delivered product

	Average buyback price submitted, flat for 25 yrs (\$/MWh)	Plains & Eastern Clean Line transmission cost (\$/MWh)	Clean Line delivered cost
All proposed projects	\$28	\$20	\$48/MWh
Most competitive 4,000 MW	\$24	\$20	\$44/MWh

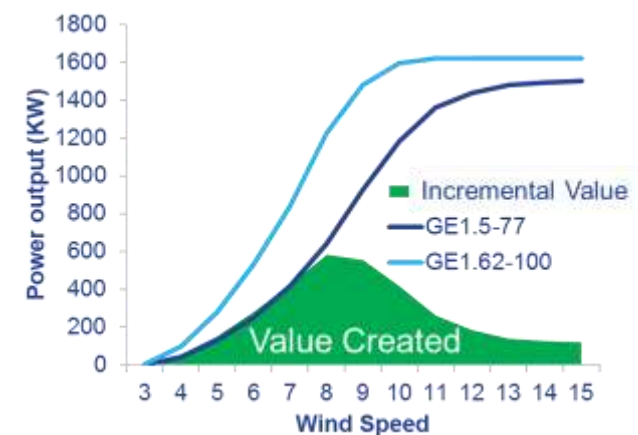
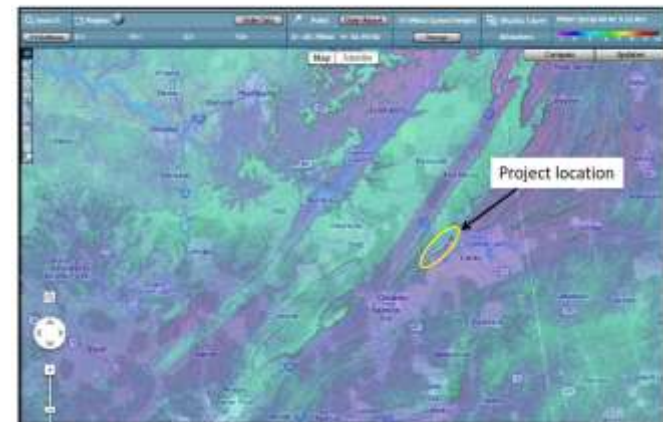
Note: Pricing includes Production Tax Credit.
CLEAN LINE ENERGY PARTNERS

Sources: Clean Line Energy Partners, materials supplied to TV-RIX (April 2013, August 2013).

In-Valley Wind Will Compete

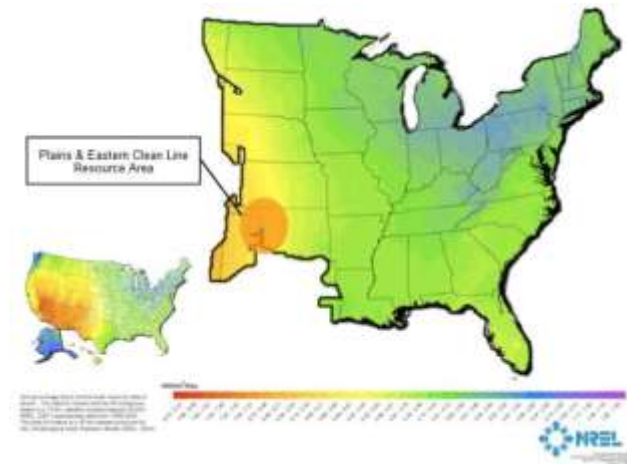
- **In-Valley wind at \$45-60 / MWh with 48% net capacity factor**
 - GE Wind & Pioneer Green Energy estimates
- **3,200 MW of opportunity in region, multiple developers waiting for customer interest**
- **Shinbone Wind Project already under development**
- **Developers are being enabled by new focus 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

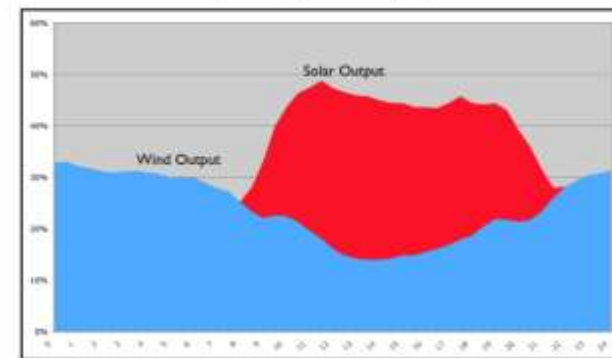


How Solar Could Augment Wind

- **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)

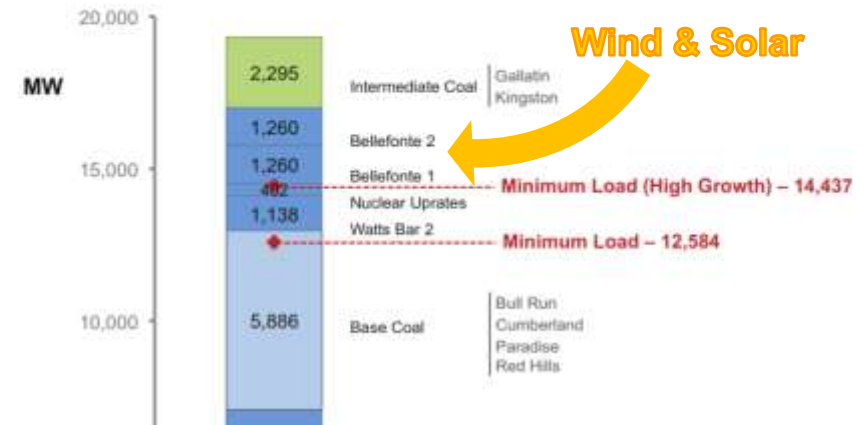


Source: US Department of Energy, National Renewable Energy Laboratory, PVWatts tool (for solar) and ERCOT (aggregate wind production for August 2009).

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).