Northwest Power and Conservation Council

January 4, 2012

MEMORANDUM

TO: Council

FROM: Ken Corum

SUBJECT: Bonneville's Technology Innovation Initiative

Bonneville's Technology Innovation Initiative supports research targeted at technology with potential to help Bonneville meet its customers' power needs and its environmental responsibilities. The Initiative supports research across a broad range of topics, from generation through transmission and distribution to electricity-consuming equipment in customers' homes (see http://www.bpa.gov/corporate/business/innovation/projects.cfm for a list and descriptions of Bonneville's fiscal year 2011 research portfolio). The Council has an interest in a number of the projects supported by the Technology Innovation Initiative, and recently contributed to one of them, a pilot program testing the feasibility of using electric water heating, electric space heating, and refrigerated warehouse loads to help integrate the increasing amounts of variable generation in Bonneville's balancing area. The description of the Technology Innovation Initiative from Bonneville's web site is attached.

Terry Oliver is Bonneville's Chief Technology Innovation Officer, and he will describe the initiative, some of the projects that are ongoing, and the process for choosing which projects Bonneville supports.

Attachments

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Technology Innovation

One key to BPA's success is making a firm connection with the business and technology challenges facing the utility industry. Technology roadmaps capture the logic and business framework for research and development. The roadmaps describe the specific BPA-related factors driving technology needs and identify the areas offering the greatest potential. BPA's Technology Innovation uses a cross agency Council of executives and technologists to guide its research and development efforts.

BPA's Technology Innovation initiative has an annual cycle of portfolio funding based on strategic needs identified in the agency's technology roadmaps. In February, all projects in the portfolio are reviewed by the Council, and then in March a solicitation is open for new projects. The solicitation is open from March to May. Technical reviews of the proposals occur in June. In July, the Council selects the projects for inclusion in the following fiscal year's portfolio. BPA's technology innovation projects constitute a portfolio of near-, medium-, and long-term projects, and, as a portfolio, are expected to produce direct financial benefits to BPA, and through BPA, deliver value to the Pacific Northwest electric system.

Contact us at Technology Innovation

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BPA Technology Innovation

A disciplined approach to research portfolio management that leads to BPA applications that deliver value, reduce costs or increase revenues, and maintain low rates and reliable power for the region.

BPA Results

Ductless Heat Pumps

- Heat Pump technology assessment capability
- Installed more than 4,800 ductless heat pumps into homes in the Pacific Northwest
- Success resulted in expansion of program for small business applications
- Provides future savings to BPA

Value Delivered =
$Millions in Least Cost Energy

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Seismic

- Reduce the seismic acceleration by: 50% for 500 kV equipment; 30% for 230 kV and 115 kV equipment &10% for 69 kV equipment
- Created tools for equipment designers to validate models of seismic mechanics & perform representative analysis and design approach

Value Delivered = $ Hundreds of Millions
Faster System Restoration

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Conductor Shunt

- 20 mile Ross-Lexington upgrade
- Increased capacity with “splice shunts” instead of new wire
- Half outage time
- One BPA crew vs. multiple
- $4 million direct savings first application
- Multiple applications in progress and pending

Value Delivered = $Millions in First Cost Savings

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Synchrophasors

- SCADA @ BPA = 2 seconds
- Synchrophasors = 60 / second (120 times faster)
- Now - sleuth grid issues (looking backward)
- Soon - control functions for reliability
- Mid-term - oscillation damping
- Long-term - additional Pacific Intertie throughput

Value Potential = $Hundreds of Millions Additional Revenue

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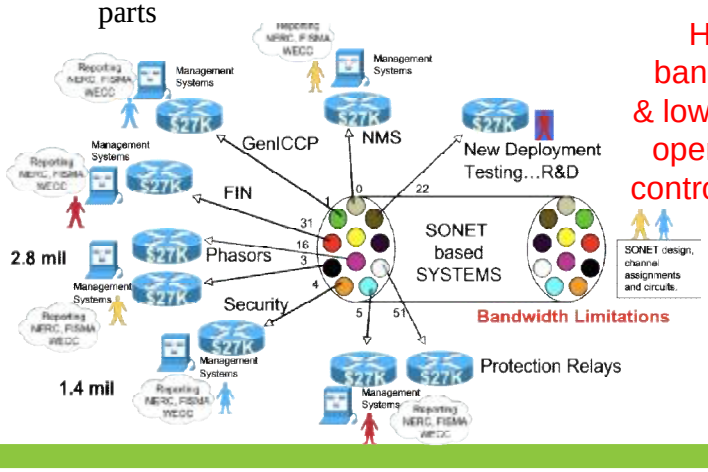
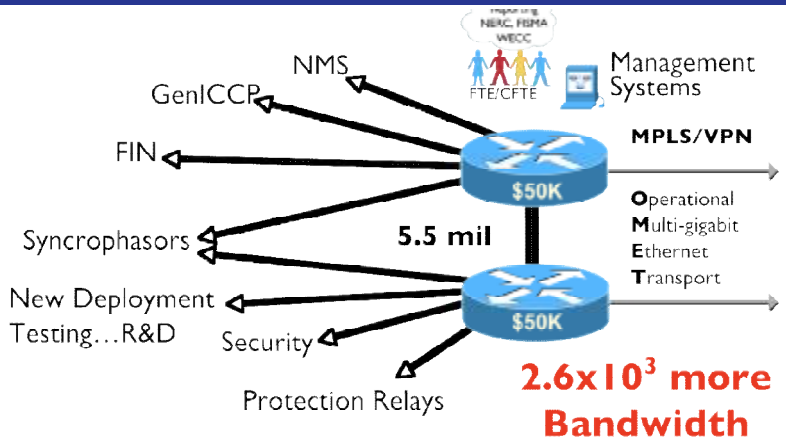
Operations Telecommunications

- Used for SCADA, etc
- Needs to be used for smart grid, synchrophasors, etc
- Current technology reliable but low bandwidth and many parts



Huge bandwidth & low latency operations control needs

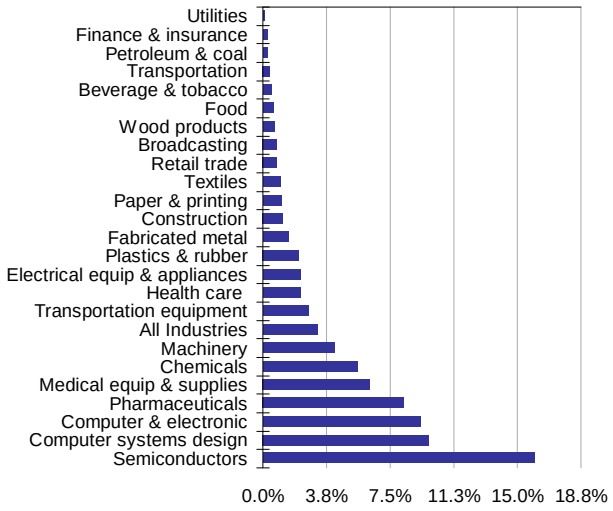
Multi-Gigabit Ethernet Transport for Operations



Value Delivered = $Millions in First Cost; multiples of that for operations savings

Plus critical bandwidth

R&D Spending as % Revenues



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What's Wrong with Spending 0.01%?

- Power sector "owns" about 40% of climate change issues
  - **R&D needs:** CO^2 sequestration, energy efficiency, effective renewables and storage integration, & smart grid
- Power sector could "own" another 30% related to transportation (electric vehicles)
- New and more complicated grid operations – Wind + Smart Grid

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Good R&D Practices

- Publicly articulated research interests and agenda (www.bpa.gov/ti)
- Portfolio concept across key dimensions
- Great project management including built-in kill decision points
- In-company integration addressing business needs

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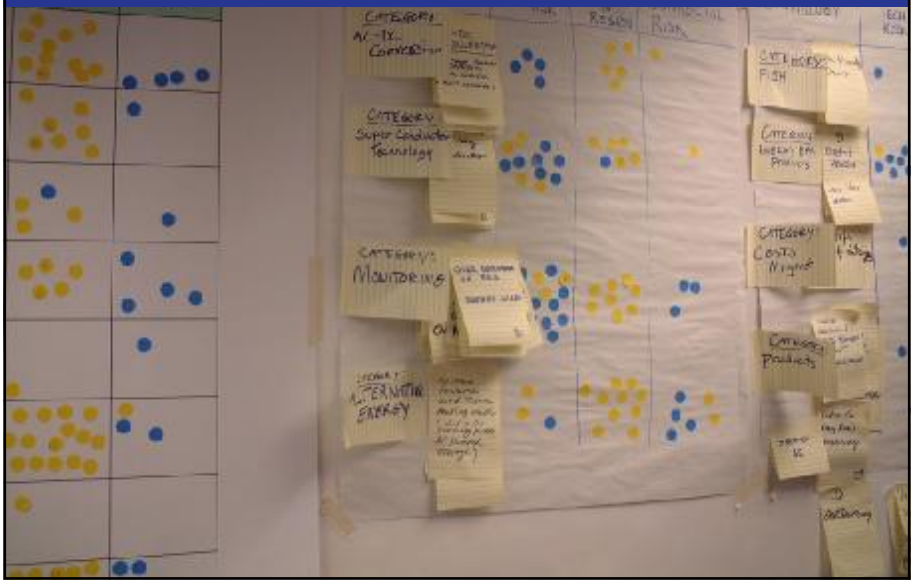
BPA's Version



Agency Strategy I5

Technology Innovation

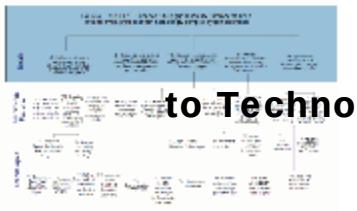
Agency Strategy Map Technology Innovation-I5

BPA solves business challenges and enables breakthroughs using a program of disciplined research and technology innovation that is recognized to deliver high value to the region

Direct Linkages

BPA Strategy

to Business Challenges



to Technologies

to Research Portfolio

Technology Roadmaps Guide the Initiative

Explicit Linkages to Business Challenges

Transmission
TECHNOLOGY ROAD MAP
September 2006

1885 Generator
At first glance one may think, "My how things have changed," But at second glance one may admit, "Things haven't changed much at all."

Physical Security
Technology Road Map
February 2007

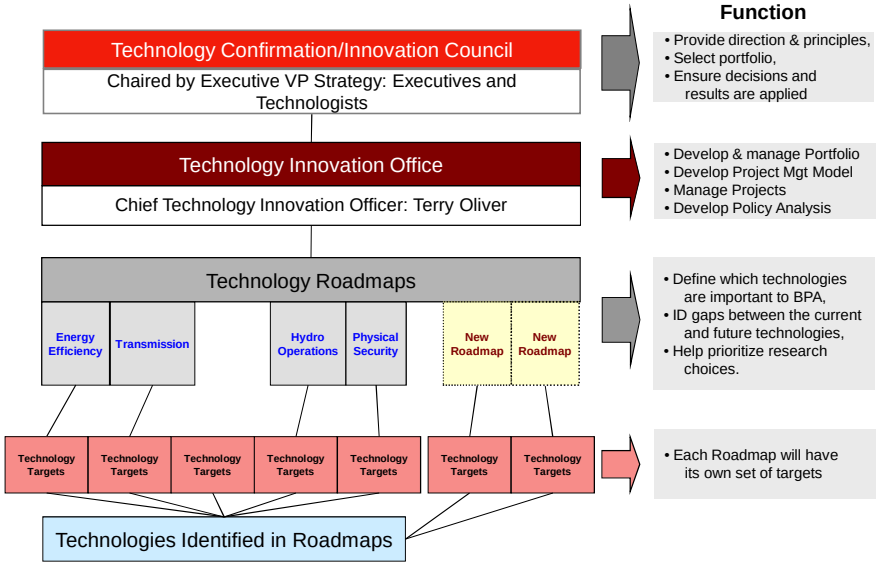
The Enigma was a portable cipher machine used to encrypt and decrypt secret messages

Power services
TECHNOLOGY ROAD MAP
March 2008

Hungry Horse Dam

Research is to see what everybody else has seen, and to think what nobody else has thought.
- Albert Szent-Gyorgyi

Technology Innovation Council



Technology Innovation Council

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Randi Thomas, Manager System Ops
Jeff Hildreth, Labs
Mark Jones, Hydro
Elliot Mainzer, EVP Strategy
Terry Oliver, Chief TI Officer
Don Watkins, Tx WECC NERC

Executives & Experts – Paneled as Peers

Buckets

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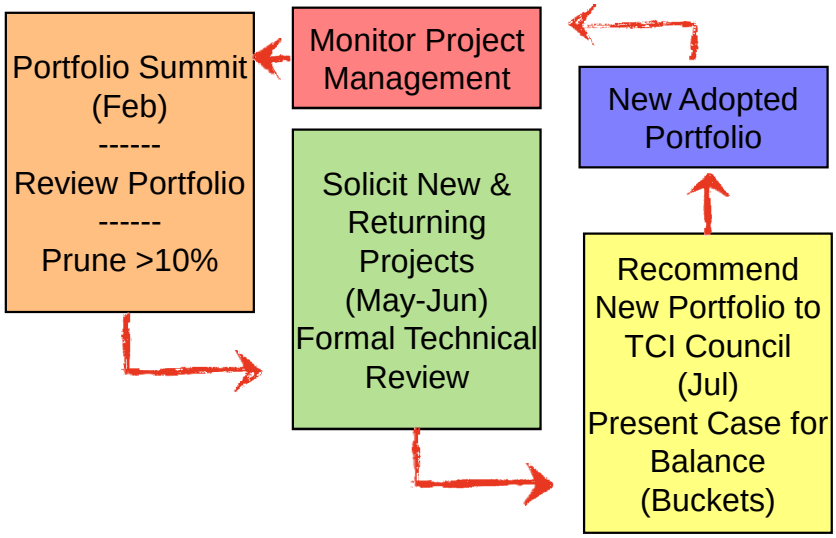
Cycles



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Questions

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