

Creating a Business Case for Smart Grid Implementation

Smart Grid Initiatives for Utilities

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“A little revolution now and
then is a good thing.”

- Thomas Jefferson, 1787

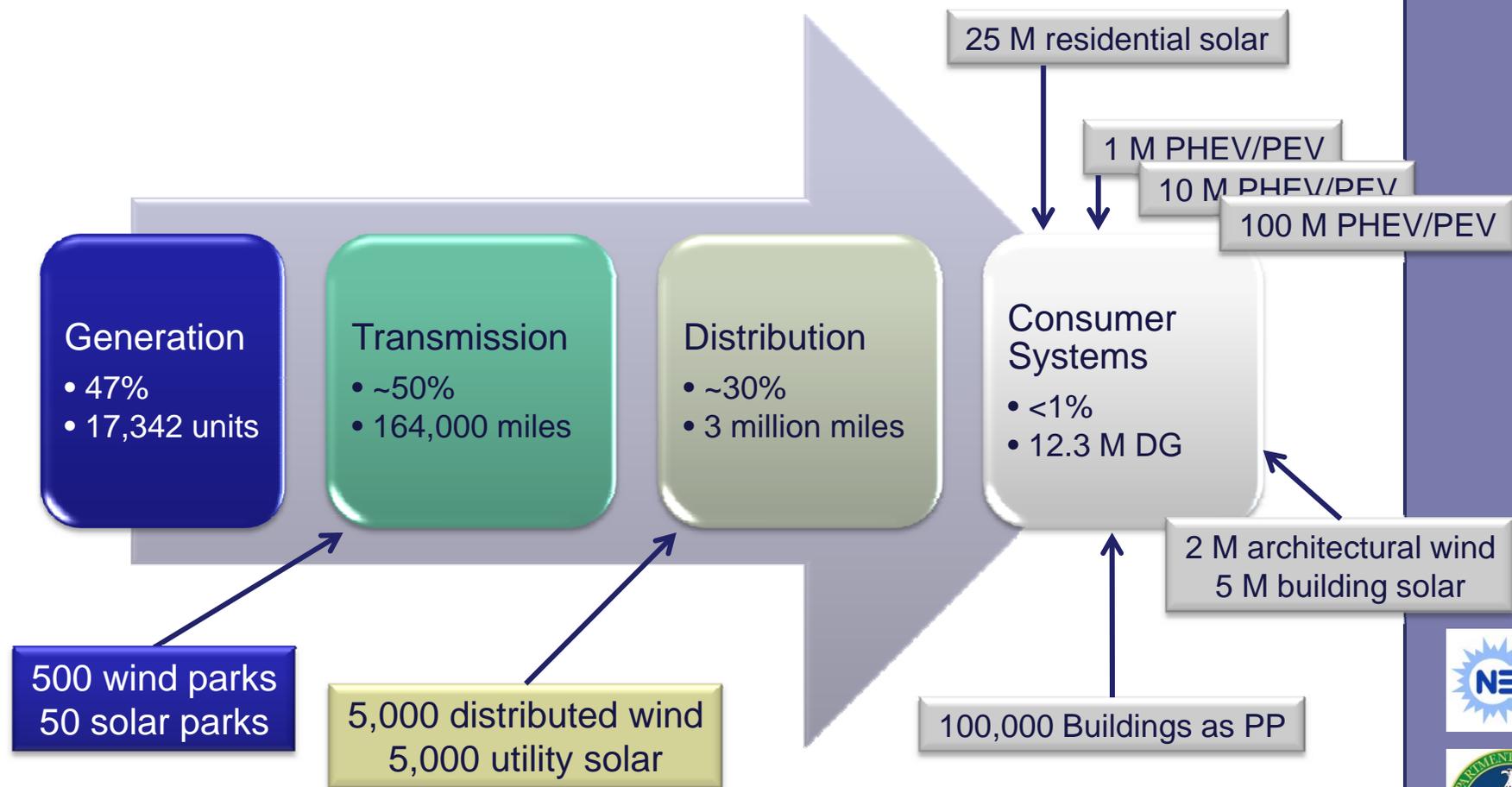


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- **Consumers' interest is increasingly green and self-determining.**
- **Grid complexities are increasing.**
- **Political landscape is shifting, and the old electricity model is being questioned at its roots.**
- **While today's focus is on large wind plants, the massive change on the electric system is really happening with distributed renewables.**
- **This is the disruptive arena for the next 20 years - driven by consumers and the greening of America.**
- **This requires significant intelligence in the grid and a new regulatory model.**



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- **Consumer engagement with resources to solve power issues locally**
- **Two-way power flow in Distribution**
- **As prices increase, local renewables will increase in residential, commercial, and industrial**
- **Imperative to transform from passive to active control in Distribution**
- **New ways for Distribution to become a Transmission resource**



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The Smart Grid is “transactive” and will:

- *Enable* active participation by consumers
- *Accommodate* all generation and storage options
- *Enable* new products, services, and markets
- *Provide* power quality for the digital economy
- *Optimize* asset utilization and operate efficiently
- *Anticipate & respond* to system disturbances (self-heal)
- *Operate* resiliently against attack and natural disaster

...the enabler



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If you come to a fork in the road,
take it.

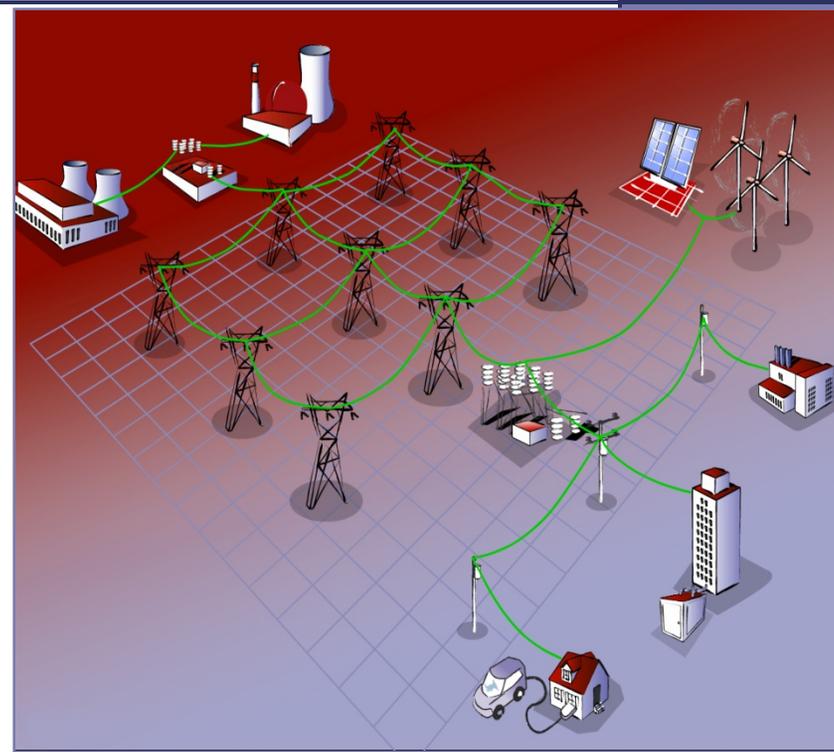
- *Yogi Berra*

WEST VIRGINIA SMART GRID IMPLEMENTATION PLAN



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- **\$640K project jointly funded through Attachment H process by NETL, RDS, Allegheny Power, AEP, State of West Virginia, WVU, and DOE OE**
- **Results will describe approach and value proposition of implementing Smart Grid in West Virginia**
- **Cost & benefit analysis comparing the state of current electricity grid and future Smart Grid in West Virginia**
- **Address the role of coal in Smart Grid**
- **Support economic development in State of West Virginia**
- **Only state-wide Smart Grid implementation plan**
- **Establishes West Virginia and NETL as leader in Smart Grid**
- **Only second Smart Grid study to be published**



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Solution	Scope
<p>Advanced Meter Infrastructure (AMI) IT Integration (IT)</p>	<p>All residential, commercial, and industrial Customers represented by 998,317 meters A CIS Upgrade to accommodate AMI and DR functionality & Outage Management</p>
<p>Demand Response (DR)</p>	<p>The aggregated sum of 104 MW of DR from Residential, Commercial, and Industrial Customers</p>
<p>Distribution Management System (DMS)</p>	<p>The automated fault clearing & restoration of service, circuit monitoring, and control of the Distribution System to include 707 circuits of 1,107 total circuits</p>
<p>Distributed Energy Resources (DER)</p>	<p>100MW of Base Generation, 800 MW of Peak Generation, 250 MW of Advanced Storage and 100 MW of Wind Resources all capable of being dispatched on demand</p>



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PV 20-yr Cost and Benefits (\$M)

Solution	Cost	Benefits
AMI	\$399	\$1,649
IT	\$170	\$1,308
DR	\$22	\$1,091
DMS	\$454	\$3,288
DER	\$832	\$5,289
Total	\$1,878	\$12,625



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PV 20-yr Benefits by Beneficiaries (\$M)

Solution	Consumer	Operational	WV Society	US Society
AMI	\$630	\$439	\$308	\$271
IT	\$563	\$136	\$326	\$283
DR	\$23	\$614	\$240	\$214
DMS	\$2,909	\$73	\$303	\$2
DER	\$3,368	\$2	\$301	\$1,618
Total	\$7,493	\$1,263	\$1,479	\$2,389

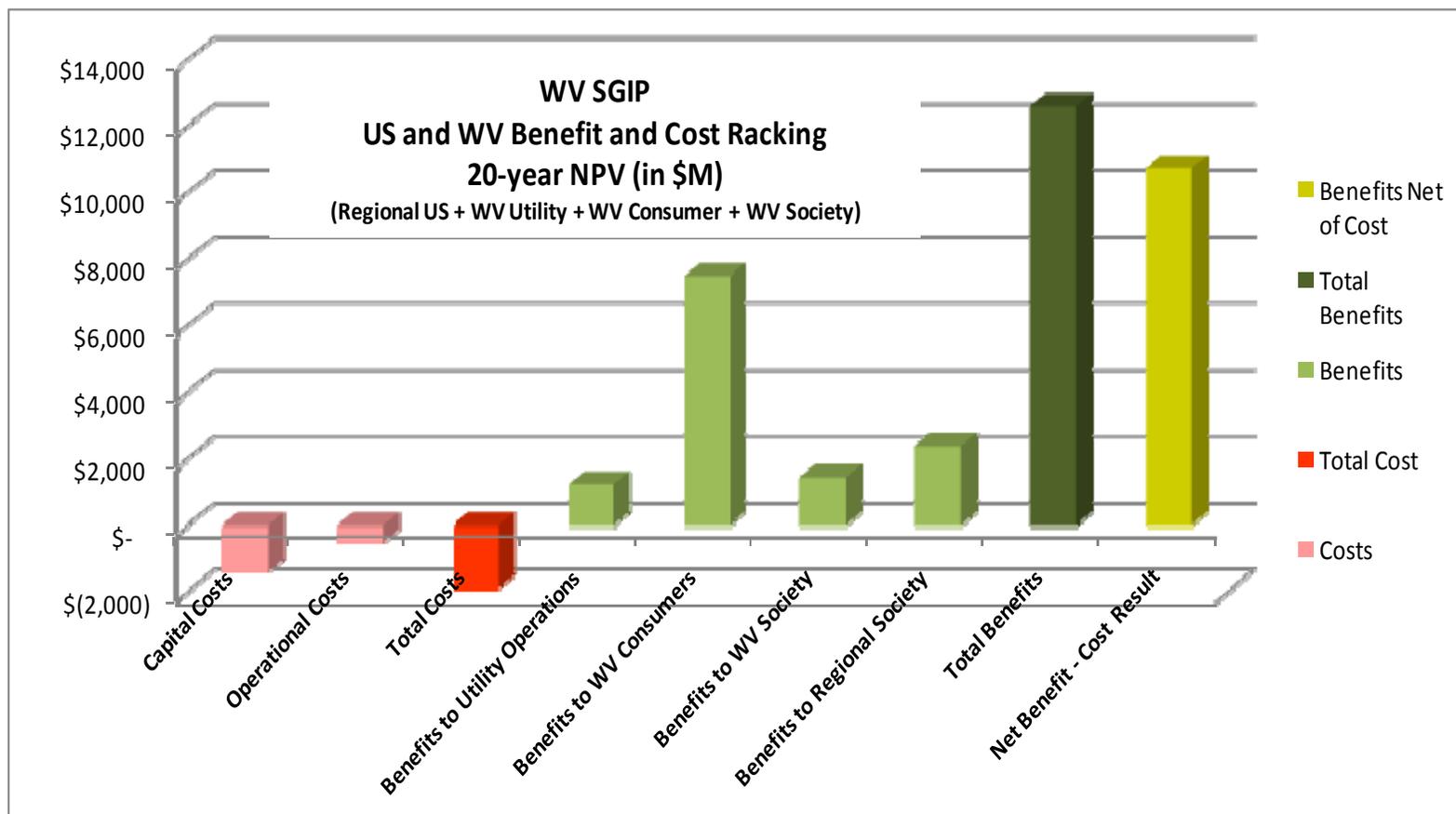


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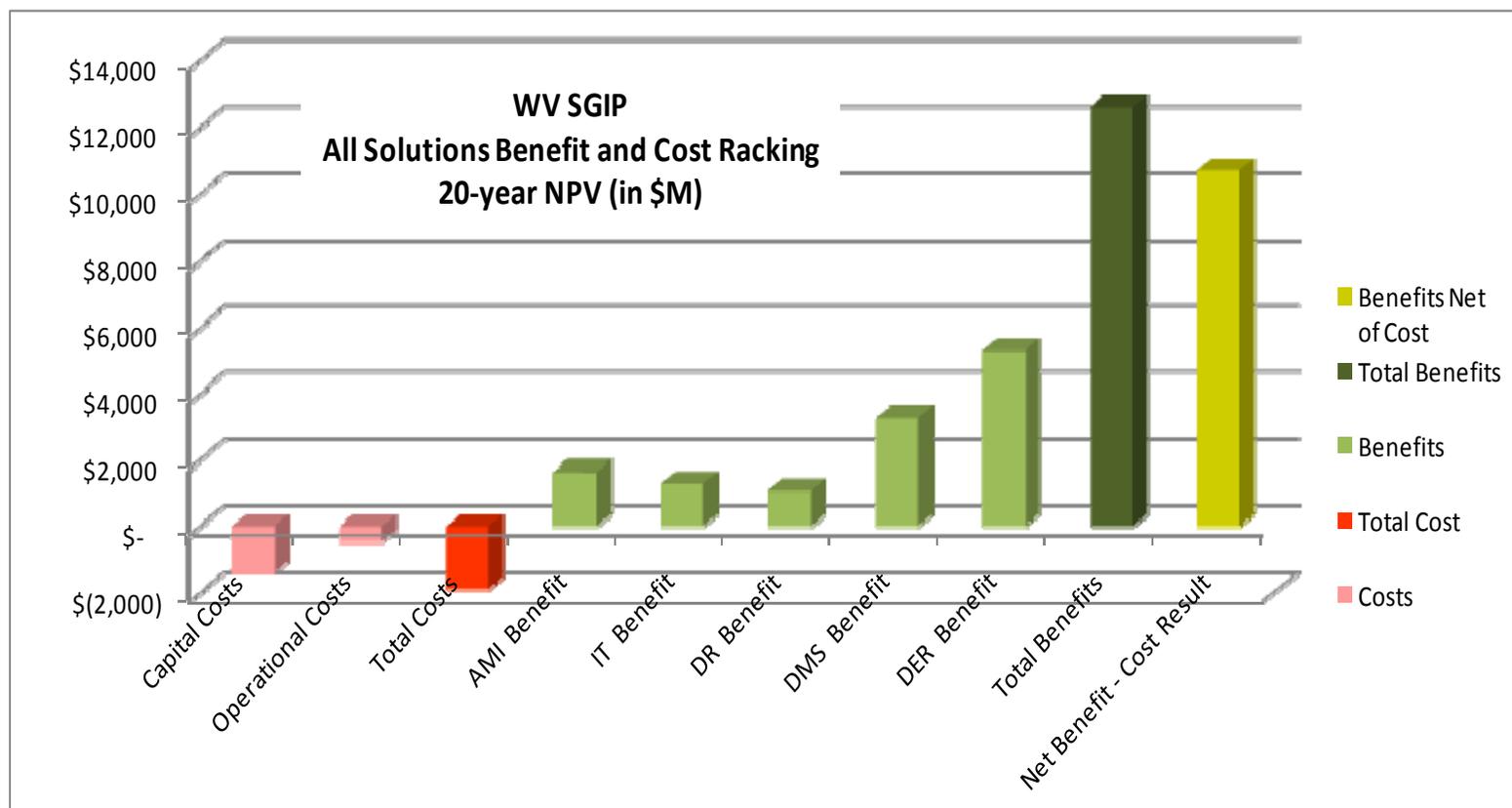
Key Success Factors	Benefits	Annual Benefits (\$M) (All Beneficiaries)
Reliability	Reduced Consumer Losses	\$898
	Reduce Power Quality Events	\$131
Economic	Reduce Price of Electricity	\$399
	Job Creation	\$215
	Consumer Sales of DER Resources	\$175
	Increased Energy Sales as Exports	\$7
	Reduced Transmission Congestion	\$1
	Increased Transportation Fuels Business	\$5
	Consumer Conservation	\$20
	Operational Savings	\$194
Environmental	Reduced Emissions	\$7
Security	Reduced Blackout Probability & Dependence on Foreign Oil	\$13
Safety	Reduce Hazard Exposure	\$1



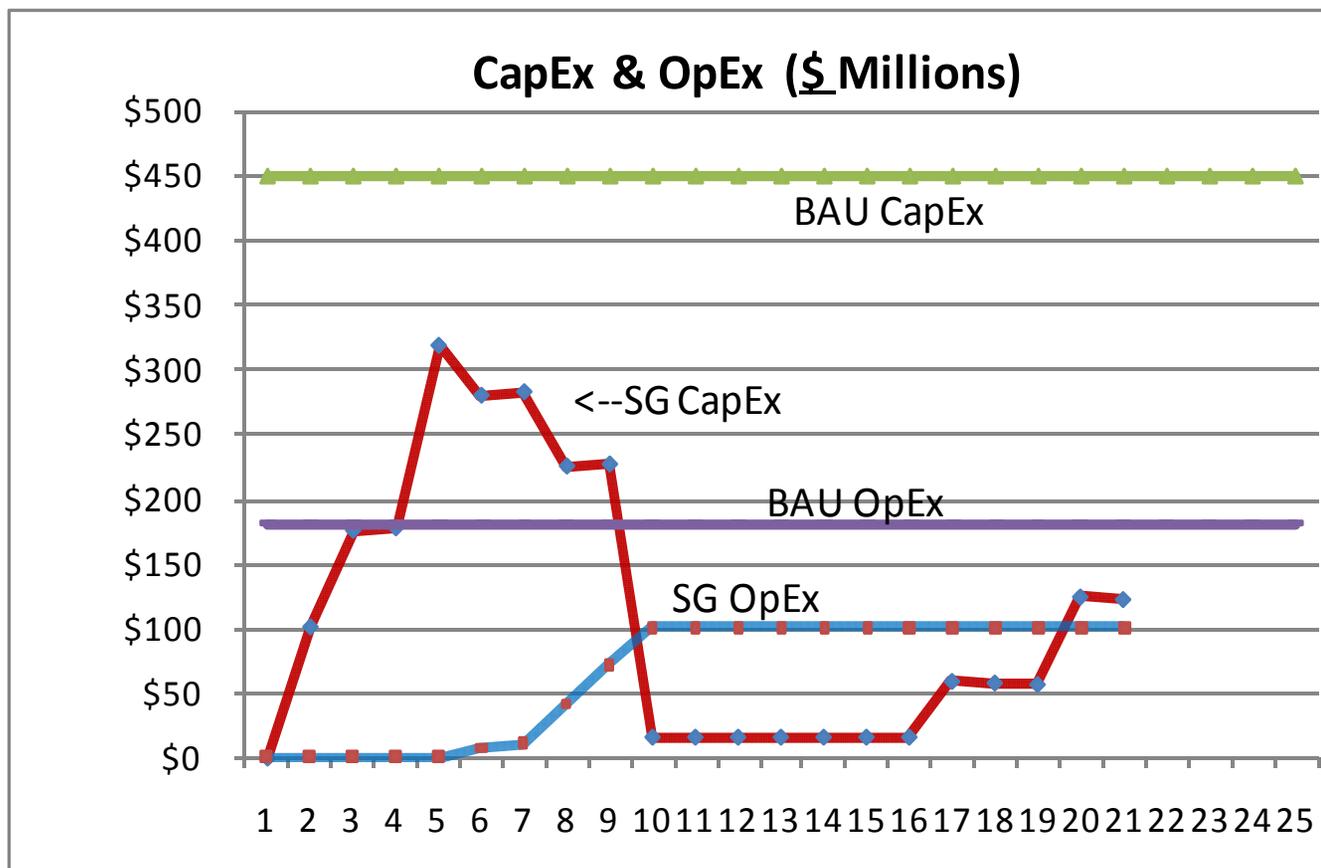
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- **Implementing a Smart Grid will:**
 - Radically improve system reliability
 - Lower the carbon footprint
 - Support a better sustainable business climate
 - Generate benefits beyond the borders
- **WV “numbers” (20-yr present value)**
 - ~ 1 million meters
 - Total Smart Grid Cost - ~ \$1.9B
 - Total Smart Grid Benefit - ~ \$10B
 - Benefit Cost Ratio: 5:1
- **A Smart Grid can be implemented with a portion of the business as usual (BAU) 10-year capital plan.**
- **The next 20 years will be fun!**



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For additional Information, contact
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<http://www.netl.doe.gov/moderngrid>

304-599-4273 x101

Links:

- [The Modern Grid Strategy](#)
- [Smart Grid Newsletter](#)
- [EPRI Intelligrid](#)
- [Galvin Electricity Initiative](#)
- [GridWise Alliance](#)
- [GridWise Architecture Council](#)
- [European SmartGrid Technology Platform](#)



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