



## 2012 FCRPS Hydro Asset Strategy

2010 Integrated Program Review Workshop  
May 13, 2010



**US Army Corps  
of Engineers**



## Objectives for Today

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Review strategy methodology and results

Discuss large capital program forecast



## Presenting

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### Bonneville Power Administration

- Mark Jones, Manager for Federal Hydro Projects
- Jim Clune, Hydro Asset Manager
- Philip Thor, Capital Program Manager

### Bureau of Reclamation, Pacific Northwest Region

- Steve Brawley, Assistant Regional Director for Resources and Technical Services
- Terry Kent, Regional Power Manager

### Corps of Engineers, Northwestern Division

- Lori Rux, Chief of Operations
- Ed Miska, Capital Program Manager
- Sandra Takabayashi, Hydropower Program Manager
- Dan Davis, O&M Program Manager



## Scope of the 2012 Hydro Asset Strategy

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The strategy identifies condition and risk implications of the currently committed hydro investment program and new investments prioritized around minimizing lifecycle cost.

It represents a reasonable level and timing of future investment to maintain the production capability of the FCRPS hydro system at a cost effective level of reliability.

The strategy addresses hydropower specific and joint-use features, but excludes costs for Columbia River Fish Mitigation and Lower Snake Compensation Plan.

Strategy results are precise and directionally correct, but are not prescriptive. Significant additional effort is needed to develop resource plans for implementing this strategy.

The strategy does not include an evaluation of specific issues that may result in new strategic initiatives, e.g., expansion opportunities, pumped storage, procurement mechanisms, automation, staffing, etc.



## 1. Asset Category Overview





# FCRPS Integrated Business Management Model (IBMM)

The Integrated Business Management Model (IBMM) is used by the FCRPS partnership to provide a framework for ongoing asset-based planning and management. The IBMM consists of 12 business processes contained within four major areas - Strategic Planning, Asset Planning, Resource Management, and Performance Assessment.

Joint Operating Committees (Bonneville/Corps and Bonneville/Reclamation) and sub-committees of the FCRPS are tasked with managing specific aspects of the IBMM:

- Capital Investment Program
- O&M Program
- Benchmarking and Performance Indicators
- River Management
- Hydro Optimization
- Technical Coordination
- Cultural Resources
- Fish and Wildlife

Direction from OMB and the three agencies of the FCRPS is to increase the level of efficiency, visibility and accountability for key business processes. The FCRPS sub-committees are the primary management means for implementing this direction.



# FCRPS Hydro System



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The FCRPS is comprised of 31 hydroelectric plants – 21 operated by the Corps and 10 by Reclamation. The FCRPS has an overall capacity of 22,060 MW and, in an average water year, produces 76 million megawatt-hours of electricity.

Within the hydro asset category, the plants are grouped into four strategic classes depending on the role they play in the system. These categories are as follows:

- **Main Stem Columbia:** plants that provide the majority of power, ancillary services, and non-power benefits to the Pacific Northwest.
- **Headwater/Lower Snake:** plants that support services provided by Main Stem Columbia plants.
- **Area Support:** plants that do not support the region as a whole, but provide key power and non-power benefits to an area of the Pacific Northwest.
- **Local Support:** plants that primarily provide services to a local area only.



# Value of Strategic Classes by Purpose

Purpose	Main Stem Columbia	Headwater/Lower Snake	Area Support	Local Support
<b>Power</b>	Provides 76% of energy and capacity, and 30% of storage from the FCRPS. Provides nearly all the reserves and other ancillary services for supporting the 500 KV grid.	Provides 20% of energy and capacity, and 50% of storage from the FCRPS. Provides supplementary ancillary services for supporting the 500 KV grid.	Provides 3% of energy and capacity, and 18% of storage from the FCRPS. Provides voltage support to specific areas of the regional transmission grid	Provides 1% of energy and capacity, and 2% of storage from the FCRPS. Provides limited voltage support to local areas of the Pacific Northwest.
<b>Flood Damage Reduction</b>	Seasonal flood reduction and water management storage affecting significant parts of the Columbia River basin.	Seasonal flood reduction and water management storage affecting significant parts of the Columbia River basin.	Provides flood reduction benefits primarily in the Willamette Valley, but does not contribute significantly to the flood reduction capability of the overall Columbia River basin.	Provides flood reduction benefits in a local area
<b>Navigation</b>	Provides navigation for the lower Columbia River from below Cascade Locks to the Tri-Cities	Provides navigation for the lower Snake River from the Tri-Cities to Lewiston, ID	None	None
<b>Irrigation</b>	Primary source of irrigation for the Columbia River Basin	None	None	Primary source of irrigation within a specific region
<b>Recreation</b>	Significant recreation for boating and camping. Includes several "destination" recreation sites and numerous local sites.	Major recreation for boating and camping. Includes several "destination" and local sites.	Major recreation for boating and camping. Includes several "destination" and local sites.	Some boating and camping at local sites.



# FCRPS Hydro System



Plant	ID	Units	MW Capacity	aMW Energy	Strategic Class	Operator
Grand Coulee	GCL	24	6,735	2,497	Main Stem Columbia	Reclamation
Chief Joseph	CHJ	27	2,614	1,387	Main Stem Columbia	Corps
McNary	MCN	14	1,120	575	Main Stem Columbia	Corps
John Day	JDA	16	2,480	991	Main Stem Columbia	Corps
The Dalles	TDA	22	2,052	773	Main Stem Columbia	Corps
Bonneville	BON	18	1,195	513	Main Stem Columbia	Corps
Dworshak	DWR	3	465	214	Headwater/Lower Snake	Corps
Lower Granite	LWG	6	930	272	Headwater/Lower Snake	Corps
Little Goose	LGS	6	930	263	Headwater/Lower Snake	Corps
Lower Monumental	LMN	6	930	278	Headwater/Lower Snake	Corps
Ice Harbor	IHR	6	693	211	Headwater/Lower Snake	Corps
Libby	LIB	5	605	238	Headwater/Lower Snake	Corps
Hungry Horse	HGH	4	428	113	Headwater/Lower Snake	Reclamation
Albeni Falls	ALF	3	49	24	Area Support	Corps
Detroit	DET	2	115	46	Area Support	Corps
Big Cliff	BCL	1	21	13	Area Support	Corps
Green Peter	GPR	2	92	30	Area Support	Corps
Foster	FOS	2	23	12	Area Support	Corps
Lookout Point	LOP	3	138	37	Area Support	Corps
Dexter	DEX	1	17	10	Area Support	Corps
Cougar	CGR	2	28	17	Area Support	Corps
Hills Creek	HCR	2	34	18	Area Support	Corps
Lost Creek	LOS	2	56	36	Area Support	Corps
Palisades	PAL	4	177	74	Area Support	Reclamation
Minidoka	MIN	4	28	22	Local Support	Reclamation
Anderson Ranch	AND	2	40	18	Local Support	Reclamation
Boise Diversion	BDD	3	3	2	Local Support	Reclamation
Black Canyon	BCD	2	10	9	Local Support	Reclamation
Roza	ROZ	1	13	10	Local Support	Reclamation
Chandler	CDR	2	12	9	Local Support	Reclamation
Green Springs	GSP	1	17	6	Local Support	Reclamation
<b>Total</b>		<b>196</b>	<b>22,060</b>	<b>8,716</b>		



## 2. Asset Strategy Scope, Direction, and Objectives





# FCRPS Hydro Strategy Logic and Scope

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## **The FCRPS Hydro Strategy focuses on three goals:**

- Low Cost Power;
- Power Reliability; and
- Trusted Stewardship

## **The strategy is implemented through a set of Direct Funding Agreements to:**

- Ensure that life safety and environmental requirements are met;
- Meet FCRPS commitments for fish and wildlife and cultural resource programs;
- Meet Bonneville's needs for a reliable supply of low-cost generation by ensuring power generating assets are properly operated, inspected, and maintained;
- Mitigate the risk of power generation component failures by replacing or refurbishing equipment and purchasing spares when warranted;
- Increase the efficiency and/or capability of power facilities where economically feasible; and
- Fund a portion of high priority multi-purpose projects, in accordance with Bonneville's direct funding agreements with the Corps of Engineers and Bureau of Reclamation.

## **With this in mind, the 2012 strategy includes:**

- Direct Funded O&M Program,
- Direct Funded Investment Program, and
- Appropriations reimbursed by Bonneville.



## FCRPS Hydro Strategy Logic and Scope

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Program funding needs are established through the IBMM model, as described in section 1.

In general, the **O&M Program** reflects core funding for maintenance, operations, and minor equipment replacements, and is largely driven by the staffing needs of each facility.

In contrast, the **Investment Program** is comprised primarily of large, discrete investment needs for equipment replacement or refurbishment, largely driven by condition and risk.

Two timelines for Investment Program funding proposals are presented within this strategy:

- The current and next three rate periods, FY2010 to FY2017, reflecting specific projects that are already committed, and new investments that are identified for safety, environment, or financial risk mitigation reasons, and
- FY2018 to FY2025, identifying out-year risk mitigation needs.

# Objectives of the Strategy



Target investments that address hydro strategic goals and achieve the following results by 2022:

Strategic Goal	FCRPS Hydro Partnership Objective	Bonneville Agency Long-term Outcome	Targeted Plan Result (Draft)
Low Cost Power	Provide a cost effective power supply	Meet environmental and reliability goals at the least lifecycle cost	Achieve a fully allocated cost of production of less than \$10 per MWh in 2009 dollars
			Reduce Lost Generation Risk to 300 aMW or less
Power Reliability	Provide a reliable power supply	Meet availability requirements	Maintain an average condition rating of 7.0 or higher for unit reliability equipment (Main Stem Columbia and Headwater/Lower Snake classes)
	Support a reliable transmission system	Meet reliability standards	Comply with WECC/NERC reliability standards applicable to generators
Trusted Stewardship	Optimize the multiple benefits of the river for the region	Meet hydro system environmental requirements	Reduce the number of equipment items with high environmental risk to zero
	Maintain a safe work environment	Meet safety and security standards	Achieve a Lost Time Accident Rate of less than 2.0 per 200,000 employee-hours

# Criticality of Assets



FCRPS Hydro Plant Classification

Relative Cost of Unavailability	Severe				CHJ GCL MCN
	Extreme			DWR	JDA
	Major	AND, BCD BDD, MIN, ROZ, CDR, GSP	BCL, DEX, LOS, DET, GPR, LOP, HCR, CGR, FOS, ALF, PAL	LIB, HGH, IHR, LGS, LWG, LMN	BON TDA
		<b>Local Support</b>	<b>Area Support</b>	<b>Headwater/ Lower Snake</b>	<b>Main Stem Columbia</b>

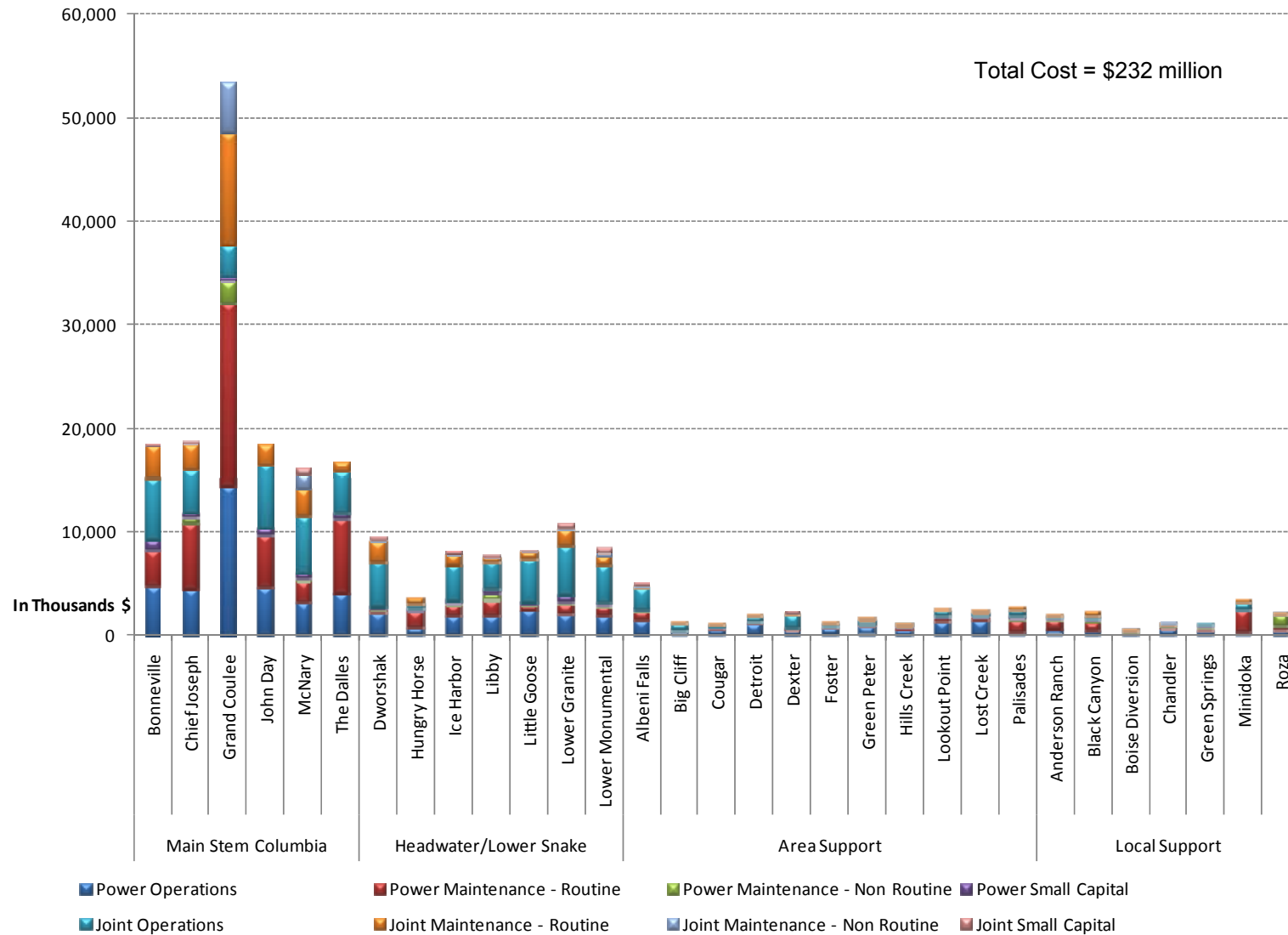


### 3. Current Performance, Condition, and Risk





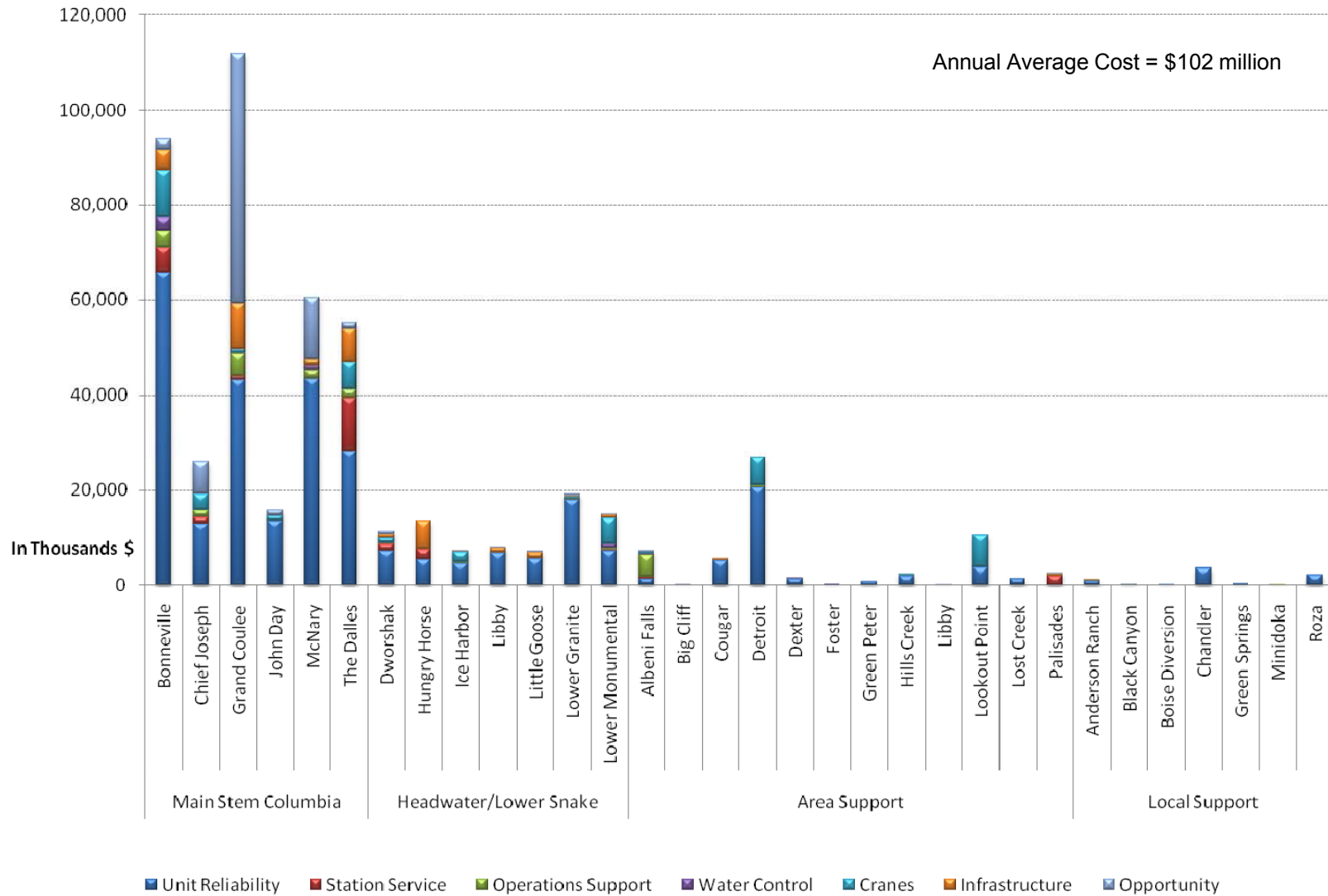
# Performance, Low Cost Power: 2008 O&M Program





# Performance, Low Cost Power: Large Capital Program

(Total Cost, FY2005 – FY2009)





# Performance, Low Cost Power: Fully Allocated Cost

Name of Asset	Completed Plant	Net Utility Plant	CWIP	Accumulated Depreciation	FY 2009 Depreciation	FY 2009 O&M Expense	FY 2009 Interest	Outstanding Fed. Approp.	Capital Investment	Net Generation (GWH)	Production Cost (\$/MWh)	Fully Allocated Cost (\$/MWh)
	"Cumulative Capital cost" /a	"Useable value of plant" /b	"included in Net Utility Plant but not in Completed Plant"	"included in Net Utility Plant but not in Completed Plant"	"FY 2009 Accumulated Depreciation less FY 2008 Accumulated Depreciation" /c	"Annual expense" /d	"Interest for this year" /e	"Sum of remaining principle" /f	"Total Capital invested during the year"	"Average generation based on 50-year hydro regulation studies"	"FY 2009 O&M Expense divided by Net Generation"	"(FY 2009 O&M Expense + Interest - Depreciation) divided by Net Generation"
<b>Main Stem Columbia</b>												
Bonneville	\$1,035,062	\$732,258	\$70,969	(\$373,773)	(\$11,216)	\$19,337	\$33,882	\$505,989	\$27,962	4,490	4.31	14.35
Chief Joseph	\$607,749	\$356,583	\$37,176	(\$288,342)	(\$8,429)	\$17,189	\$15,147	\$238,378	\$7,782	12,154	1.41	3.35
John Day	\$523,118	\$307,817	\$7,453	(\$222,755)	(\$6,019)	\$18,700	\$5,475	\$80,718	\$2,933	8,685	2.15	3.48
McNary	\$357,394	\$185,280	\$24,479	(\$196,593)	(\$4,765)	\$15,648	\$696	\$13,142	\$18,481	5,033	3.11	4.19
The Dalles	\$398,174	\$235,754	\$40,018	(\$202,438)	(\$9,247)	\$16,014	\$4,424	\$75,078	\$18,441	6,771	2.37	4.38
Grand Coulee	\$1,352,991	\$968,504	\$52,440	(\$436,927)	(\$14,581)	\$59,897	\$37,892	\$548,020	\$23,580	21,872	2.74	5.14
<b>Total Main Stem Columbia</b>	<b>\$4,274,489</b>	<b>\$2,786,196</b>	<b>\$232,536</b>	<b>(\$1,720,828)</b>	<b>(\$54,257)</b>	<b>\$146,786</b>	<b>\$97,516</b>	<b>\$1,461,325</b>	<b>\$99,178</b>	<b>59,003</b>	<b>2.49 \$/MWh</b>	<b>5.06 \$/MWh</b>
<b>Headwater/Lower Snake</b>												
Dworshak	\$303,725	\$191,791	\$3,170	(\$115,104)	(\$4,497)	\$9,444	\$10,891	\$154,747	\$3,517	1,873	5.04	13.26
Ice Harbor	\$172,834	\$97,290	\$4,130	(\$79,674)	(\$2,778)	\$7,832	\$2,136	\$35,145	\$2,634	1,845	4.25	6.91
Libby	\$440,573	\$285,487	\$2,223	(\$157,309)	(\$5,564)	\$7,039	\$16,764	\$235,932	\$2,815	2,086	3.37	14.08
Little Goose	\$224,340	\$123,428	\$1,428	(\$102,340)	(\$3,312)	\$7,444	\$7,430	\$107,492	\$1,475	2,304	3.23	7.89
Lower Granite	\$370,584	\$235,408	\$2,627	(\$137,802)	(\$4,087)	\$11,081	\$12,142	\$176,228	\$5,228	2,386	4.64	11.44
Lower Monumental	\$250,690	\$144,135	\$5,589	(\$112,144)	(\$3,974)	\$7,877	\$6,261	\$62,672	\$142	2,435	3.23	7.44
Hungry Horse	\$126,874	\$81,619	\$5,760	(\$51,015)	(\$1,377)	\$3,706	\$777	\$11,983	\$6,161	986	3.76	5.94
<b>Total Headwater/Lower Snake</b>	<b>\$1,889,619</b>	<b>\$1,159,159</b>	<b>\$24,928</b>	<b>(\$755,388)</b>	<b>(\$25,589)</b>	<b>\$54,424</b>	<b>\$56,401</b>	<b>\$784,199</b>	<b>\$21,973</b>	<b>13,915</b>	<b>3.91 \$/MWh</b>	<b>9.80 \$/MWh</b>
<b>Area Support</b>												
Albeni Falls	\$45,049	\$32,233	\$9,946	(\$22,762)	(\$986)	\$4,970	\$204	\$3,048	\$1,883	208	23.84	29.55
Cougar	\$82,494	\$76,316	\$6,005	(\$12,183)	(\$1,123)	\$960	\$2,706	\$52,208	\$329	146	6.56	32.73
Detroit-Big Cliff	\$51,258	\$50,413	\$26,085	(\$26,930)	(\$378)	\$4,150	\$85	\$1,592	\$8,146	519	8.00	8.90
Green Peter-Foster	\$56,042	\$33,419	\$1,147	(\$23,769)	(\$592)	\$3,498	\$14	\$226	\$665	368	9.51	11.15
Hill Creek	\$20,861	\$10,488	\$1,527	(\$11,900)	(\$490)	\$892	\$543	\$7,976	\$739	161	5.53	11.94
Lookout Point-Dexter	\$61,704	\$33,092	\$12,673	(\$41,285)	\$425	\$4,494	\$730	\$13,232	\$1,357	410	10.96	11.71
Lost Creek	\$28,620	\$16,903	\$53	(\$11,770)	(\$458)	\$1,844	\$1,006	\$14,096	\$3,653	317	5.82	10.43
Minidoka-Palisades	\$113,836	\$85,665	\$953	(\$29,123)	(\$1,344)	\$5,976	\$3,644	\$50,953	\$85	841	7.11	13.04
<b>Total Area Support</b>	<b>\$459,864</b>	<b>\$338,531</b>	<b>\$58,388</b>	<b>(\$179,722)</b>	<b>(\$4,946)</b>	<b>\$26,784</b>	<b>\$8,930</b>	<b>\$143,332</b>	<b>\$16,859</b>	<b>2,971</b>	<b>9.02 \$/MWh</b>	<b>13.69 \$/MWh</b>
<b>Local Support</b>												
Boise Diversion-Anderson Ranch-Black Canyon	\$29,162	\$20,324	\$147	(\$8,986)	(\$322)	\$4,206	\$294	\$4,422	\$18	253	16.61	19.05
Chandler-Roza	\$10,578	\$8,963	\$1,805	(\$3,420)	(\$96)	\$2,185	\$105	\$1,713	\$2,123	161	13.56	14.80
Green Springs	\$10,821	\$3,134	\$650	(\$8,338)	(\$39)	\$581	\$655	\$11,145	\$86	51	11.44	25.09
<b>Total Local Support</b>	<b>\$50,561</b>	<b>\$32,420</b>	<b>\$2,602</b>	<b>(\$20,744)</b>	<b>(\$457)</b>	<b>\$6,972</b>	<b>\$1,054</b>	<b>\$17,280</b>	<b>\$2,226</b>	<b>465</b>	<b>14.99 \$/MWh</b>	<b>18.24 \$/MWh</b>
<b>Total Power Assets</b>	<b>\$6,674,534</b>	<b>\$4,316,306</b>	<b>\$318,454</b>	<b>(\$2,676,682)</b>	<b>(\$85,249)</b>	<b>\$234,966</b>	<b>\$163,902</b>	<b>\$2,406,137</b>	<b>\$140,236</b>	<b>76,354</b>	<b>3.08 \$/MWh</b>	<b>6.34 \$/MWh</b>

/a -- Sum of the initial capital and replacement costs; capital cost of retired equipment is deducted. [FY09 ASPRJ Summary-SUMMARY2009.xls: Completed Plant]

/b -- Completed plant (previous column) with accumulated depreciation deducted and CWIP added. [FY09 ASPRJ Summary-SUMMARY2009.xls: Net Utility Plant]

/c -- Includes effects of prior period depreciation adjustments.

/d -- Annual expense cost by dam. [Summary2009.xls: Total O&M]

/e -- For the life of a debt, BPA pays interest annually, the principle is paid as a lump sum at the end of its payment period.

BPA refinanced its debt in FY1998, resulting in slightly higher interest rates. [Appropriated Interest FY09.xls: line 128]

/f -- Remaining unpaid principle [Appropriated Interest FY09.xls: line 66]



# Performance, Low Cost Power: Cost Benchmarks

(O&M Costs for the FCRPS)

Public Affairs and Regulatory (49%): Recreation, fish and wildlife mitigation (including Bonneville’s direct fish program), cultural stewardship, and fees for the use of land and water.

Support (16%): Human resources, fleet services, information services, security, purchasing, training, budgeting and accounting, and legal.

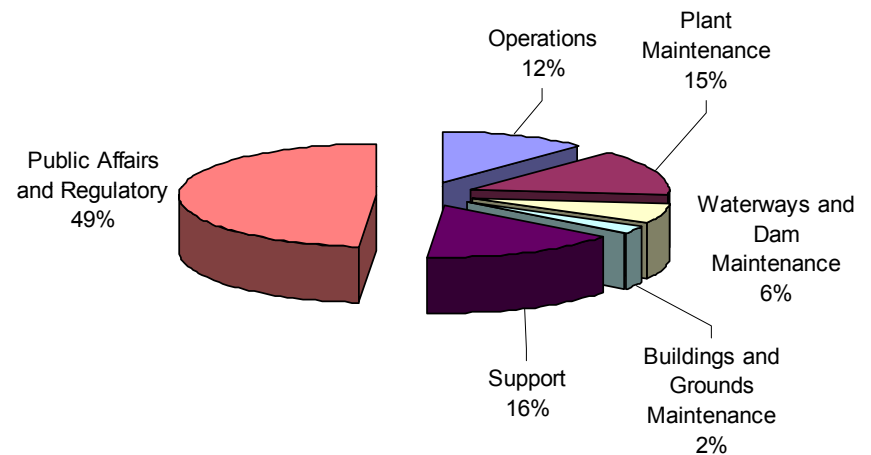
Operations (12%): On-site plant operations, off-site water management, and Bonneville’s generation scheduling and dispatch.

Plant Maintenance (15%): Maintenance of generation facilities.

Waterways and Dam Maintenance (6%): Dam, spillways, and reservoir maintenance.

Buildings and Grounds Maintenance (2%).

Distribution of FCRPS O&M Costs





# Performance, Low Cost Power: Cost Benchmarks

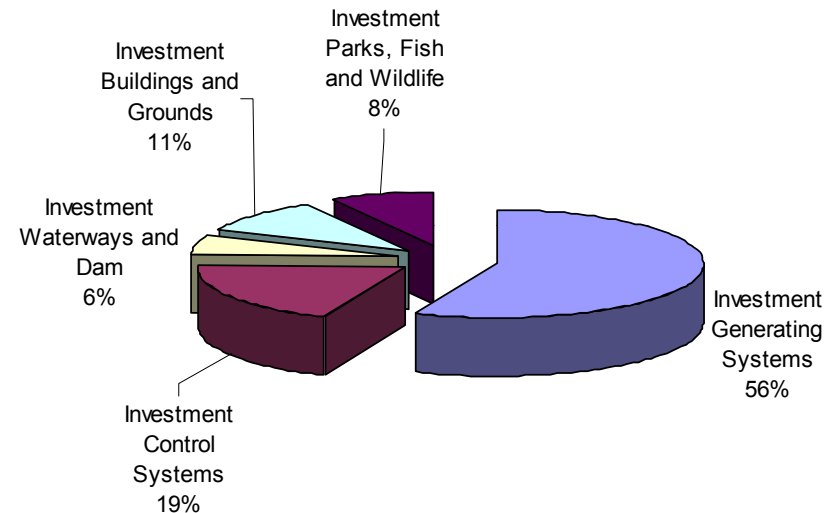
(Investment Costs for the FCRPS)

Large Capital and Extraordinary Maintenance projects to repair, replace, and enhance hydropower and joint-use equipment.

Investment is comprised of both Direct Funding and appropriated dollars.

More than half of benchmarked Investment costs are in Generating Systems, with the remainder of costs in Control Systems and other multi-purpose equipment.

**Distribution of FCRPS Investment Costs**





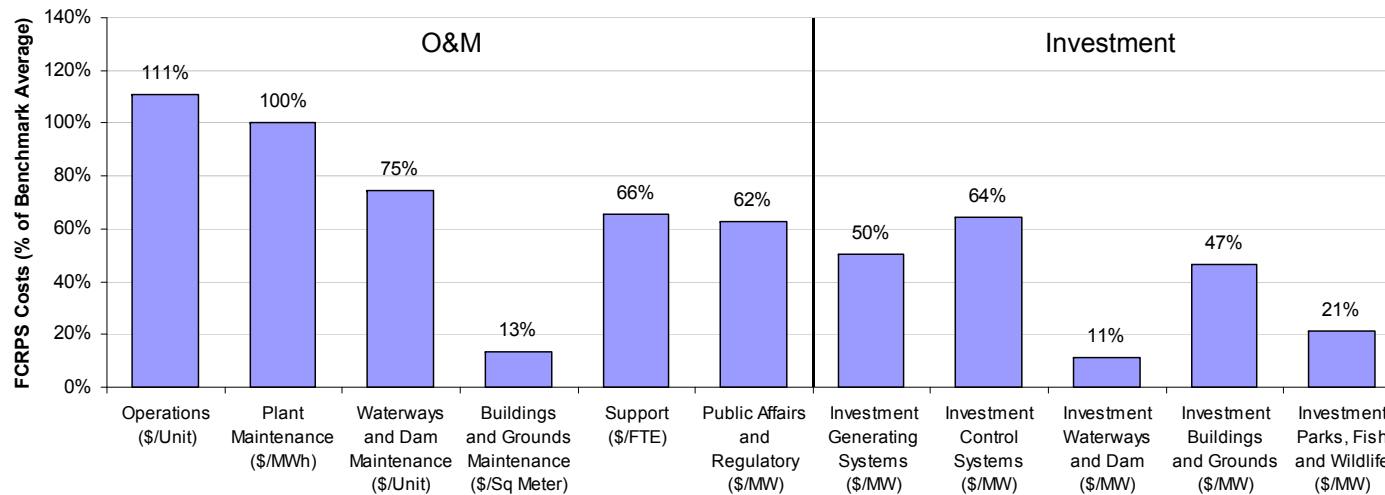
# Performance, Low Cost Power: Cost Benchmarks

Most O&M Program function costs are lower than benchmark averages.

- Operations costs are 11 percent higher than benchmark averages, in part due to water management functions that reside in three FCRPS federal agencies, but also to the number of Corps plants with staffed control rooms. Much of the industry now has automated stations, which lowers Operations staffing costs significantly.
- Powerhouse maintenance costs, which are increasing as hydro plant equipment gets older.
- Operations, Plant Maintenance, and Public Affairs and Regulatory costs are above the median in each function.

Historical Investment costs are less than half of benchmark averages.

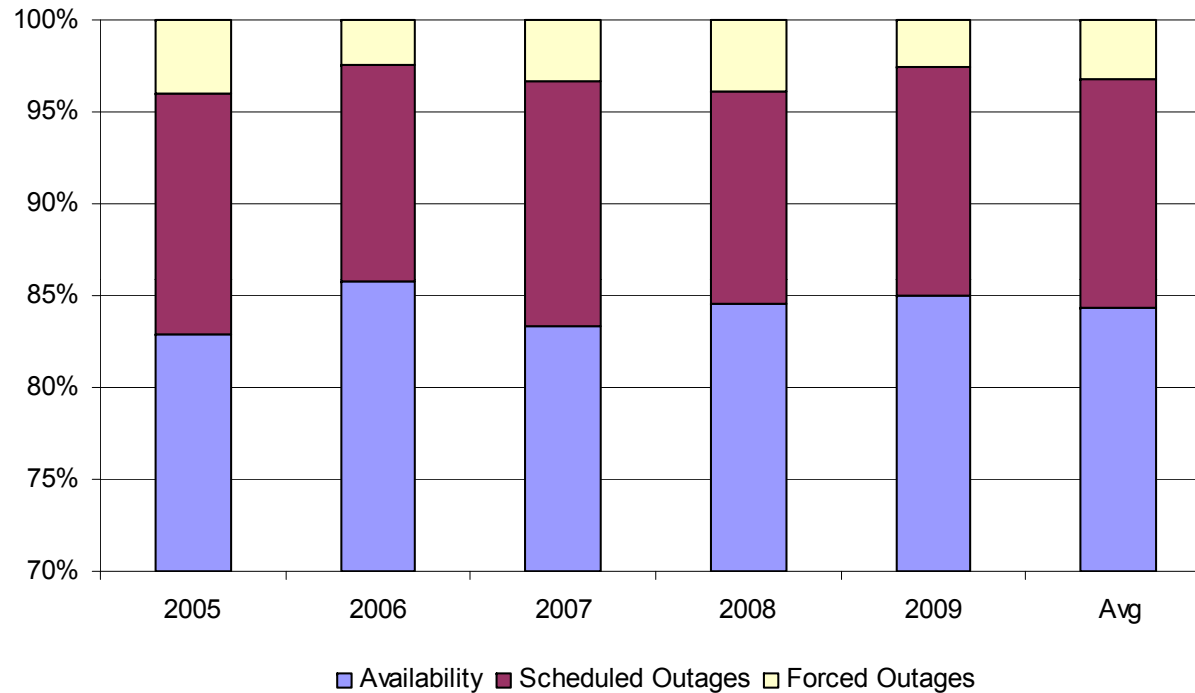
**FCRPS Costs as a Percent of Benchmark Averages**



# Current Performance, Power Reliability



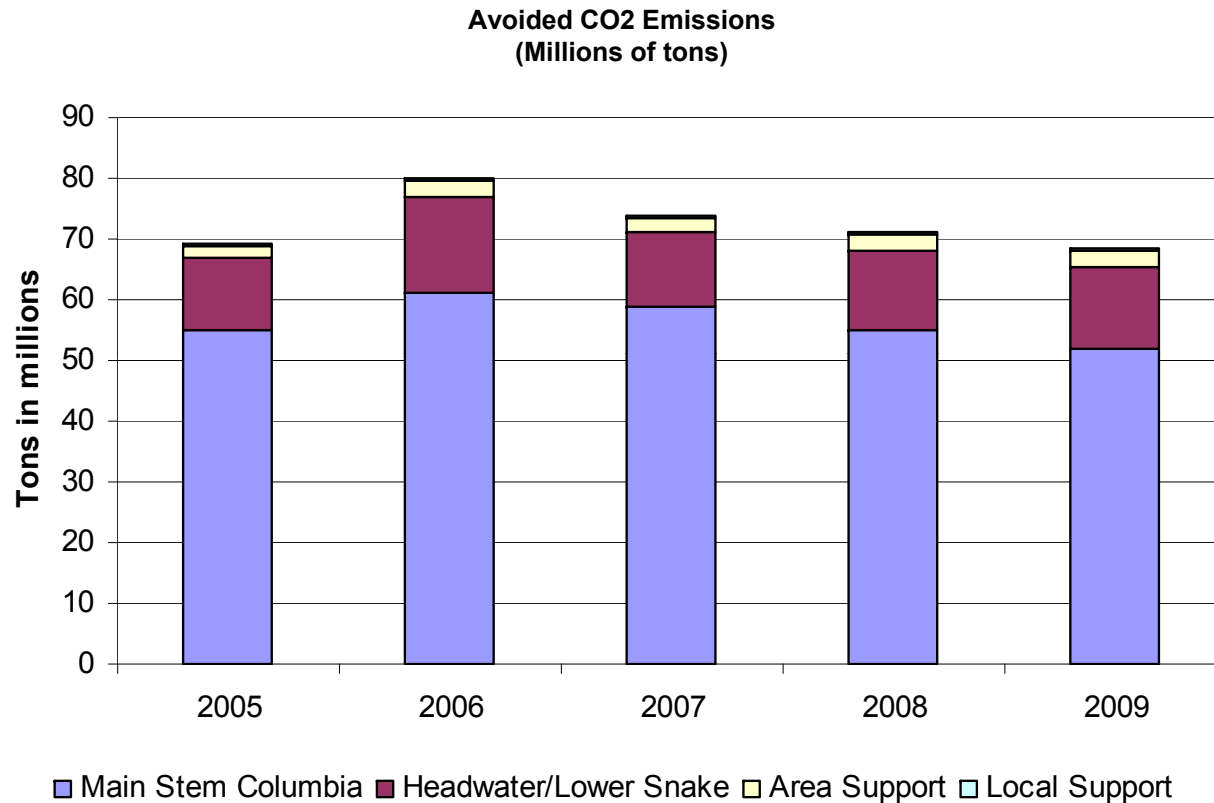
**FCRPS Hydro Availability Statistics**



**Number of Instances**

Measure	2005	2006	2007	2008	2009	5-yr Avg.
Startup Failures	11	18	10	18	11	14
Forced Outages	587	521	479	487	375	490

# Current Performance, Trusted Stewardship



**Lost Time Accidents per 200,000 person-hours**

Measure	2005	2006	2007	2008	2009	5-yr Avg.
Lost Time Accident Rate	1.6	1.3	1.9	3.3	1.2	1.9



## Condition Overview

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The FCRPS manages 196 generating units in 31 hydro plants, plus 16 additional station service, fish, and pump turbine units. Overall, it considers more than 5,500 equipment components in maintenance and investment planning.

Component condition is a key driver of maintenance and investment needs.

- Routine maintenance activities identify and address deficiencies prior to their posing threats to equipment reliability.
- Even with effective maintenance programs, condition will eventually deteriorate to the point where inadequate reliability will warrant re-investment.

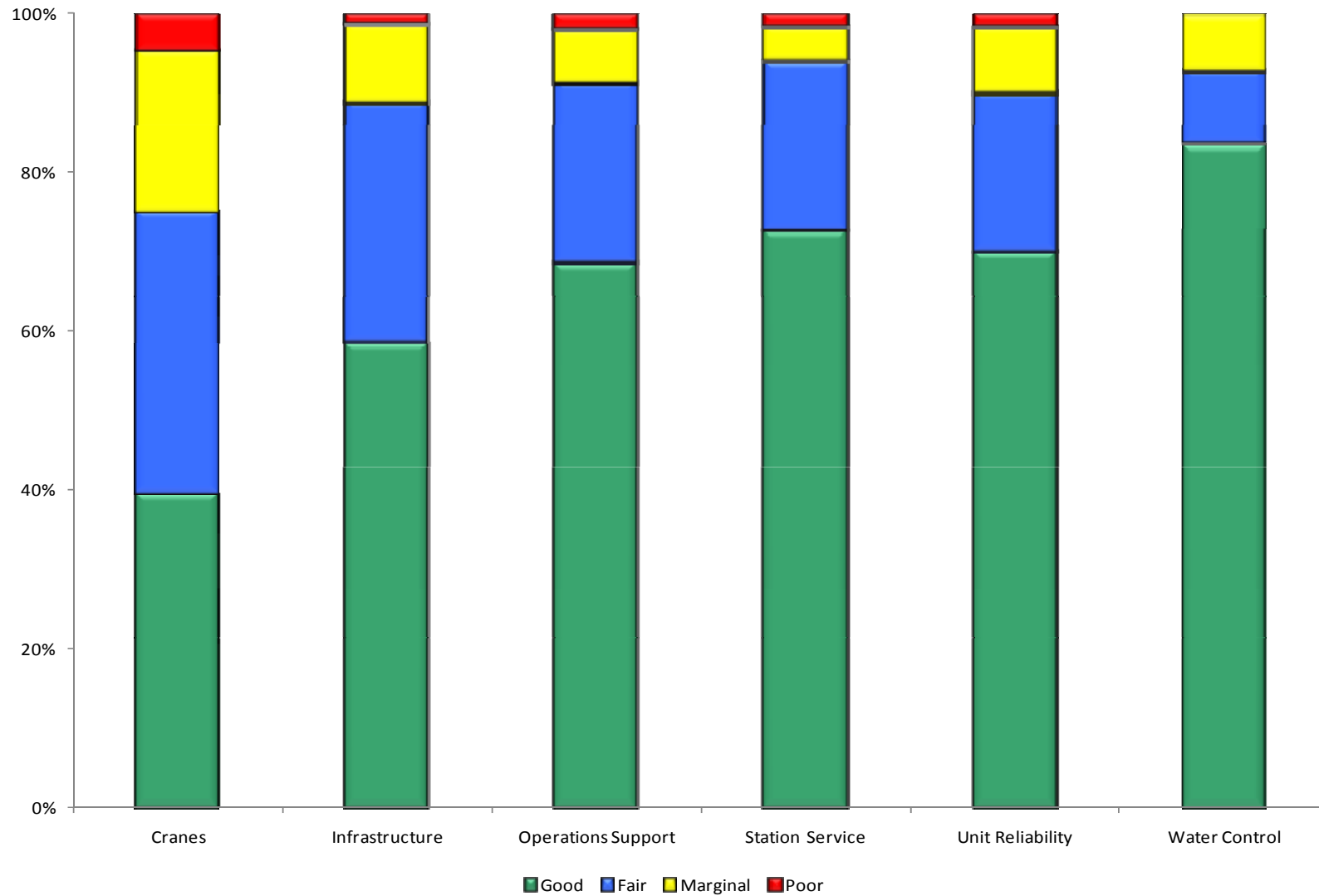
There are few redundant or spare components in hydroelectric generating facilities and, as such, it is important that the condition of major components be understood and managed.

In the 2009 System Asset Plan, hydroAMP was used to assess the condition of seven power train components: unit transformers, generator windings, generator rotors, exciters, governors, unit breakers, and turbine runners. In this strategy, the hydroAMP framework is used to develop a complementary condition rating system for assessing condition of other equipment for which hydroAMP guides are not available. While the list of equipment components evaluated in this strategy is not yet comprehensive, it is significantly larger than before.



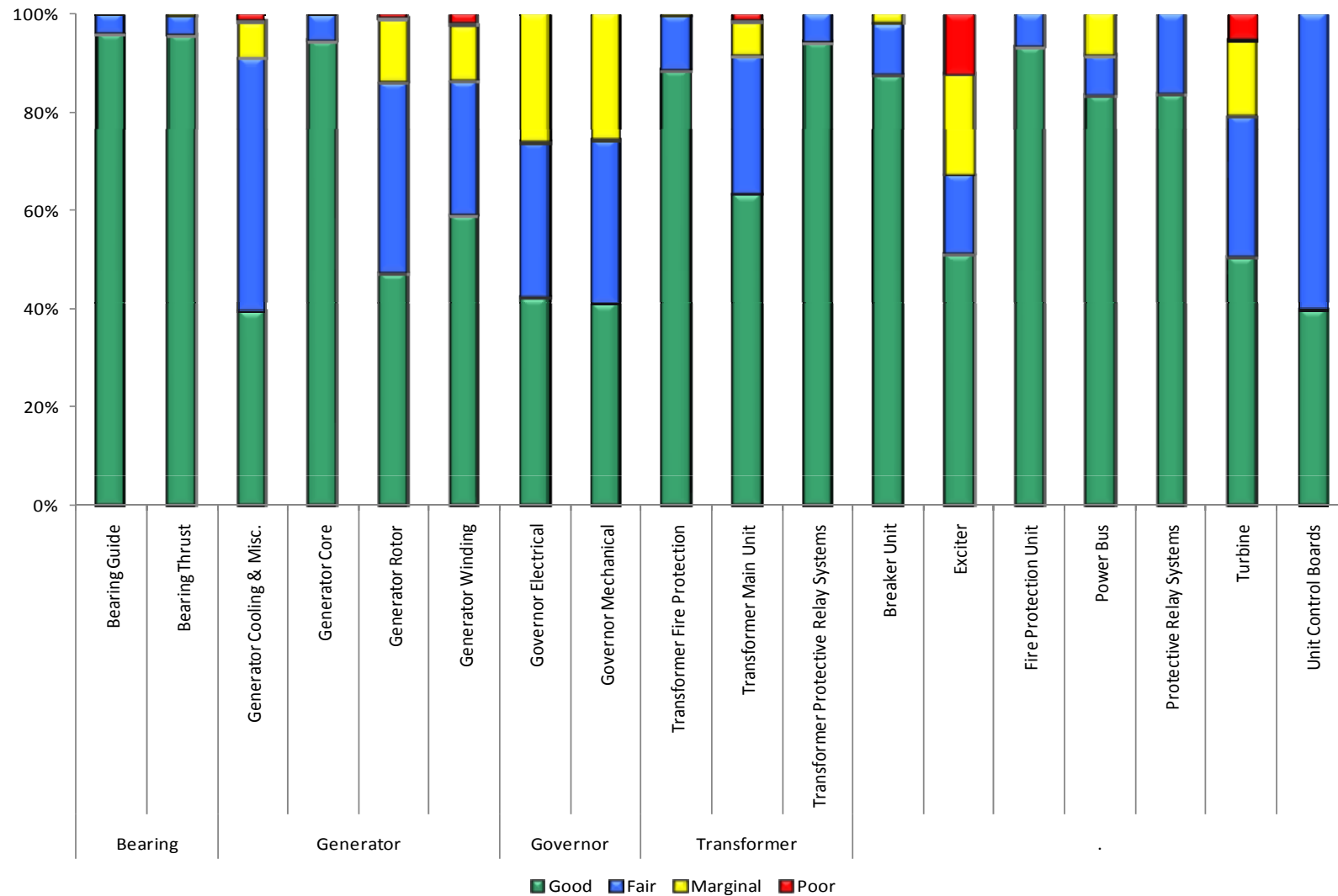


# Current Condition by Equipment Type



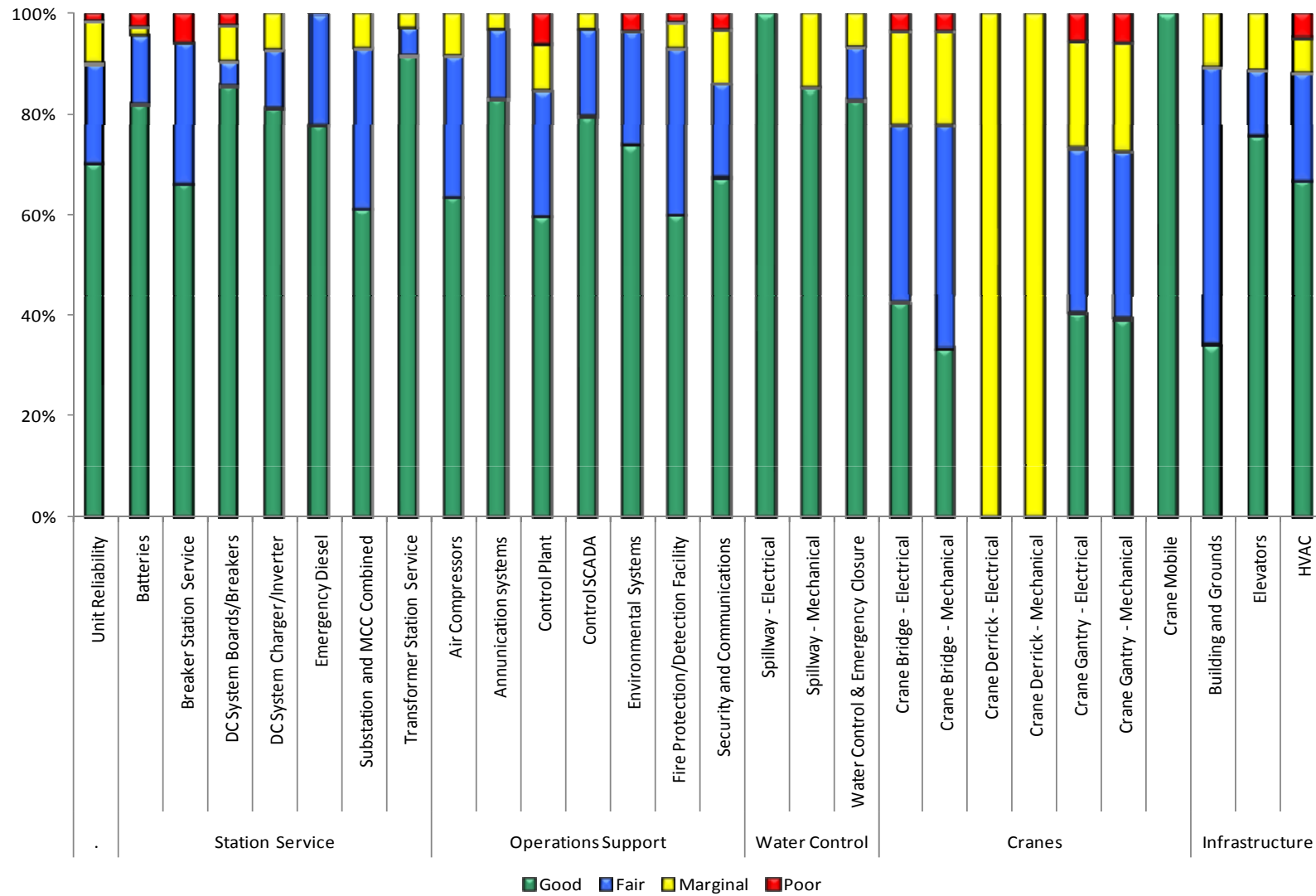


# Current Condition: Unit Reliability Equipment





# Current Condition: All Equipment





## Age of Equipment

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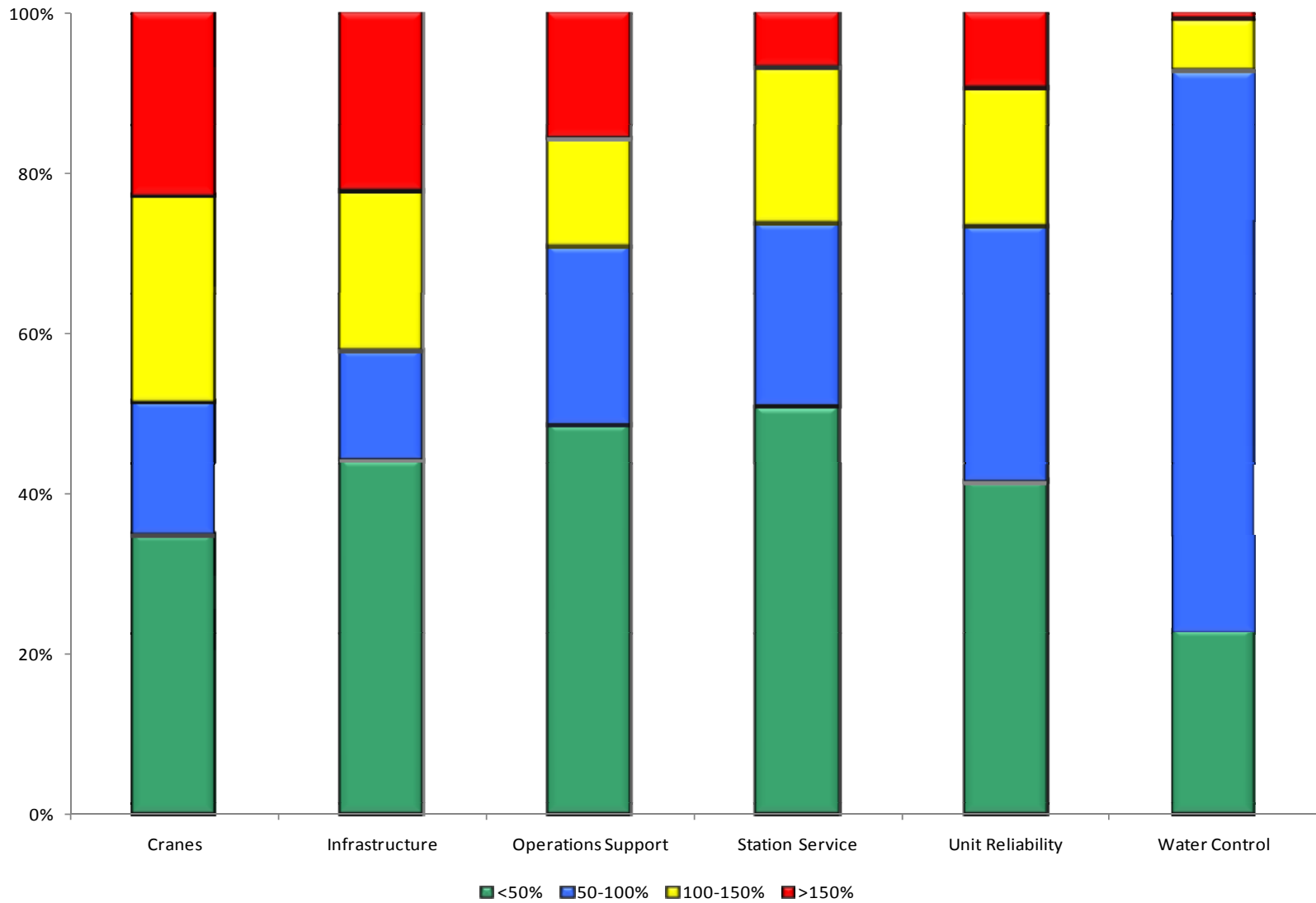
For presentation purposes, component ages have been grouped into four categories to create asset profiles. These categories are as follows:

- Less than 50 percent of design life;
- 50 to 100 percent of design life;
- 100 to 150 percent of design life, and
- Greater than 150 percent of design life.

### **Current Age by Equipment Type:**

- Nearly 50 percent of cranes and infrastructure equipment has exceeded design life. The combination of condition and age make cranes a likely candidate for re-investment.
- Water control equipment (spillway electrical/mechanical and emergency closure) has the fewest percentage of components exceeding design life.

# Current Age by Equipment Type (Percent of Design Life)





## Failure of Hydro Plant Equipment

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Loss of hydro plant equipment can lead to a number of negative consequences, including:

- Economic losses as a result of the need to replace components;
- Economic losses as a result of the need to purchase replacement power to meet contractual obligations, or lost opportunities to sell power to the market;
- Safety issues, should the catastrophic failure of a component cause injury or death;
- Environmental impacts such as the off-site release of oil;
- Regulatory violations through an inability to meet preferred unit operation, temperature controls, or Total Dissolved Gas (TDG) limits;
- Operational and Transmission support impacts such as unplanned spill or inability to provide reserves, voltage support, or capacity at peak periods, and
- Other stakeholder impacts such as lost pumping ability for Reclamation's irrigation customers.

The risk of equipment failure is assessed using two tools:

- Risk maps for safety, environmental and financial risk, and
- By quantifying lost generation risk.



## Risk: Condition Index vs. Likelihood of Failure

The hydro program correlates a condition rating with the likelihood of equipment failing to perform as expected. An equipment component with a low condition rating has a higher likelihood of failure than one with a higher rating. The correlation is shown below.

Likelihood	Condition Index	Description
Almost Certain	0 to 0.9	Poor
	1 to 1.9	
Likely	2 to 2.9	
	3 to 3.9	
Possible	4 to 4.9	
	5 to 5.9	
Unlikely	6 to 6.9	Fair
	7 to 7.9	
Rare	8 to 8.9	Good
	9 to 10	

# Current Safety Risk Map



Likelihood	Almost Certain	22 Unit Reliability	8 Station Service 2 Operations Support	3 Operations Support		0 to 0.9	Condition Index	
		2 Infrastructure	2 Cranes			1 to 1.9		
	Likely	60 Unit Reliability 6 Station Service 1 Operations Support	11 Unit Reliability 1 Station Service 2 Operations Support	6 Unit Reliability 1 Station Service 7 Operations Support	1 Operations Support	1 Water Control		2 to 2.9
		5 Infrastructure	9 Cranes	12 Cranes				3 to 3.9
		257 Unit Reliability 19 Station Service 7 Operations Support	13 Unit Reliability 3 Station Service 1 Operations Support 3 Water Control 15 Cranes	16 Unit Reliability 2 Station Service 12 Operations Support	3 Operations Support	1 Unit Reliability 14 Water Control		4 to 4.9
	Possible	4 Infrastructure	7 Infrastructure	16 Cranes				5 to 5.9
		Unlikely	525 Unit Reliability 96 Station Service 26 Operations Support	136 Unit Reliability 40 Station Service 25 Operations Support	72 Unit Reliability 5 Station Service 30 Operations Support	19 Operations Support		28 Unit Reliability 23 Water Control
	40 Infrastructure		43 Cranes 8 Infrastructure	34 Cranes				7 to 7.9
	Rare	1858 Unit Reliability 264 Station Service 59 Operations Support 6 Water Control	363 Unit Reliability 125 Station Service 111 Operations Support 17 Water Control 45 Cranes	161 Unit Reliability 87 Station Service 99 Operations Support 41 Cranes	34 Operations Support	282 Unit Reliability 183 Water Control		8 to 8.9
		47 Infrastructure	46 Infrastructure					9 to 10
		No or minor injury, first aid	Treatment by medical professional	Lost time Accident - temporary disability	Lost Time Accident - permanent disability/fatality	Multiple fatalities		
<b>Consequence</b>								
Risk Level		Low	Medium	High				



# Current Environmental Risk Map



Likelihood	Almost Certain	18 Unit Reliability 2 Cranes 2 Infrastructure	4 Unit Reliability 8 Station Service	3 Operations Support	2 Operations Support	0 to 0.9 1 to 1.9	Condition Index
	Likely	41 Unit Reliability 6 Station Service 1 Operations Support 9 Cranes 5 Infrastructure	30 Unit Reliability 1 Station Service 1 Operations Support	6 Unit Reliability 1 Station Service 9 Operations Support 12 Cranes	1 Water Control	2 to 2.9 3 to 3.9	
	Possible	195 Unit Reliability 19 Station Service 7 Operations Support 15 Cranes 11 Infrastructure	75 Unit Reliability 3 Station Service	17 Unit Reliability 2 Station Service 16 Operations Support 3 Water Control 16 Cranes	14 Water Control	4 to 4.9 5 to 5.9	
	Unlikely	408 Unit Reliability 96 Station Service 26 Operations Support 43 Cranes 48 Infrastructure	253 Unit Reliability 40 Station Service 5 Operations Support	100 Unit Reliability 5 Station Service 57 Operations Support 34 Cranes	12 Operations Support 23 Water Control	6 to 6.9 7 to 7.9	
	Rare	1652 Unit Reliability 264 Station Service 59 Operations Support 45 Cranes 93 Infrastructure	569 Unit Reliability 125 Station Service 23 Operations Support	443 Unit Reliability 87 Station Service 182 Operations Support 23 Water Control 41 Cranes	39 Operations Support 183 Water Control	8 to 8.9 9 to 10	
		No impact	Impact to on-site environment (simple remediation)	Limited impact off-site (localized remediation required)	Detrimental impact on- or off-site (long-term remediation required)	Detrimental or catastrophic impact off-site (mitigation impossible)	
<b>Consequence</b>							
Risk Level		Low	Medium	High			

# Current Financial Risk Map



Likelihood	Almost Certain		8 Station Service 1 Operations Support	4 Operations Support  2 Cranes 2 Infrastructure	17 Unit Reliability	5 Unit Reliability	0 to 0.9	Condition Index
	Likely	1 Operations Support	2 Operations Support	9 Unit Reliability 2 Station Service 7 Operations Support  9 Cranes 3 Infrastructure	46 Unit Reliability 6 Station Service 1 Operations Support 1 Water Control 12 Cranes 2 Infrastructure	22 Unit Reliability	2 to 2.9	
	Possible	7 Operations Support	3 Operations Support	9 Unit Reliability 7 Station Service 13 Operations Support 13 Water Control 17 Cranes 11 Infrastructure	219 Unit Reliability 17 Station Service  4 Water Control 14 Cranes	59 Unit Reliability	4 to 4.9	
	Unlikely	26 Operations Support	19 Operations Support  19 Infrastructure	153 Unit Reliability 26 Station Service 50 Operations Support 7 Water Control 41 Cranes 25 Infrastructure	469 Unit Reliability 71 Station Service 5 Operations Support 15 Water Control 36 Cranes 4 Infrastructure	84 Unit Reliability 7 Station Service 1 Water Control	6 to 6.9	
	Rare	59 Operations Support  2 Infrastructure	369 Unit Reliability 83 Station Service 68 Operations Support 9 Water Control 3 Cranes 6 Infrastructure	425 Unit Reliability 184 Station Service 152 Operations Support 116 Water Control 47 Cranes 79 Infrastructure	1584 Unit Reliability 198 Station Service 20 Operations Support 74 Water Control 36 Cranes 6 Infrastructure	286 Unit Reliability 11 Station Service 4 Operations Support 7 Water Control	8 to 8.9	
		<b>Insignificant</b>	<b>Minor</b>	<b>Moderate</b>	<b>Major</b>	<b>Extreme</b>		
		<b>&lt; \$ 10K</b>	<b>\$ 10K to \$ 100K</b>	<b>\$ 100K to \$ 1 M</b>	<b>\$ 1 M to \$ 10 M</b>	<b>&gt; \$ 10 M</b>		
<b>Consequence</b>								

Risk Level	Low	Medium	Medium High	High
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## Current Lost Generation Risk

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Failure likelihood and consequence information is further evaluated to quantify the expected value of lost generation as Lost Generation Risk.

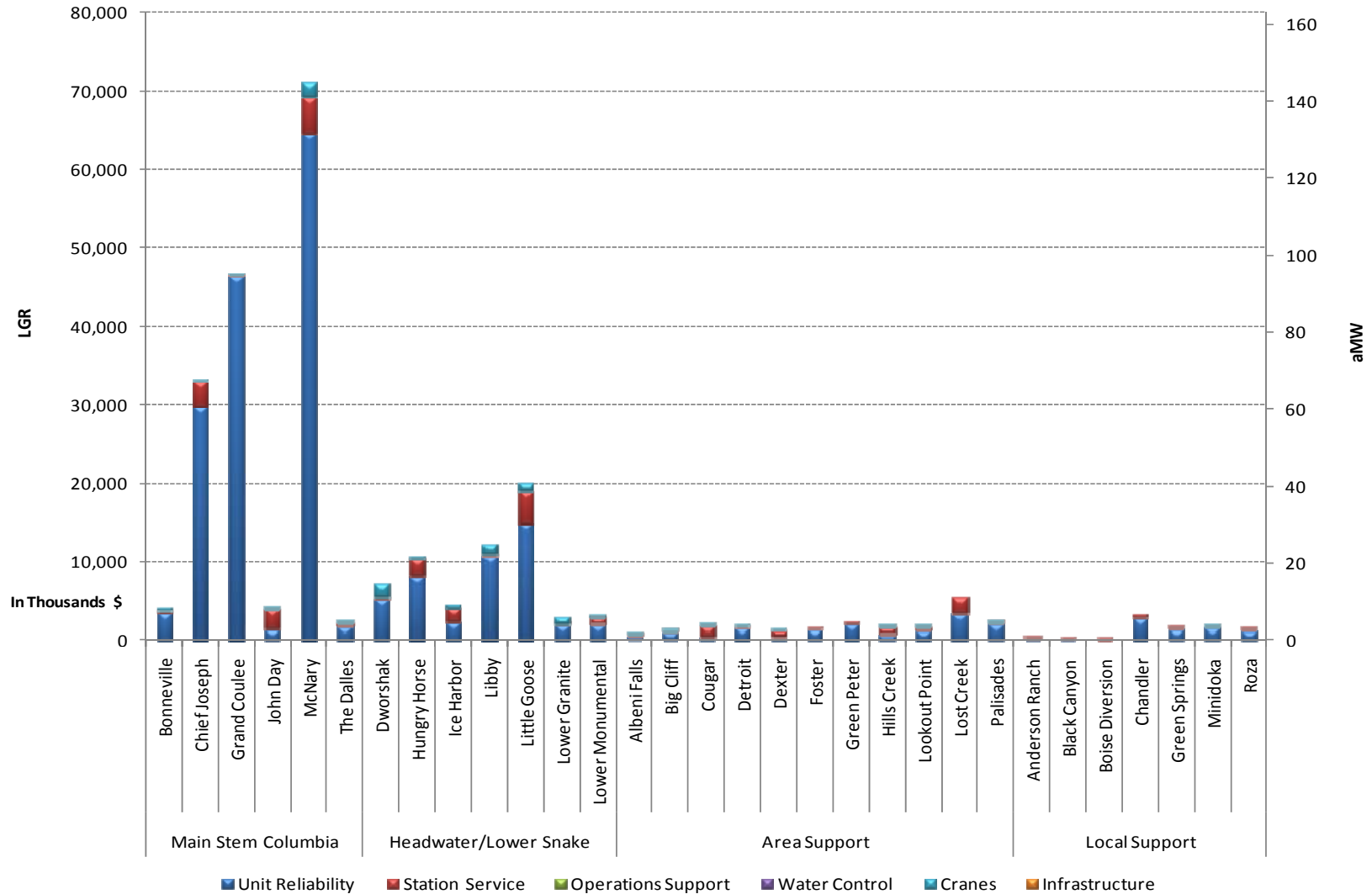
- Equipment condition correlates to a probability of failure for each component.
- These probabilities are multiplied by the lost generation consequence for each component to calculate the Lost Generation Risk (LGR), i.e., the replacement power cost risk associated with a run-to-failure strategy.

The current LGR for the system is about 508 aMW (\$249 million), about 50 percent higher than in the 2009 plan (334 aMW).

- The 2009 plan identified LGR for only seven equipment categories, whereas in this strategy, 21 equipment categories have a lost generation consequence.
- For the seven categories evaluated in the 2009 plan, the corresponding LGR in this strategy is nearly unchanged (336 aMW), indicating that improvements in condition of some equipment over the past two years have been largely offset by declines in the condition of other equipment.



# Current Lost Generation Risk by Plant





## 4. O&M Program

Routine Operations  
Routine Maintenance  
Non-Routine Maintenance  
Small Capital



**US Army Corps  
of Engineers**

## O&M Program

(from 2008 Integrated Program Review)



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*O&M Program costs included here are from the 2008 Integrated Program Review and were not updated for this 2012 strategy.*

The O&M Program reflects core funding for maintenance, operations, and minor equipment replacements, and is largely driven by the staffing needs of each facility. Typically, there is an economy of scale where larger plants have a lower unit cost of production than smaller plants.

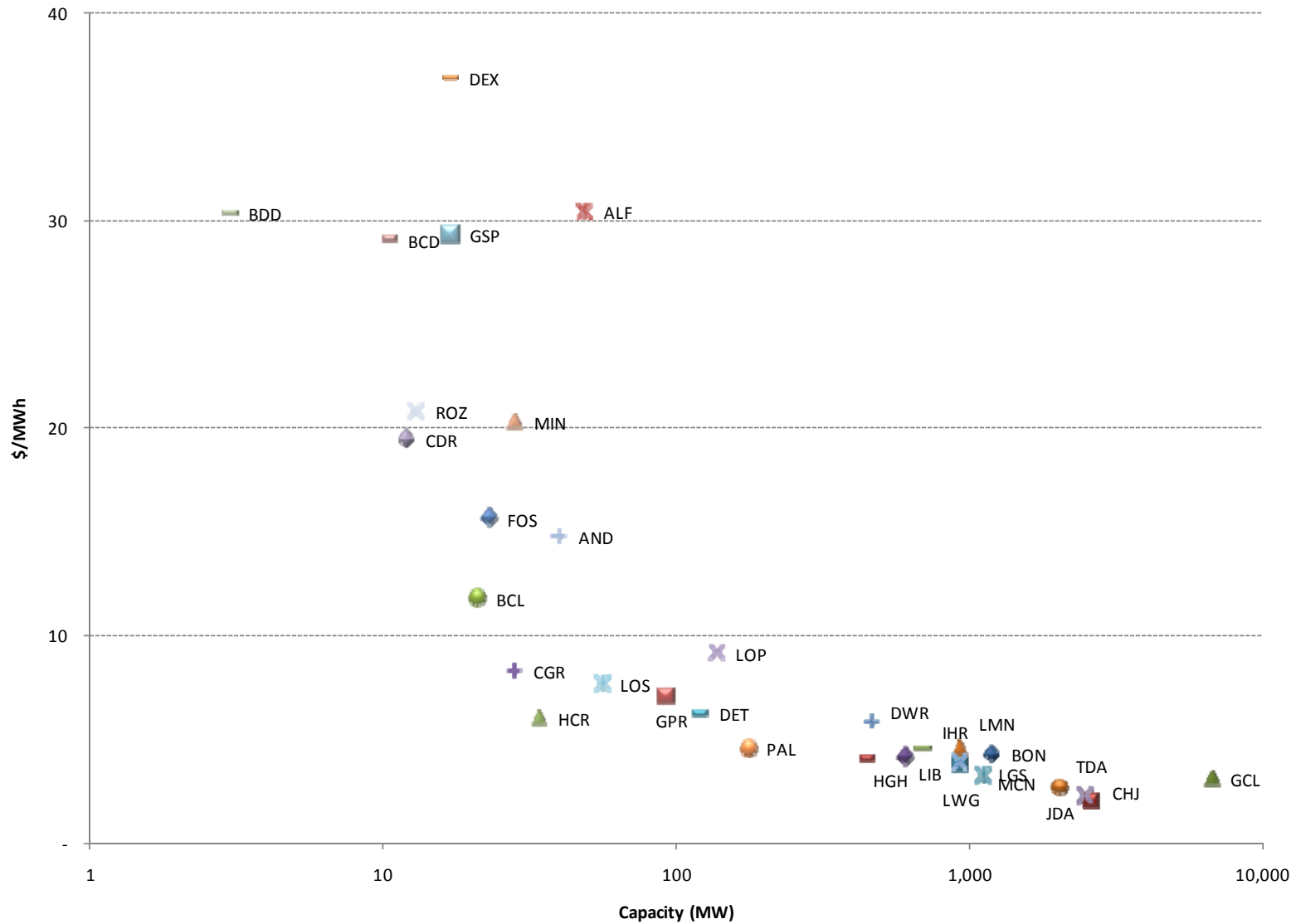
### **O&M forecast for FY2012 – FY2013:**

- Ranges from about \$2/MWh at Chief Joseph to \$36/MWh at Dexter.
- Twenty plants have an O&M forecast of less than \$10/MWh.
- The forecast for the entire system is about \$3.50/MWh of production (\$273 million).

This strategy does not address the sensitivity of key O&M Program inputs on the performance, condition, and risk of the hydro system. O&M costs are included here only to reflect the total cost of the hydro program when evaluating plan economics.

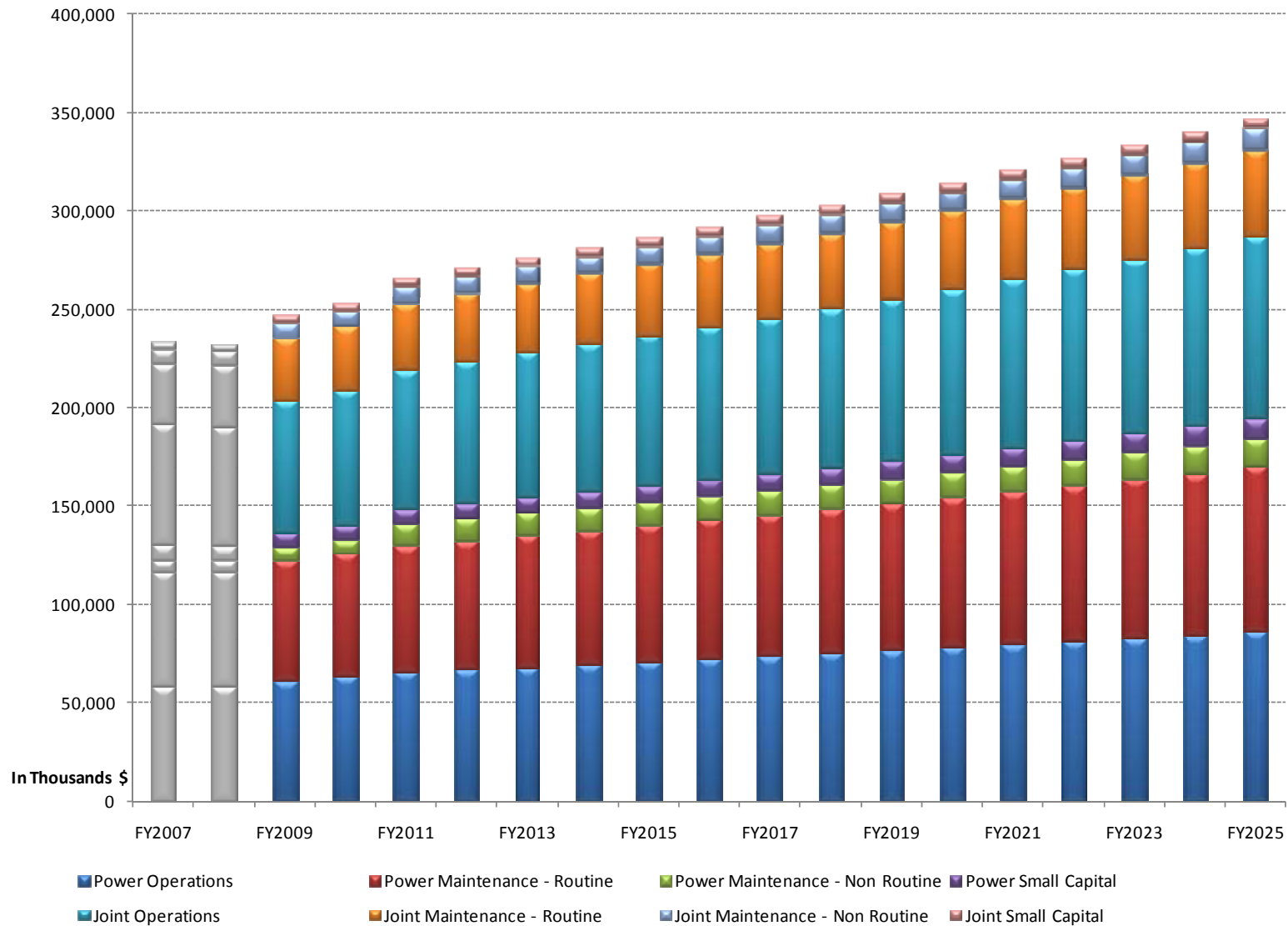
# O&M Forecast for FY2012 – FY2013

(from 2008 Integrated Program Review)



# O&M Program Forecast

(from 2008 Integrated Program Review)







## 5. Currently Committed Investment Program

Large Capital  
Extraordinary Maintenance Expense



**US Army Corps  
of Engineers**



## Committed Large Capital

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### **The Large Capital Program includes:**

- Reliability driven replacement of capital components, with the exception of smaller, “maintenance capital” replacements that are funded within the O&M Program;
- Economic opportunity investments to existing assets that are undertaken to improve system performance (e.g., turbine runner replacements to improve efficiency), and
- Investment in new assets at existing facilities, also based on economic opportunities.

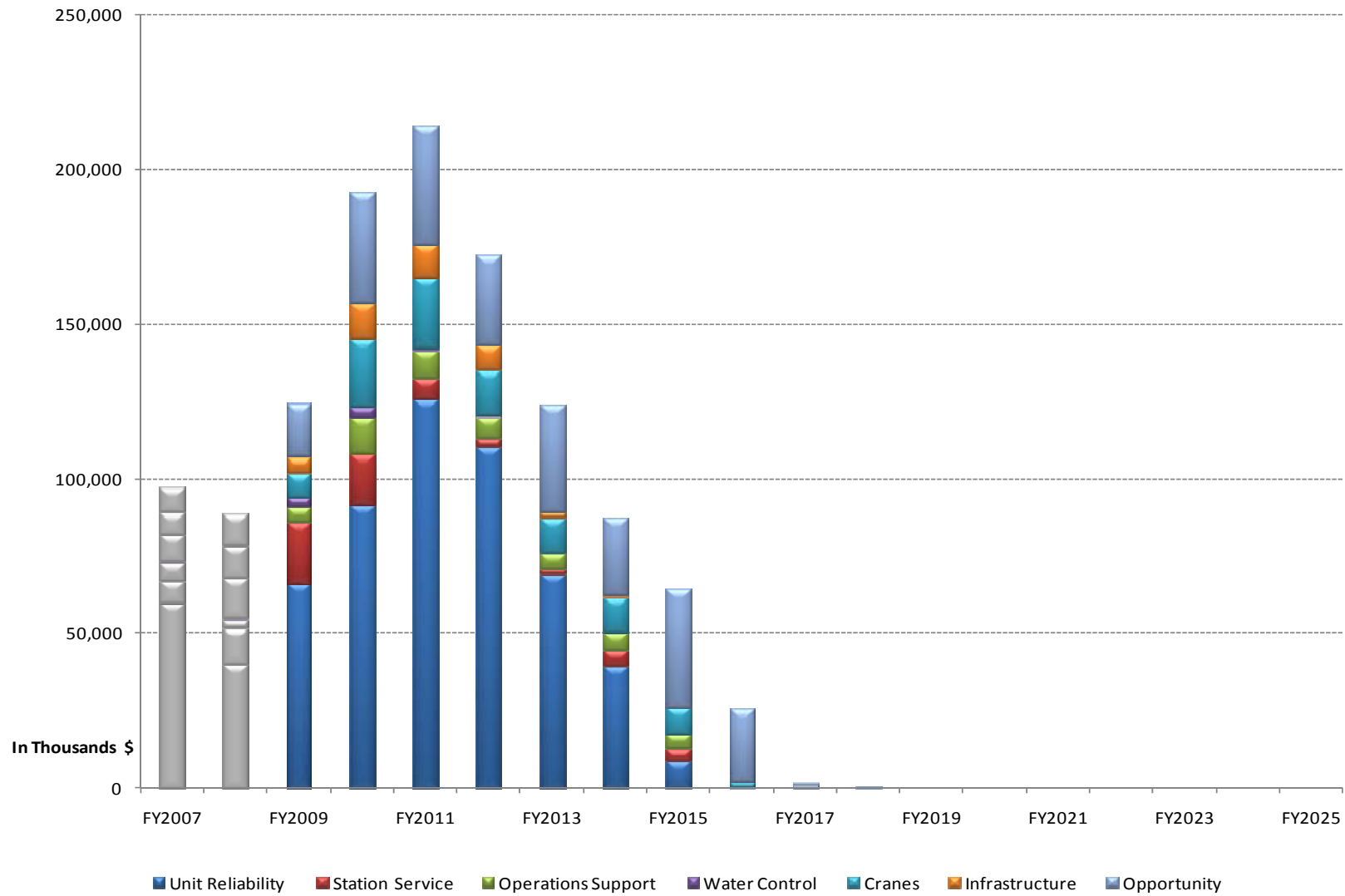
**Committed Large Capital Program:** The currently committed capital program is work that has been identified, agreed to, and initiated, primarily through the Capital Program business process, but also by analyses conducted for the 2009 Hydro Asset Plan.

**Committed Large Capital by Equipment Category:** The currently committed Large Capital Program is \$881 million for FY2010 – FY2017. The breakdown of commitments by equipment category is as follows:

- |                      |               |
|----------------------|---------------|
| • Unit reliability   | \$446 million |
| • Station service    | \$37          |
| • Operations support | \$43          |
| • Water control      | \$5           |
| • Cranes             | \$91          |
| • Infrastructure     | \$34          |
| • Opportunity        | \$224         |

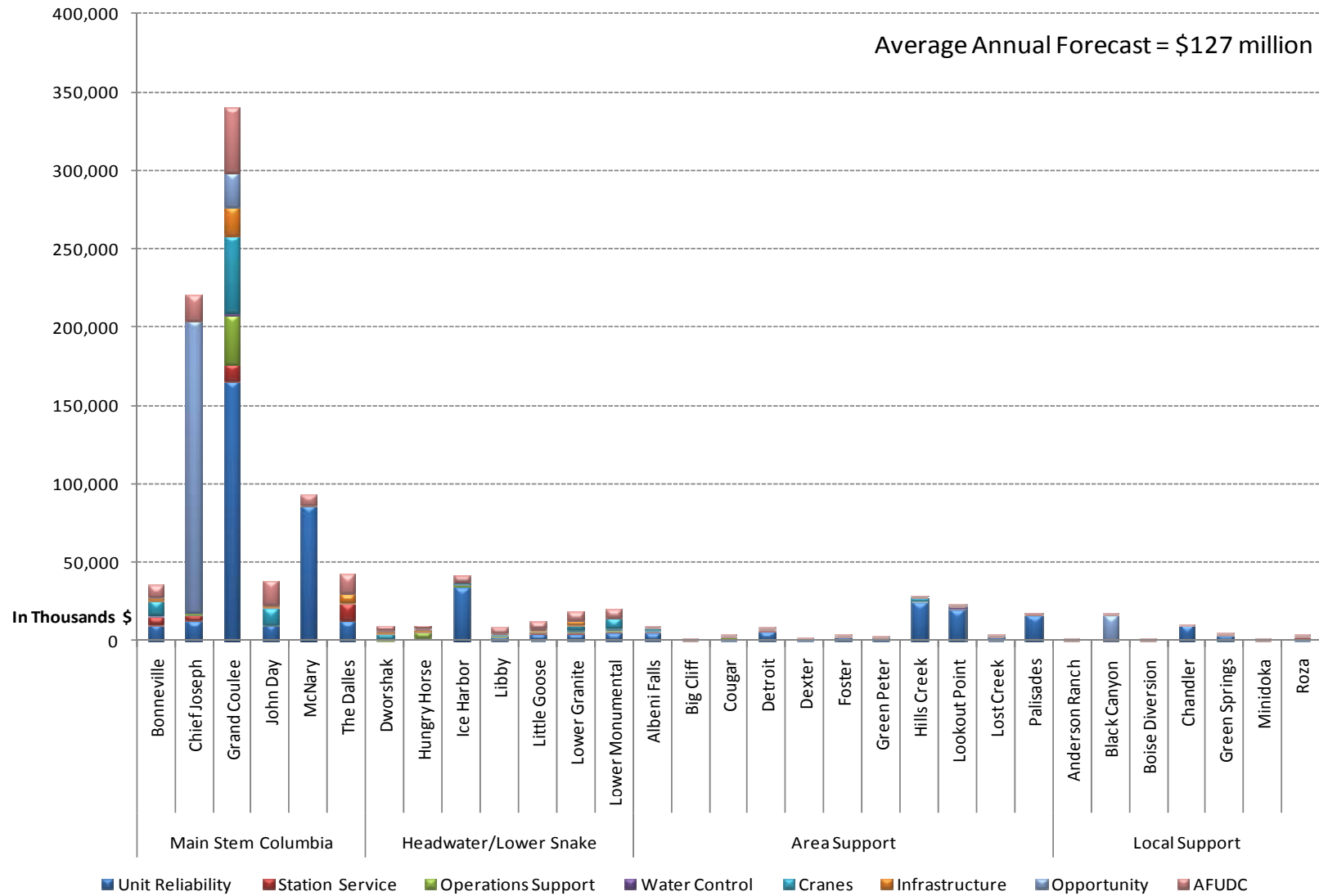


# Committed Large Capital by Equipment Category



# Committed Large Capital by Plant

(FY2010 – FY2017)





## Committed Extraordinary Maintenance Expense (from 2008 Integrated Program Review)

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*Extraordinary Expense costs included here are from the 2008 Integrated Program Review and were not updated for this 2012 strategy.*

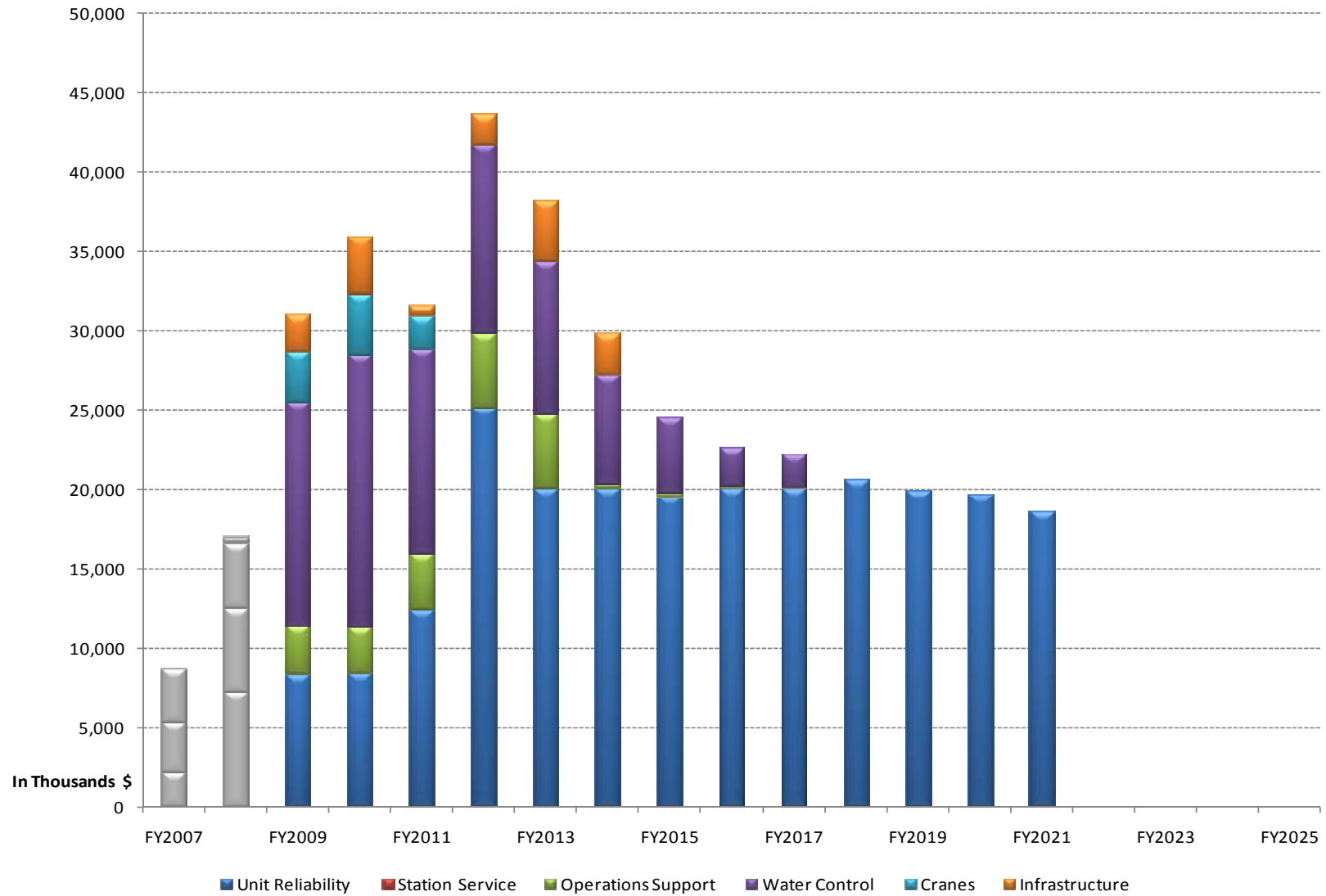
The Extraordinary Maintenance Program provides funding for large, infrequent work activities that are categorized as expense following accounting standards.

**Committed Extraordinary Maintenance by Category:** The currently committed program is \$249 million for the FY2010 – 2017 period. By equipment category, expenses break down as follows:

- Unit reliability: \$146 million
- Station service: \$0
- Operations support: \$16
- Water control: \$68
- Cranes: \$6
- Infrastructure: \$12

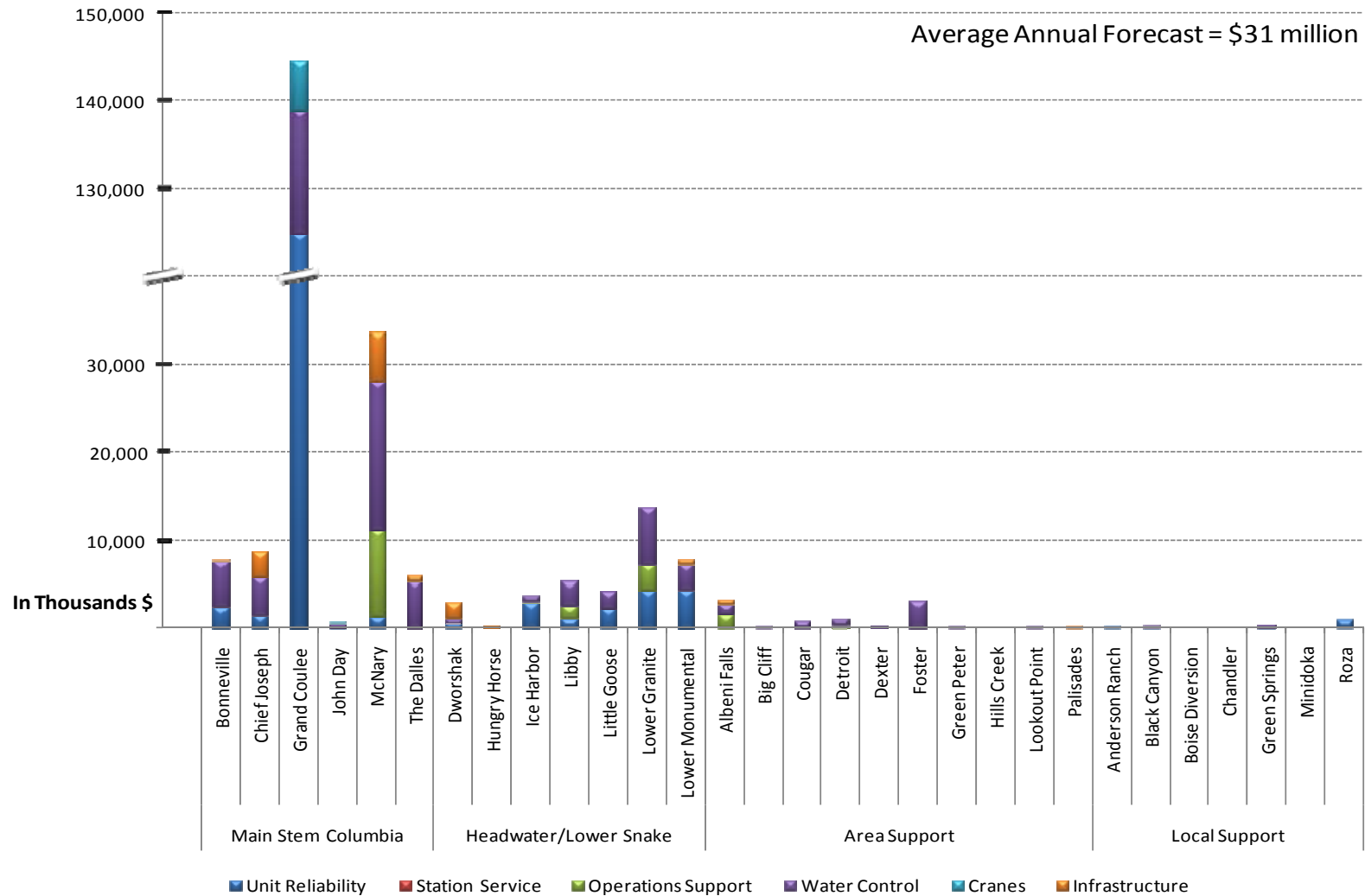
# Committed Extraordinary Maintenance by Equipment Category

(from 2008 Integrated Program Review)



# Committed Extraordinary Maintenance by Plant

(from 2008 Integrated Program Review, FY2010 – FY2017)





## Projected Condition, Age and Risk in 2022

(With Currently Committed Program)

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Equipment condition is not static – it degrades over time, even with normal maintenance.

The chart on the following page shows current and projected condition ratings in 2022 for each plant as a result of the committed program. No additional investments are reflected.

Four items are shown on the chart:

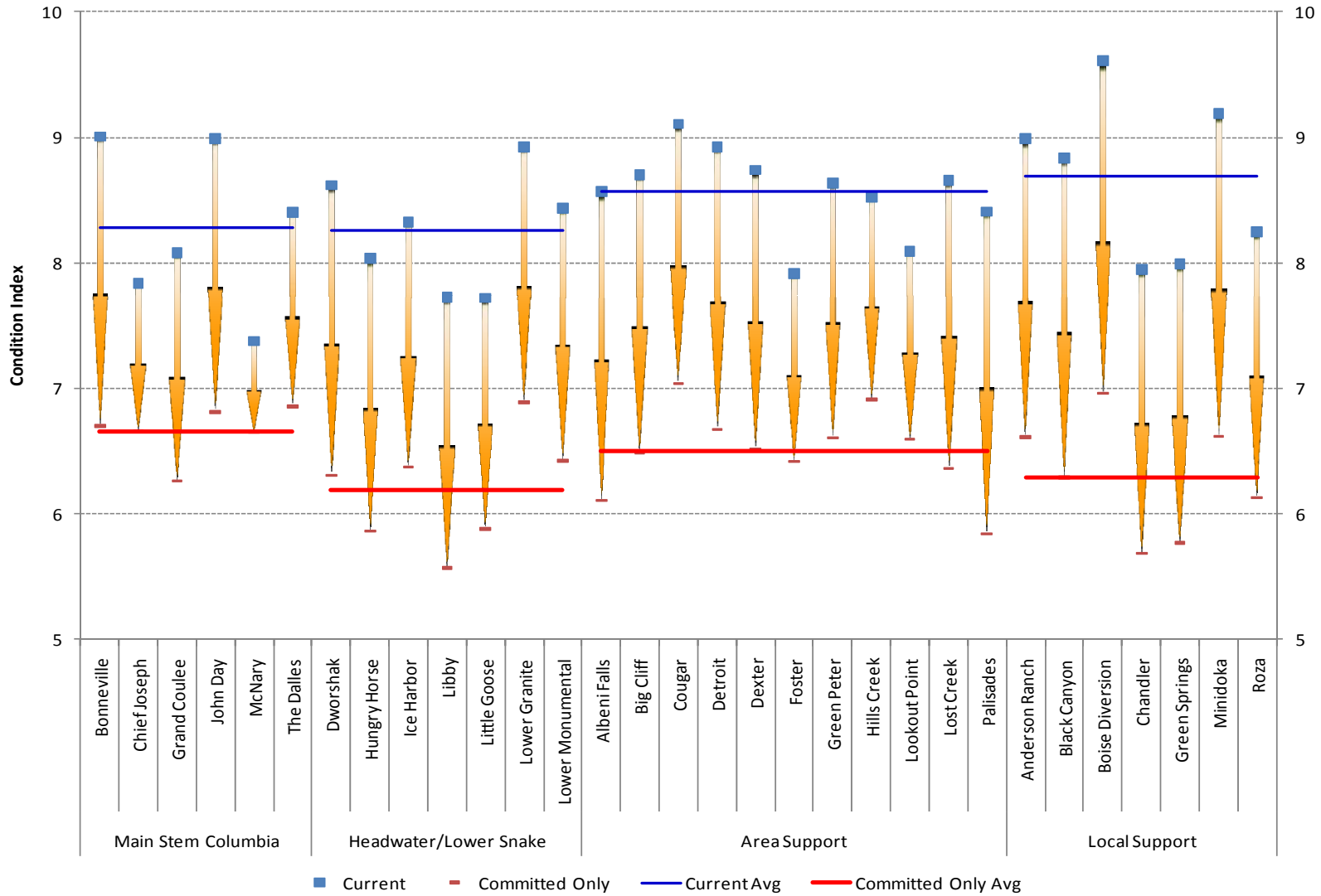
- The current average condition for rated components at the plant (e.g., the average condition rating for unit reliability components at Grand Coulee is about 8.1);
- The projected average condition rating for each plant at the start of 2022 if only currently committed investments are made to improve condition (about 6.3 for Grand Coulee unit reliability components);
- The current average condition rating for components in each strategic class, and
- The projected average condition rating in 2022 by strategic class with currently committed investments.

Similar charts are also shown for age and lost generation risk in 2022.



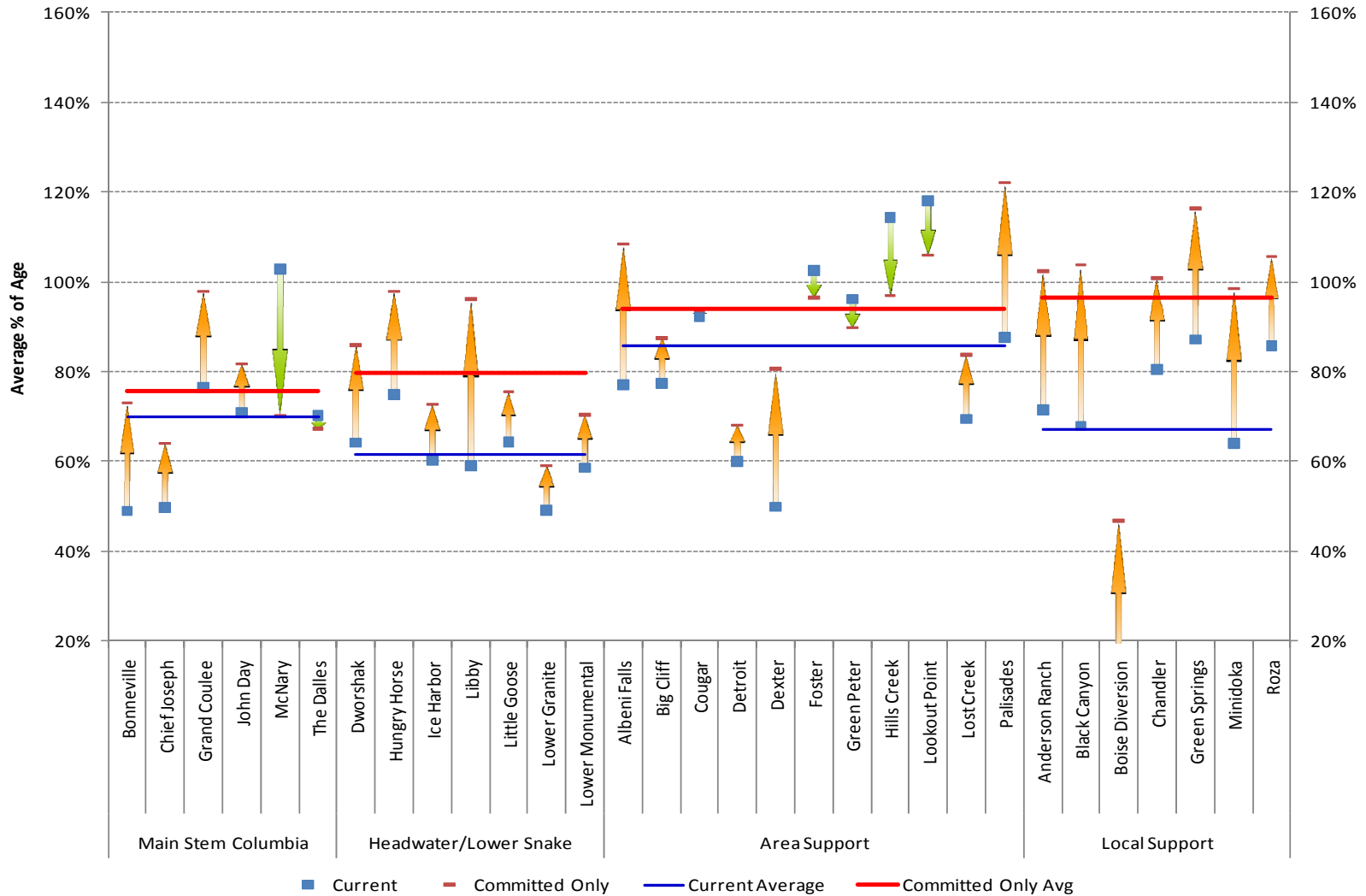
# Projected Condition in 2022: Unit Reliability Equipment

(With Currently Committed Program)



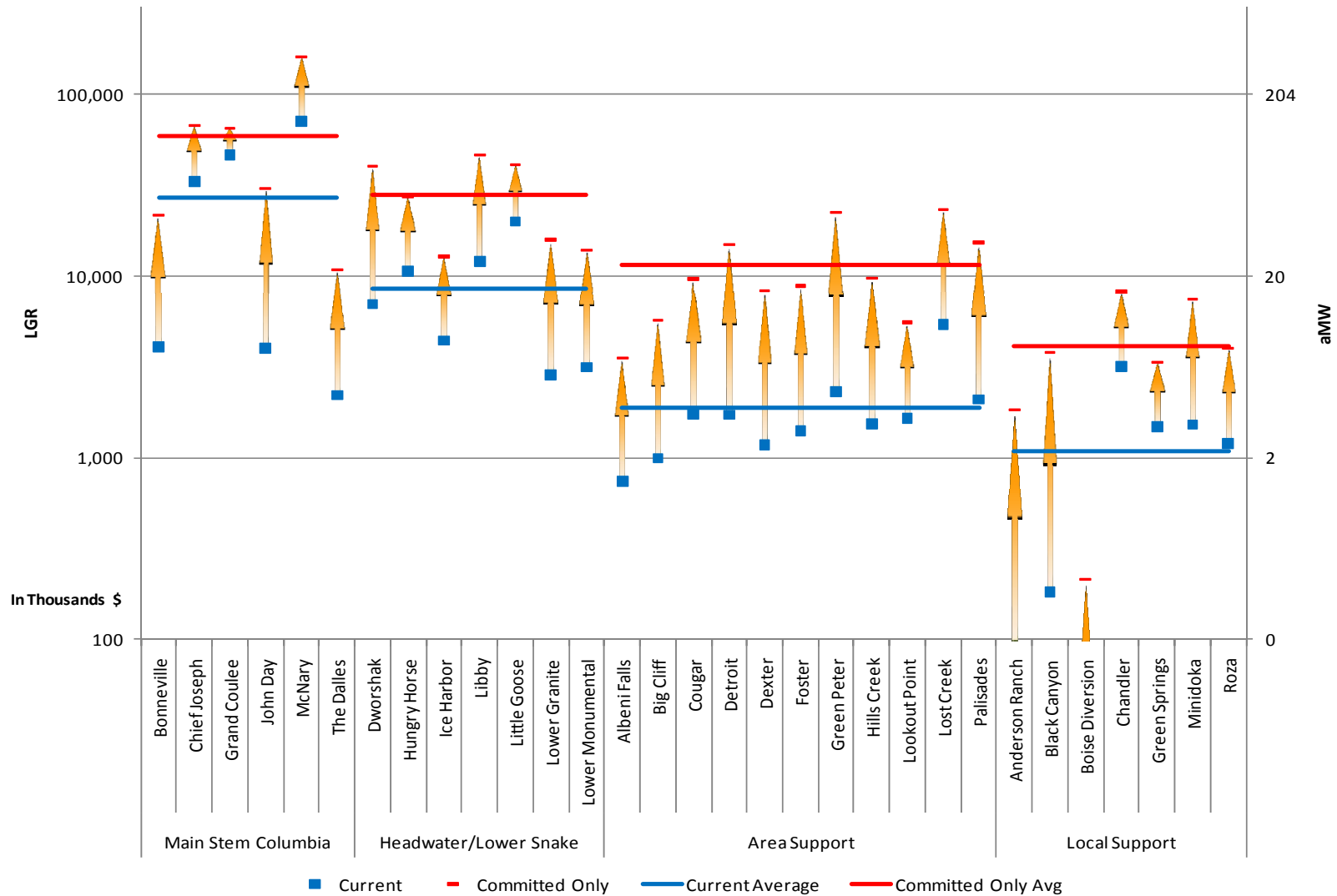
# Projected Age in 2022: Unit Reliability Equipment

(With Currently Committed Program)



# Lost Generation Risk in 2022

(With Currently Committed Program)





## 6. Hydro Investment Plan





## Hydro Investment Plan

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The Hydro Investment Plan covers forecasted O&M, the committed investment program, and new investments to maintain and improve the reliability of hydro plant equipment.

Because O&M costs are primarily labor related, and the currently committed investment program is already vetted and underway, the focus of the Hydro Investment Plan is on new investments not yet decided upon.

This strategy takes a risk-based approach to identifying the optimum time for making these new investments.

The strategy is consistent with Bonneville's asset management policy, which states:

- *BPA will invest in, maintain, and operate assets to:*
  - *Meet reliability standards, availability requirements, regional adequacy guidelines, efficiency needs, environmental requirements, safety and security standards, and other requirements; and*
  - *Minimize the life cycle costs of assets when practical.*



## Economics of Risk Intervention at Different Points in Time

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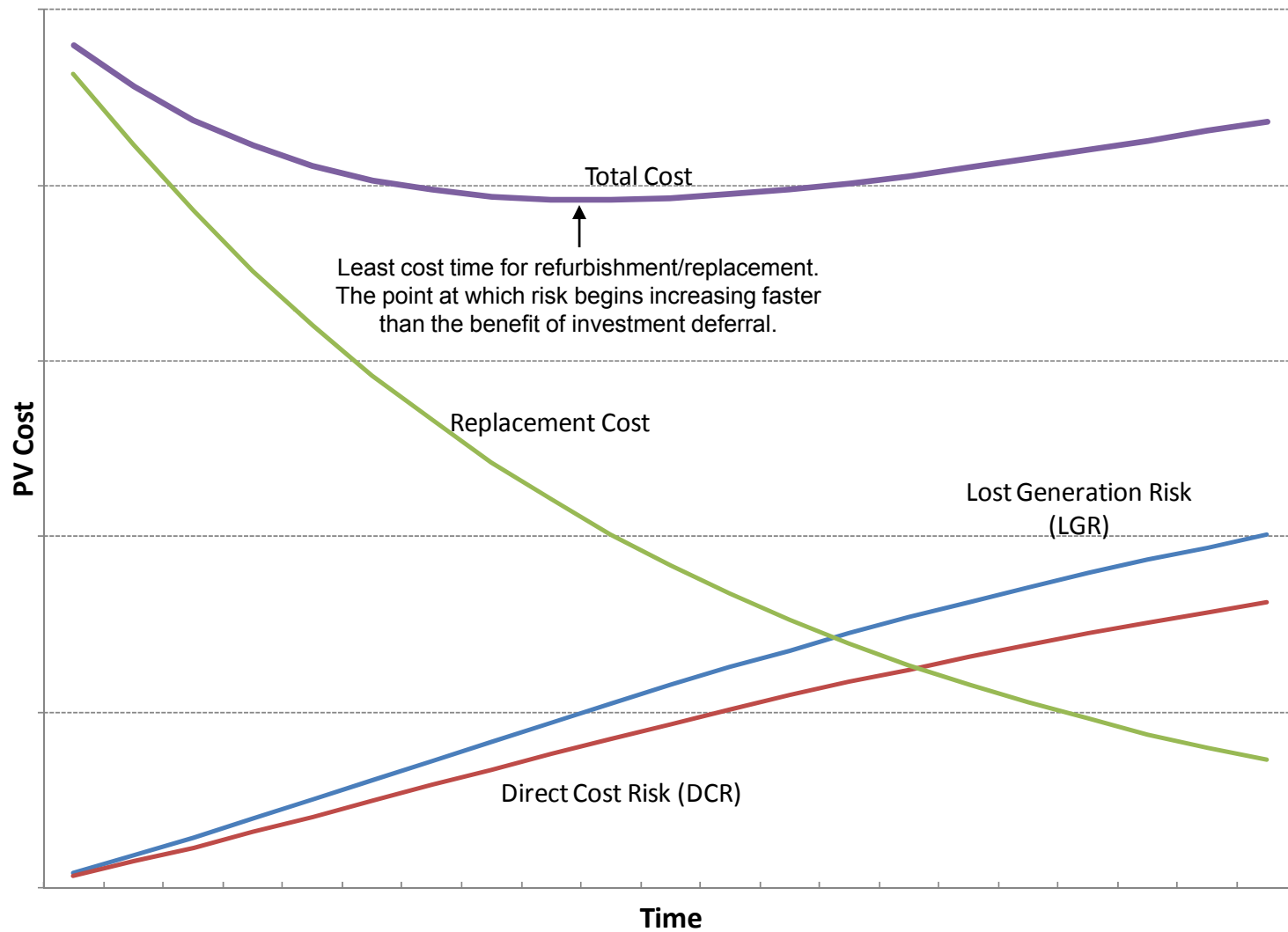
Without corrective action (intervention), equipment condition degrades over time. As equipment condition degrades, the likelihood (and risk) of equipment failing to perform as expected increases.

Three factors that influence the economics of risk intervention are outlined in the following diagram. All curves show the 2009 present value of costs over time.

- **Replacement Cost** – Typically, the longer the replacement can be deferred, the lower the present value of its cost.
- **Direct Cost Risk (DCR)** – If equipment fails during the deferral period, intervention costs may be incrementally higher for collateral damage and planning, procurement, and scheduling inefficiencies. This cost risk increases as equipment condition degrades over time.
- **Lost Generation Risk (LGR)** – Equipment failure may also result in longer outages and, thus, more lost generation than if replaced on a planned basis. LGR also increases as equipment condition degrades over time.

The **Total Cost** is the present value sum of replacement and risk costs. The cost minima on this curve is the point at which risk is growing faster than the benefit of investment deferral and represents the optimum time for replacement to minimize lifecycle cost. This objective function is applied to each of the 5,500 equipment items modeled to derive an investment plan.

# Cost of Intervention at Different Points in Time



# Assumptions Used in Modeling

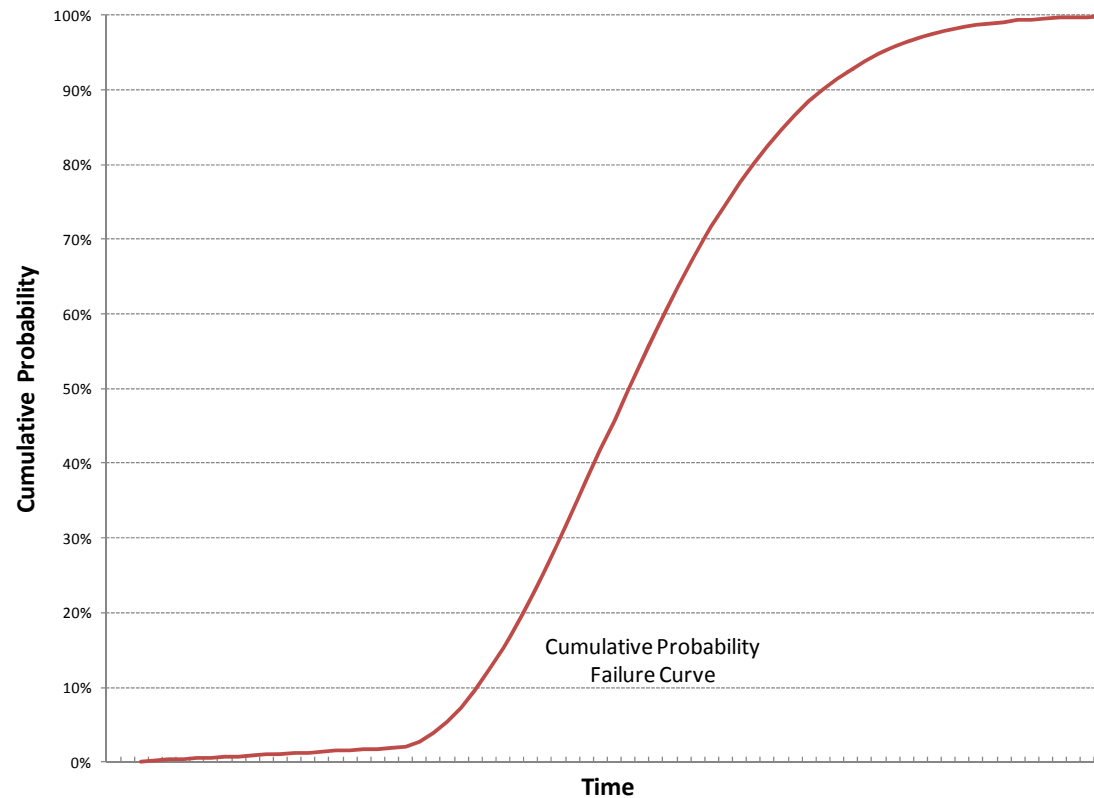


Assumption	Value	Source	Comment
Discount rate	12.0 percent	BPA Finance	
Inflation rate	1.7 percent	BPA Finance	Average annual rate based on 20-yr forecast
Forward energy prices	20-yr, by month, HLH, LLH, flat	BPA Marketing	Levelizes to \$56/MWh in 2009\$ (flat)
Equipment cost	Varies by equipment type	FCRPS hydro program	Based on industry cost data
Real cost escalation	0 percent	BPA Finance	Global Insight
Failure curves	Varies by equipment type	BPA Federal Hydro	Based on industry data for certain equipment
Outage duration for LGR	Varies by equipment type	FCRPS hydro program	Based on industry experience
Environment and safety	Risk	BPA Federal Hydro	Treats all high risk items as "must do"
Value of avoided CO2	\$45/ton	BPA Corporate Strategy	Based on Council's 6 <sup>th</sup> power plan
Alternative resource for hydro lost generation	CCCT: 0.4 ton/MWh Coal: 1.0 ton/MWh	EIA	



# Generic Failure Curve

A failure curve was derived for each equipment type modeled. Each curve has the general shape shown below where early in the equipment life, the cumulative probability of failure is low (few in the population fail during this period). Later, as the condition nears Marginal, the cumulative probability of failure increases (more failures tend to occur in the population).





## Modeling Approach

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The base case modeling runs assume funding is constrained to the current budget forecast for FY2010 – FY2017, consistent with levels identified in the 2008 Integrated Program Review. Available funding for prioritizing new projects is reduced by the amount for currently committed projects.

- (Note, over programming in FY2010 – FY2012 results in an investment forecast that exceeds current budget levels. Actual results may differ.)

Each equipment component is evaluated in yearly time steps and selected for refurbishment/replacement if it meets either of the following criteria:

- First, if its condition places it into a high risk category for safety or environment.
- Second, if risk costs are increasing faster than investment deferral benefits, i.e., it is at the cost minima.
- If an annual funding limitation is reached, investment in equipment in which risk is increasing the least is deferred until the following year, where it is re-evaluated using the same prioritization logic.

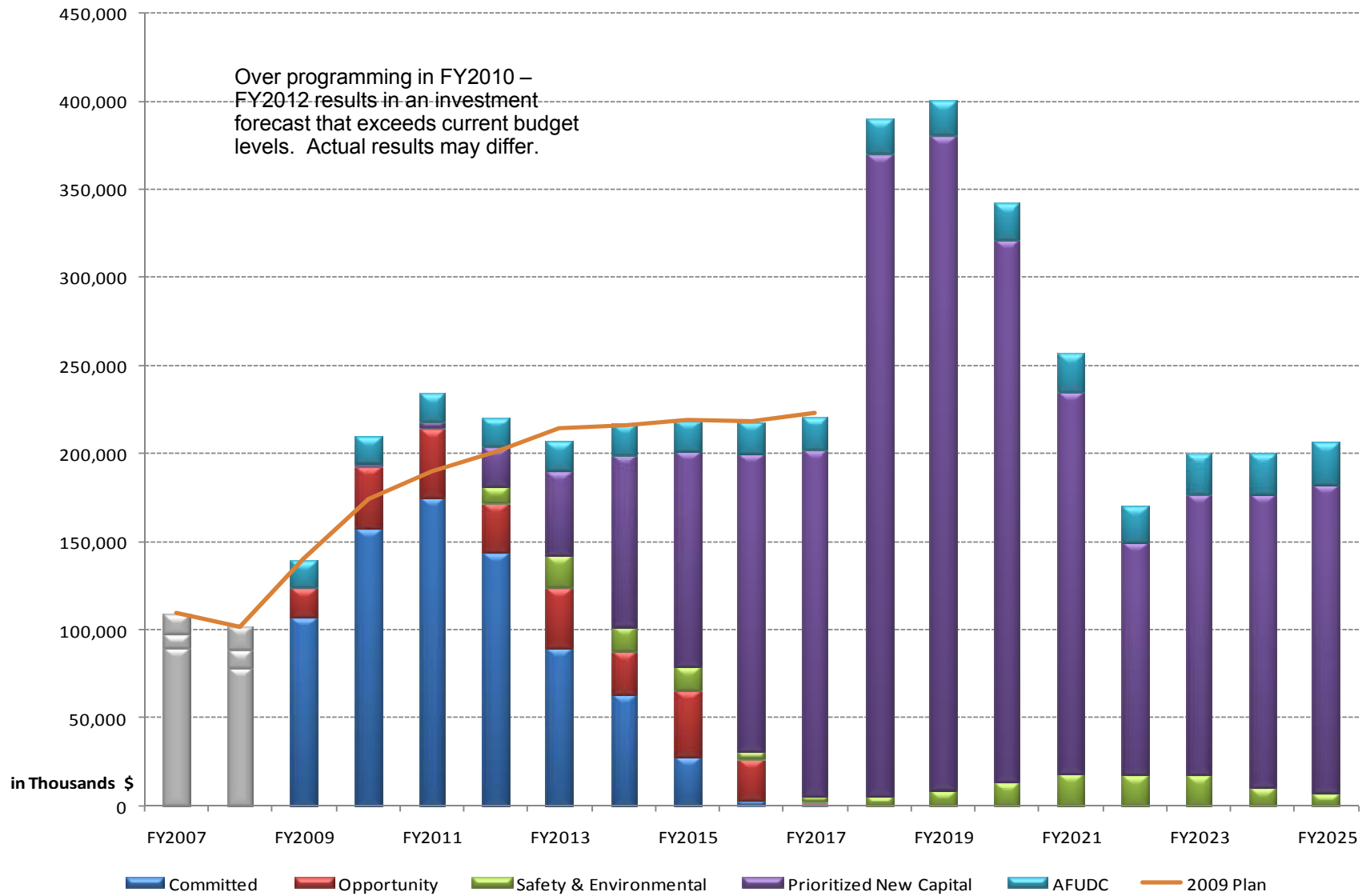
Once the equipment item is selected for investment, its condition resets to 10 at the end of the investment period. Its condition then begins to degrade at the identified degradation rate.

The following graph shows the results of the base case modeling run overlaid on the current large capital budget.



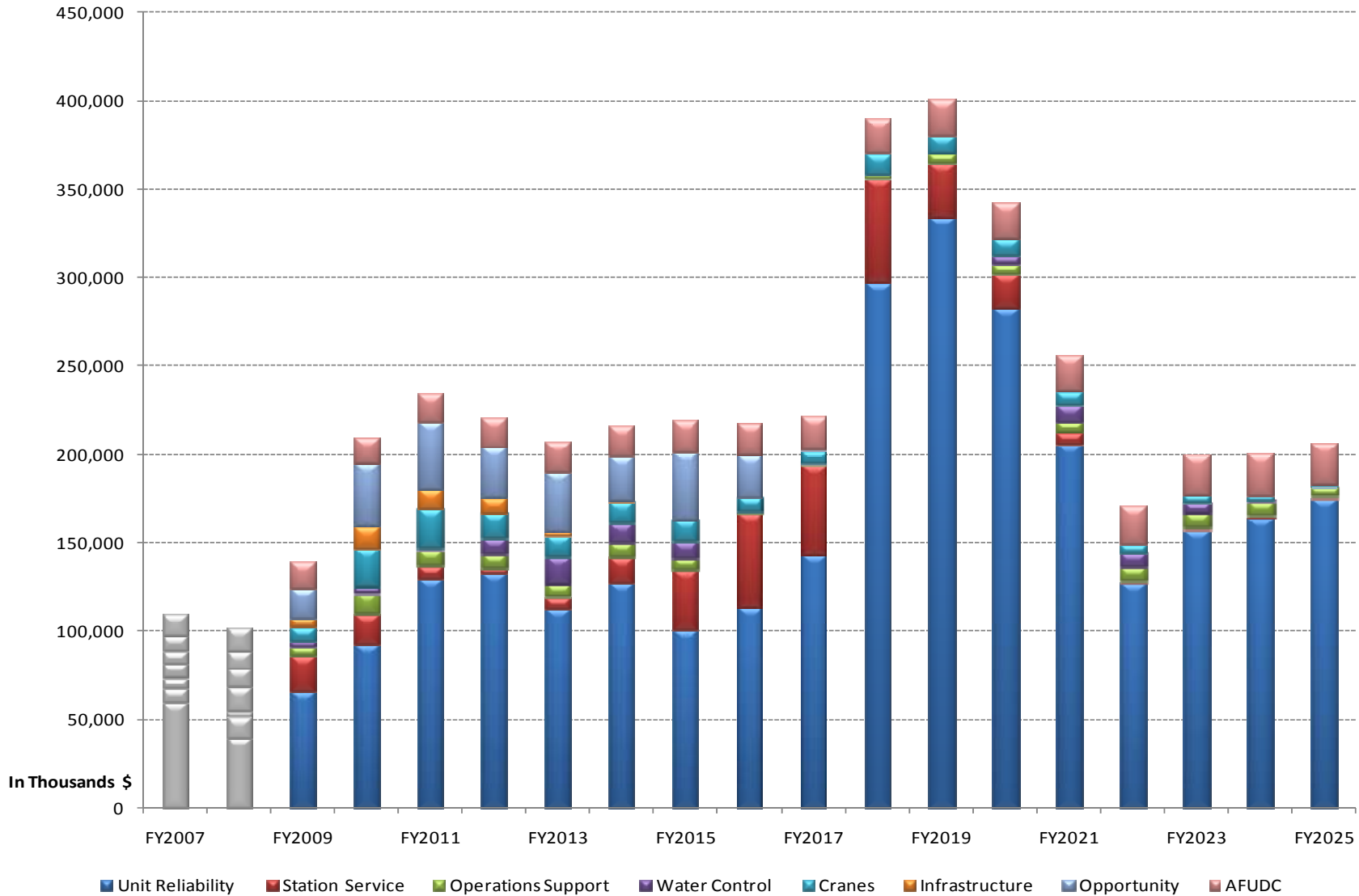
# Large Capital Forecast

(Base Case: Constrained to Current Program Budget Through FY 2017)



# Large Capital Forecast by Equipment Category

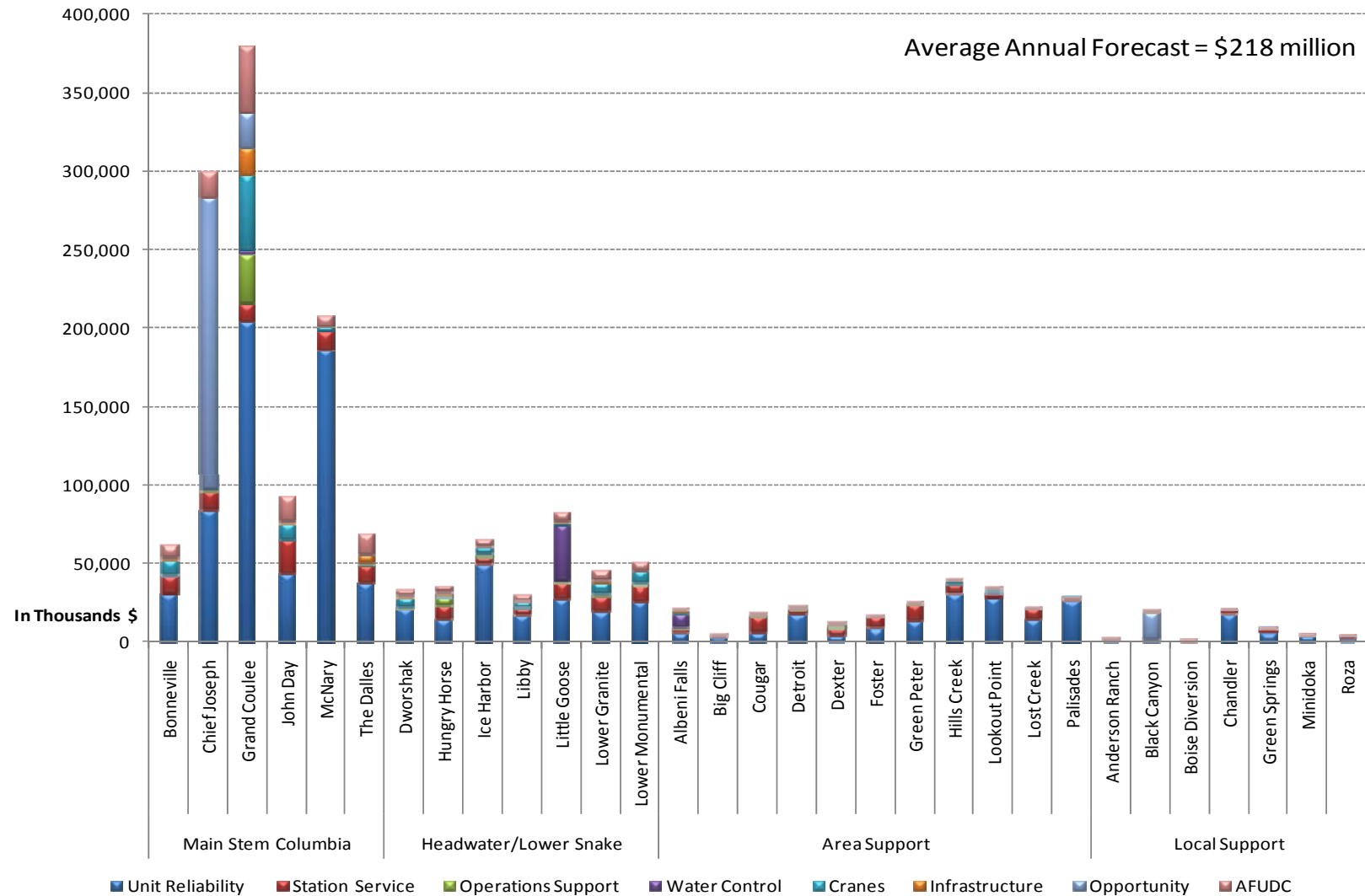
(Base Case: Constrained to Current Program Budget Through FY2017)





# Large Capital Forecast by Plant

(Base Case: Constrained to Current Program Budget Through FY2017)



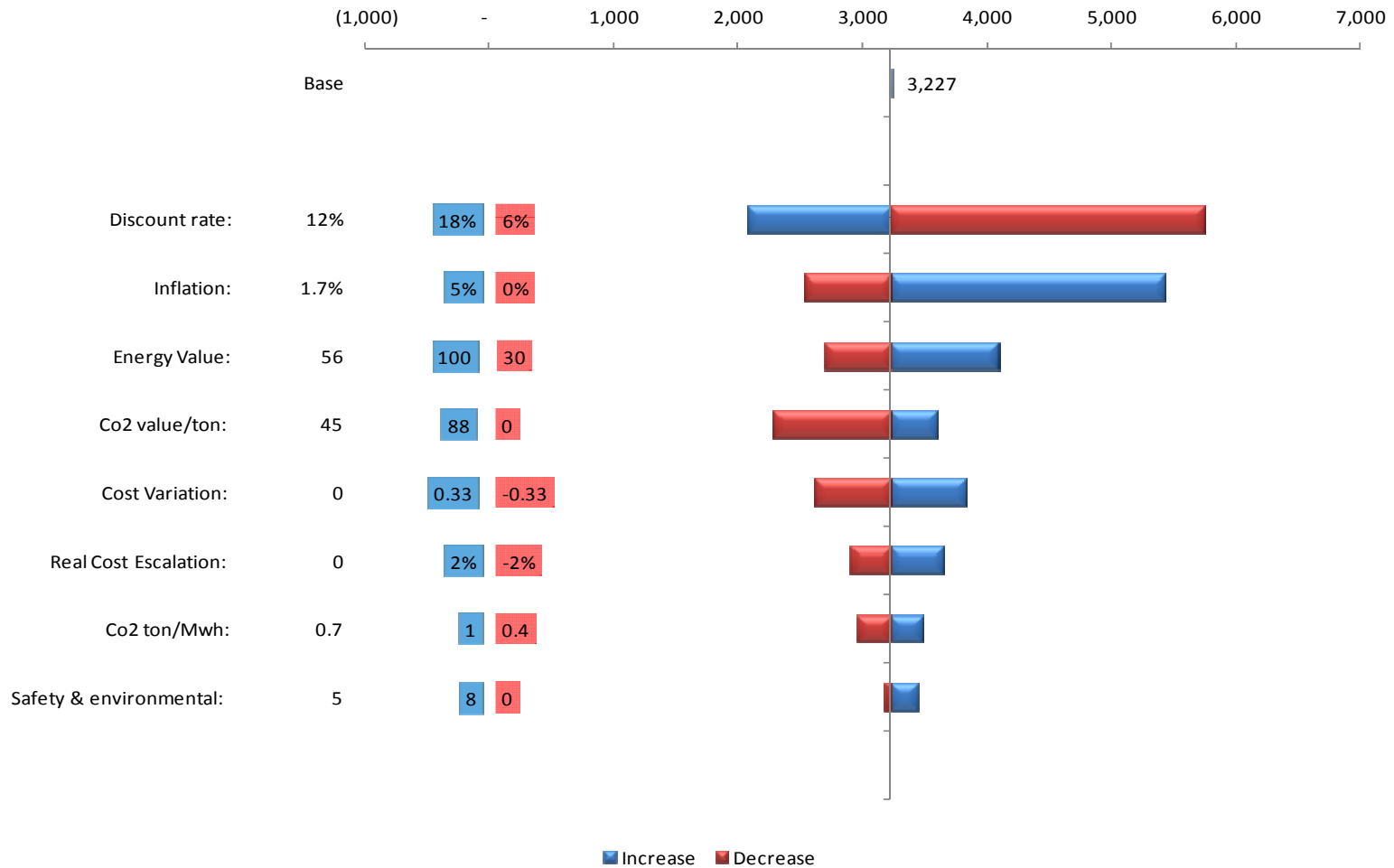
# Sensitivity Analyses Results: Variables

(Constrained to Current Program Budget Through FY2017)



## Total Cost

(In Millions) \$



# Sensitivity Analysis Results: Funding Levels

(Constrained Funding Availability Through FY2017)



Variable	Present Value of Costs (\$millions)				(\$millions)
	Identified New Capital	Direct Cost Risk	Lost Generation Risk	Total Cost	Average Annual Forecast FY10-17 (Committed Program and New Capital)
<b>Base Case (Constrained to current budget forecast)</b>	806	784	1,637	3,227	218
<b>Sensitivity</b>					
Unconstrained funding availability	955	745	1,411	3,110	304
Funding constrained to 140 percent of current forecast	904	756	1,452	3,113	280
Funding constrained to 130 percent of current forecast	881	762	1,476	3,120	265
Funding constrained to 125 percent of current forecast	869	765	1,492	3,127	257
Funding constrained to 120 percent of current forecast	854	770	1,514	3,137	248
Funding constrained to 110 percent of current forecast	824	777	1,575	3,177	230
Funding constrained to 90 percent of current forecast	786	792	1,741	3,319	206
Funding constrained to 80 percent of current forecast	773	796	1,834	3,403	196



## Recommended Investment Plan

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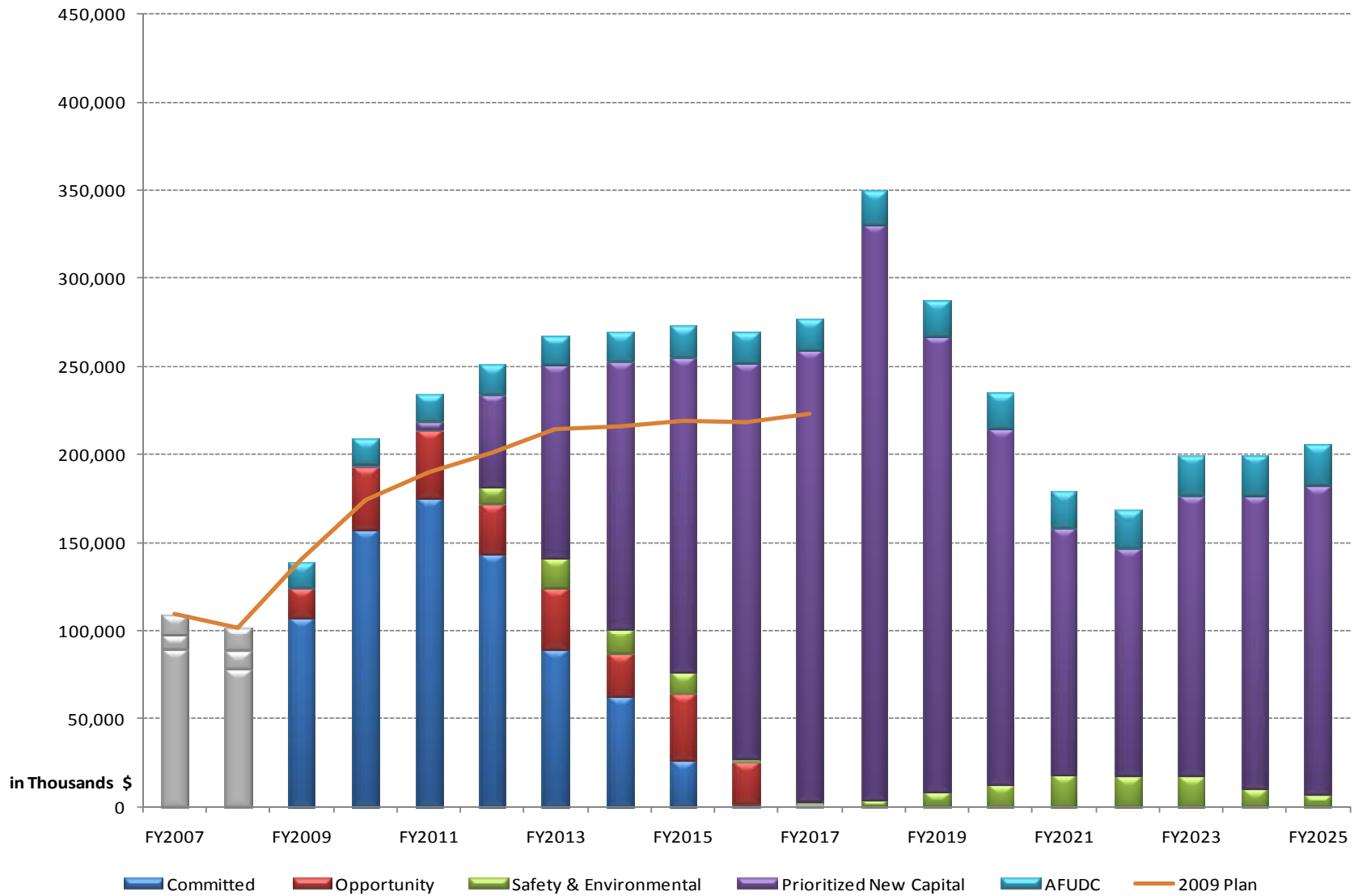
From the sensitivity analysis, a recommended plan of plus 25 percent from the current budget forecast was selected that yields a relatively stable program level both during and after the constrained funding period, and which identifies a resource capability that can be sustained for a decade or more.

Because of over programming in FY2010 and FY2011, the net effect of the recommended plan is a program that is 18 percent higher than the base case for the FY2010 – FY2017 period (\$257 million per year versus \$218 million per year).

In 2009 present value, the recommended plan costs \$63 million more than the base case, but reduces its risk by \$164 million.

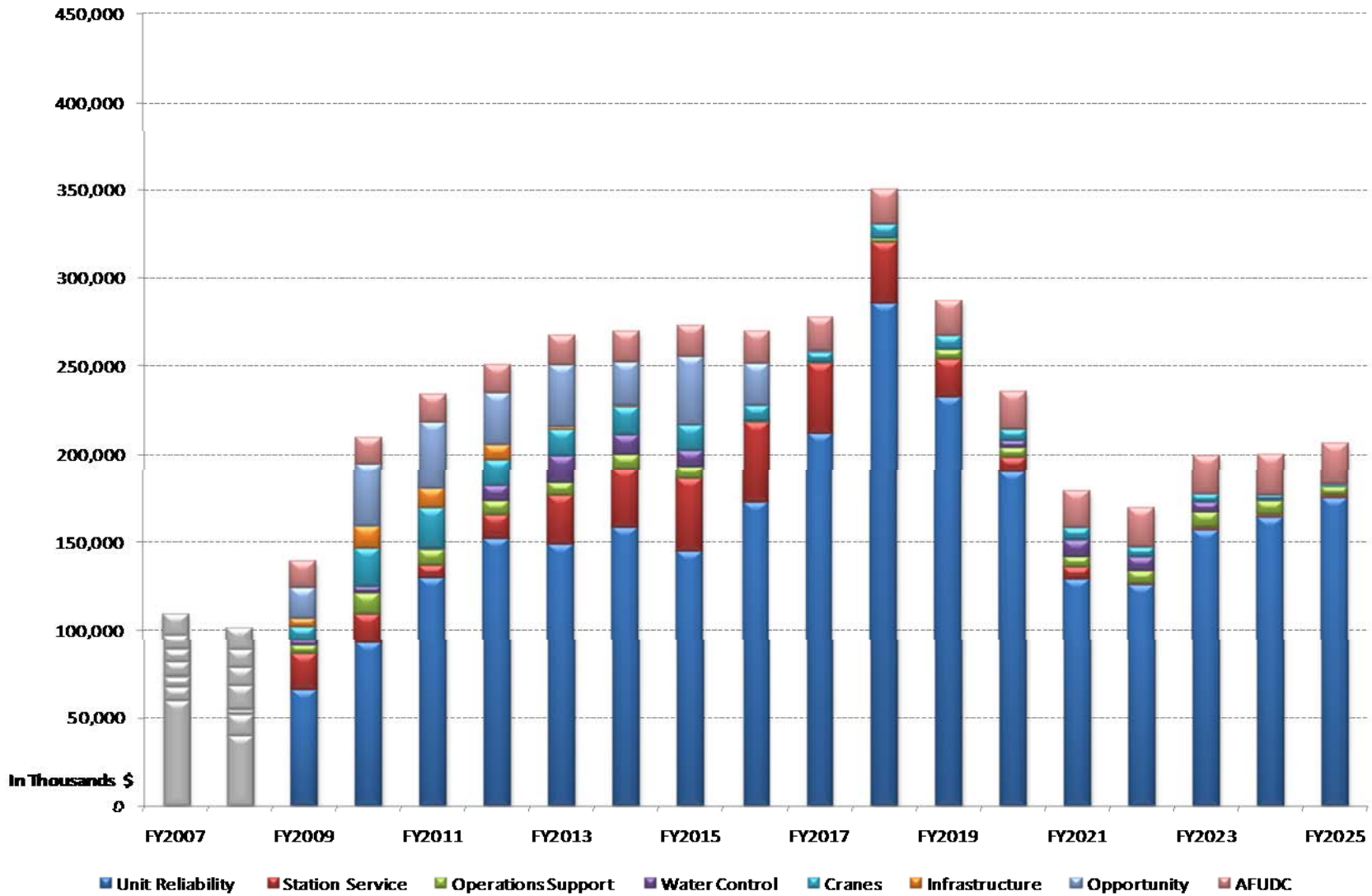


# Large Capital Forecast (Recommended Plan)



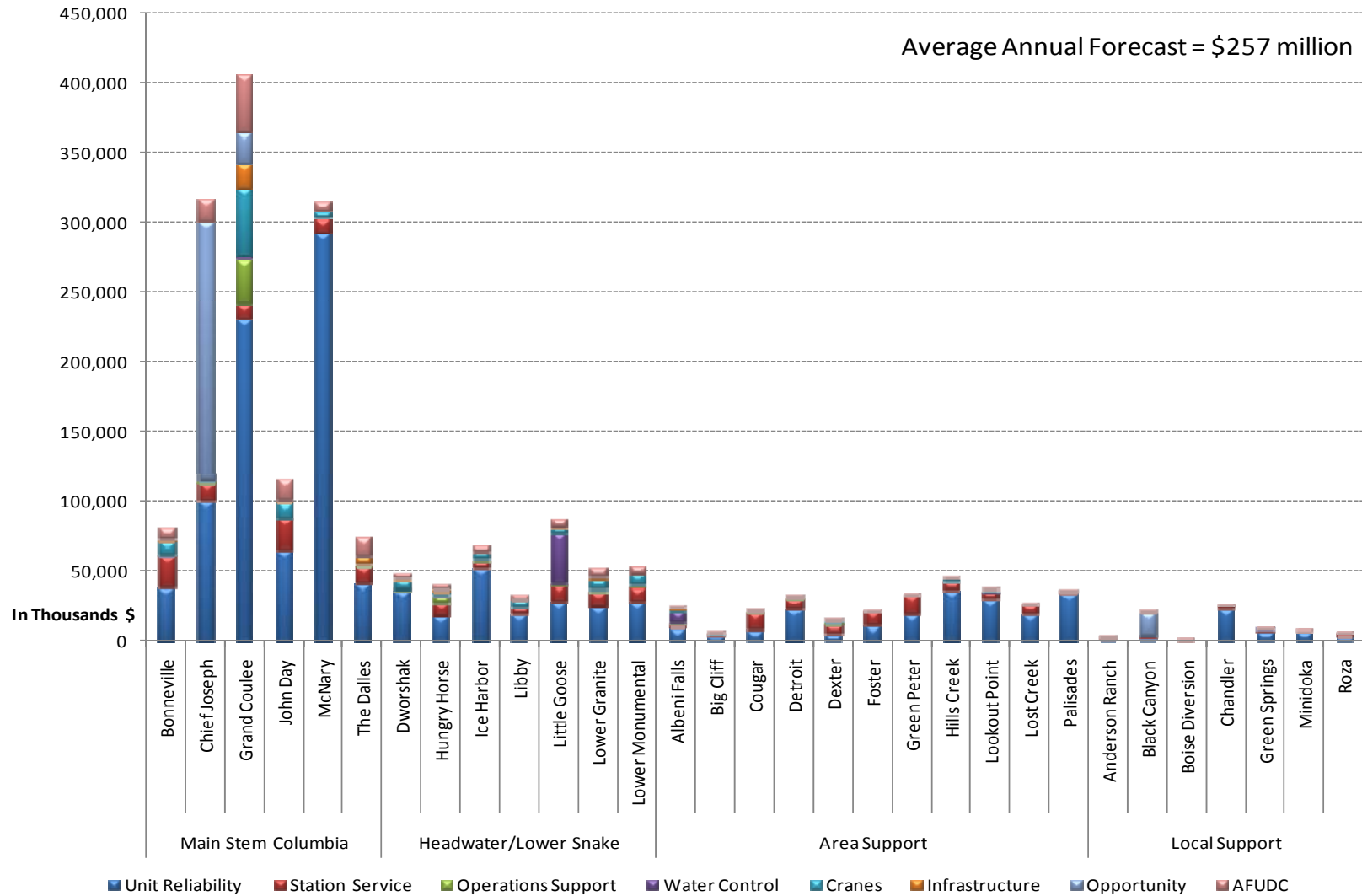
# Large Capital Forecast by Equipment Category

(Recommended Plan)

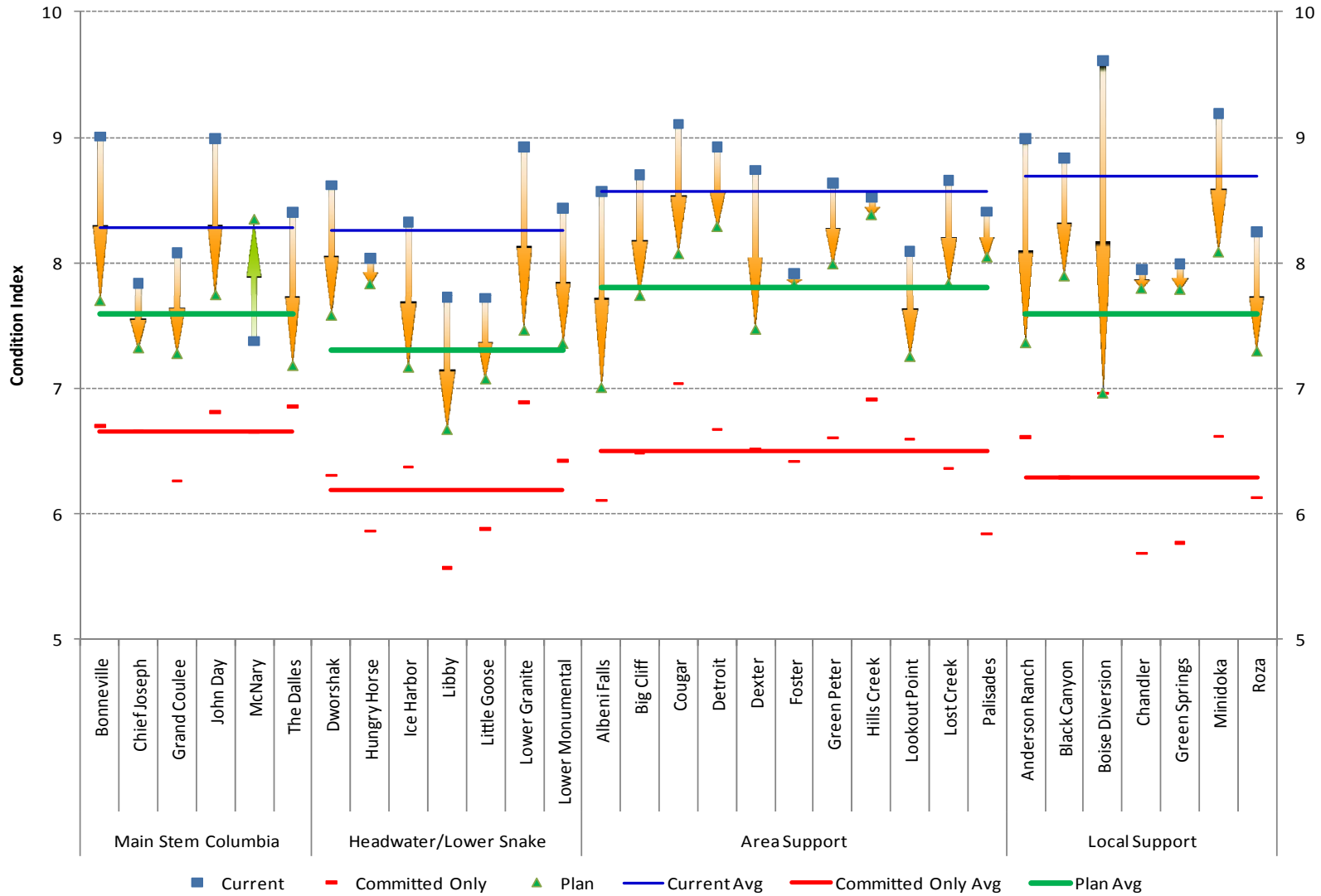


# Large Capital Forecast by Plant

(Recommended Plan)

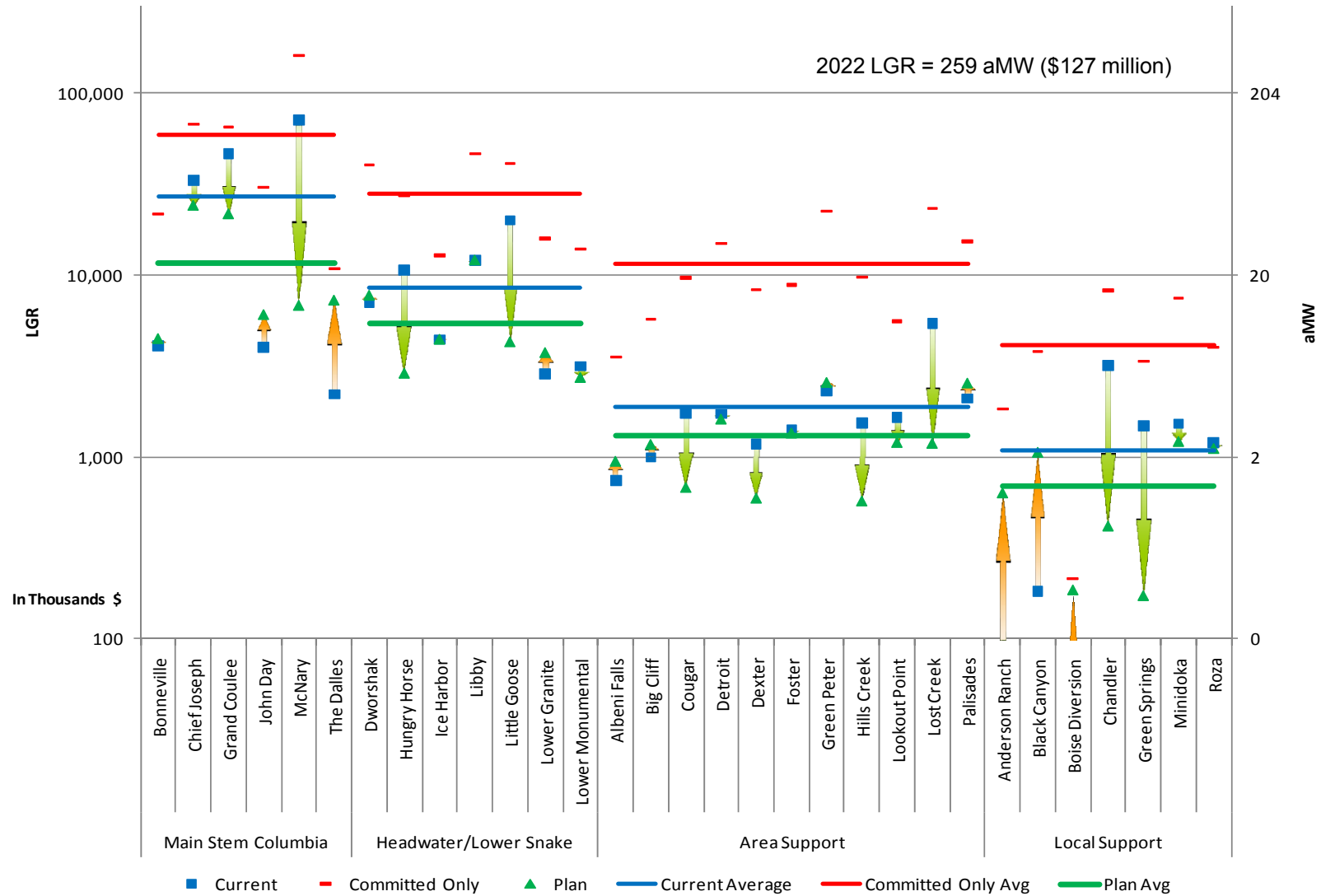


# Condition by Plant in 2022: Unit Reliability Equipment (Recommended Plan)



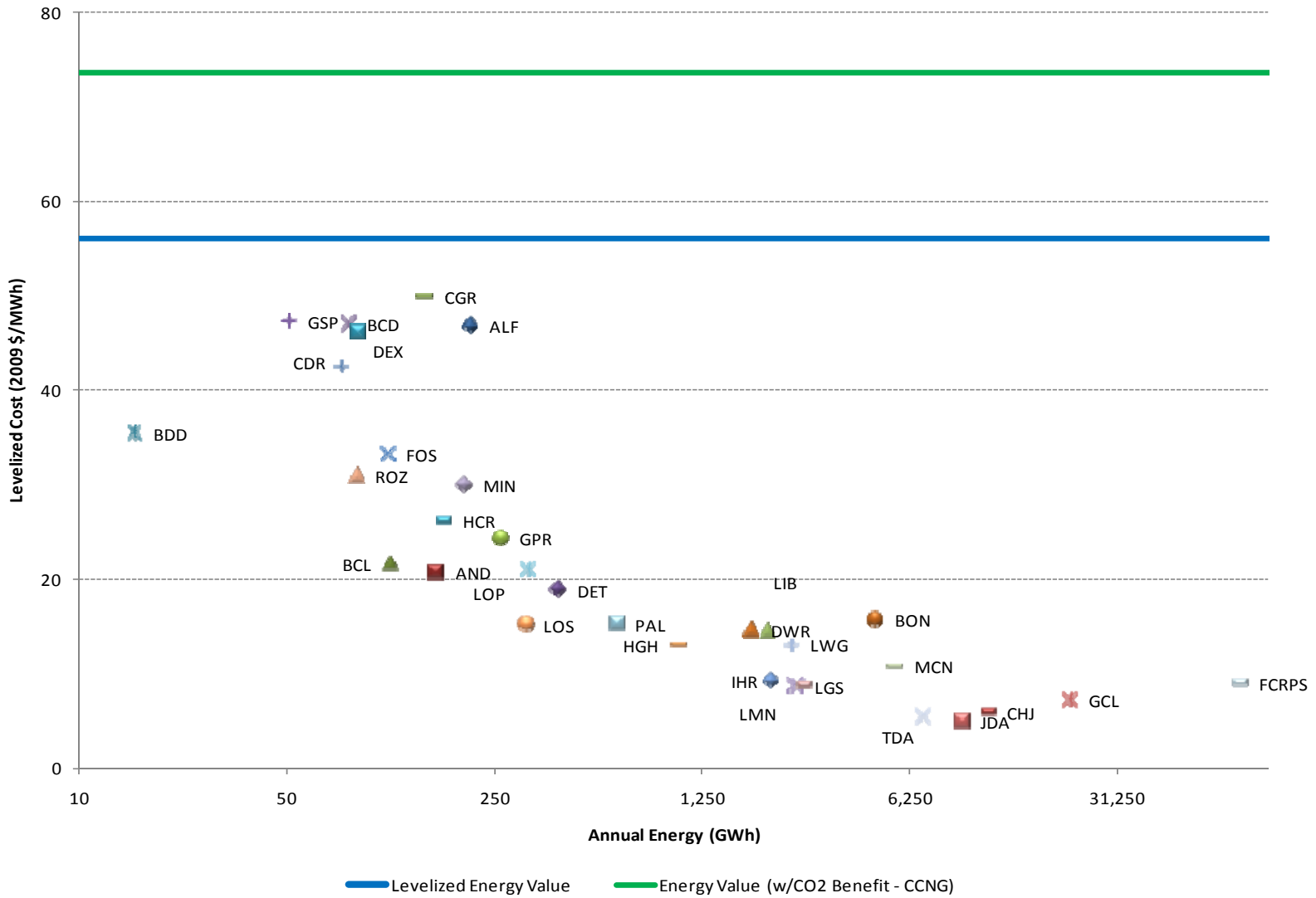
# Lost Generation Risk by Plant in 2022

(Recommended Plan)



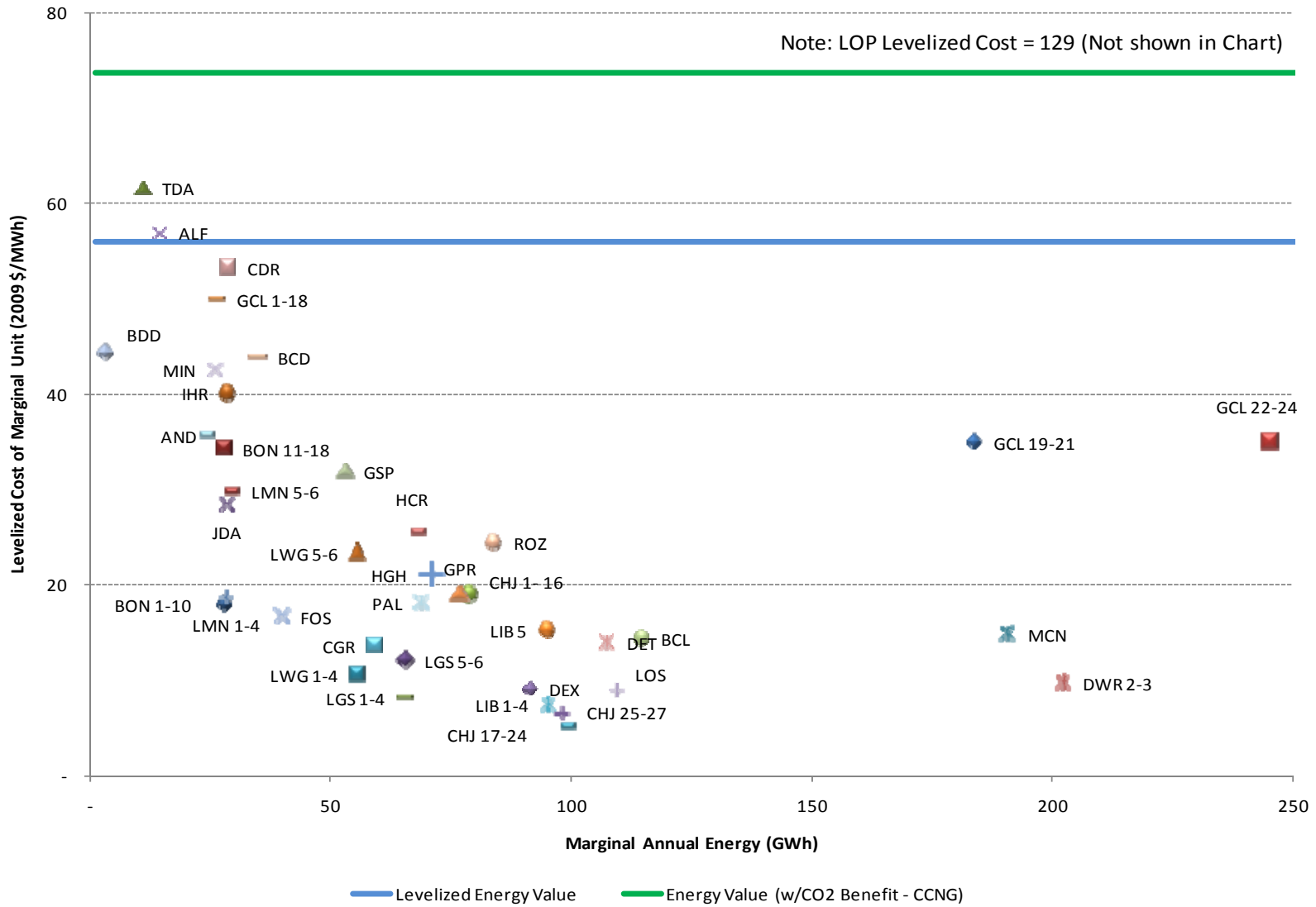
# Levelized Fully Allocated Cost

(Net Utility Plant plus FY2010 – FY2025 O&M and Investment Programs)



# Levelized Marginal Unit Cost

(Includes Power Maintenance and Generating Unit Incremental Investment)



## Summary



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The strategy identifies condition and risk implications of the currently committed hydro investment program and new investments prioritized around minimizing lifecycle cost.

It represents a reasonable level and timing of future investment to maintain the production capability of the FCRPS hydro system at a cost effective level of reliability.

The strategy includes hydropower specific and joint-use features, but excludes costs for Columbia River Fish Mitigation and Lower Snake Compensation Plan.

Results are precise and directionally correct, but not prescriptive. Significant additional effort is needed to develop resource plans for implementing this strategy.

The strategy does not include an evaluation of specific issues that may result in new strategic initiatives, e.g., expansion opportunities, pumped storage, procurement mechanisms, automation, staffing, etc.





## Summary (continued)

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The recommended investment plan identifies a relatively flat program level over a 10 year period (FY2012 – FY2021), which results in a \$63 million increase in present value of costs relative to the base case (2008 Integrated Program Review budget), but reduces the present value of risk by \$164 million.

The recommended plan has an average annual capital cost of \$257 million during the FY2010 – FY2017 period, representing an 18 percent increase to the base case.

The plan results in a levelized fully allocated cost for the hydro system of \$9 per MWh (2009 dollars).

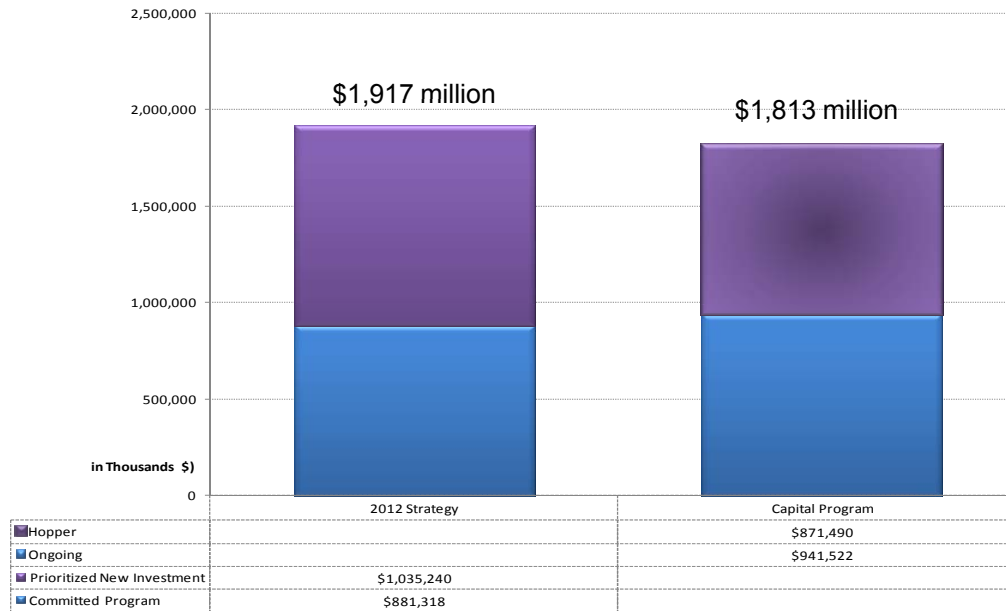
Over half of the plants have levelized costs of less than \$20 per MWh (2009 dollars), with each plant having a cost below the value of energy it produces.

# Comparison of 2012 Strategy Results to Hydro Capital Program (FY2010 – FY2017)



The graph below compares results of the 2012 strategy with ongoing and prospective work identified by the workgroup responsible for managing the Hydro Capital Program.

- The committed program (2012 Strategy) and ongoing activities (Capital Program) are identical items but for additional commitments made since locking in data for the strategy analysis in October 2009.
- Prioritized new investment (strategy) and hopper items (program) are work not yet decided upon. Prioritized new investments are identified in the asset planning process outlined in this strategy. Hopper items are prospective projects which incorporate other factors not considered in the strategy analysis and are identified by subject matter experts who participate in and manage the capital program.
- Each approach identifies a similar level of investment activity needed for the FY2010 – FY2017 period.





## Power Services – FCRPS Hydro Capital

Bureau of Reclamation  
Corps of Engineers





# Power Capital - Bureau of Reclamation & Corps of Engineers

Capital - Corps & Bureau	2009 Actuals	2010 SOY	2011 WP-10 Rate Case	2011 IPR	2012 IPR	2013 IPR
BUREAU OF RECLAMATION	34,957,327	78,653,000	103,712,000	83,670,280	105,347,925	65,637,290
CORPS OF ENGINEERS	104,595,018	106,347,000	97,288,000	116,625,720	140,921,075	197,664,710
<b>Total</b>	<b>139,552,345</b>	<b>185,000,000</b>	<b>201,000,000</b>	<b>200,296,000</b>	<b>246,269,000</b>	<b>263,302,000</b>

## Program Description

This program is driven by BPA's strategy to insure that the Federal hydro projects continue to perform and meet "availability, adequacy, reliability and cost-effectiveness standards." BPA works in partnership with the U.S. Army Corps of Engineers and the Bureau of Reclamation to ensure implementation of all regionally cost-effective system asset replacements, refurbishments and enhancements to Federal hydro projects. BPA provides funds directly to these agencies for all power generation-related investments and the power allocated share of critical multipurpose, joint investments.

## Strategic Objectives

- F1 – Capital Access
- F2 – Cost Recovery
- S1– Policy and Regional Actions
- S2 – FCRPS Operations and Expansion
- S3 – Tiered Power Rates
- S9 – Stakeholder Satisfaction
- I4 – Asset Management
- I6 – Collaboration

## Key Products and Outputs

The Hydro Capital Investment Program provides funding directly to the Corps and Reclamation through signing of subagreements to continue improving generation units performance by replacing or refurbishing equipment that is old, is deteriorating, is reaching an unacceptable level of risk for failing, or has failed in service. In addition to these reliability replacements, the program invests in turbine runner replacements to obtain incremental turbine unit efficiency improvements and in other upgrades that enhance overall generation efficiency.

# Power Capital - Bureau of Reclamation & Corps of Engineers



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## Key Products and Outputs (continued)

Currently, runner replacements are concluding at Grand Coulee Dam, which has increased energy production by 41 aMW and the first of ten runners is scheduled for installation at Chief Joseph Dam, which will result in an estimated increase of 44 aMW. Finally, the program makes investments in the power portion of joint allocated features of the system that indirectly supports electrical generation, or allows for generation to occur. The program is continually identifying new investments that are needed, assessing their criticality and timing to the system, planning and scheduling expenditures, and otherwise developing new reliability replacements or generation efficiency enhancements for implementation in later years.

## FY 2012-13 Program Spending Drivers

The Federal Hydro Projects Capital Investment Program budget for the Corps and Reclamation in FY 2012 has a proposed \$37,784,000 increase from the previous IPR. Likewise, the FY 2013 budget has a proposed increase of \$40,724,000. Similar increases occur for FY 2014 and FY 2015. All of these increases stem from the analyses contained in the 2012 FCRPS Hydro Asset Strategy. This strategy documented the condition of all hydro generation equipment assets, determined the risks associated with lost generation and direct replacement costs for this equipment, performed economic evaluations to determine when equipment replacements should occur in order to minimize life cycle costs and examined the long-term needs of the system to properly size the near-term budget in order to achieve a stable program for many years beyond this initial period.

The overall level of investment for the period 2011-2017 is consistent with the Agency's asset management strategic objective "to invest in, maintain, and operate assets to: 1) meet reliability standards, availability requirements, regional adequacy guidelines, efficiency needs, environmental requirements, safety and security standards, and other requirements; and 2) minimize the life cycle costs of assets when practical."

These budgets will provide two other important benefits: 1) they will allow our generation partners to appropriately staff and resource a program of reliability replacements for the long-term; and 2) will notify commercial vendors and contractors of our long-term commitment to a sustained program of asset replacement and modernization.

# Power Capital - Bureau of Reclamation & Corps of Engineers



<b>Capital - Corps &amp; Bureau</b>	<b>2013 IPR</b>	<b>2014 IPR</b>	<b>2015 IPR</b>	<b>2016 IPR</b>	<b>2017 IPR</b>
BUREAU OF RECLAMATION	65,637,290	53,944,300	61,303,305	49,599,525	57,277,035
CORPS OF ENGINEERS	197,664,710	212,673,700	212,576,695	227,702,475	235,526,965
<b>Total</b>	<b>263,302,000</b>	<b>266,618,000</b>	<b>273,880,000</b>	<b>277,302,000</b>	<b>292,804,000</b>

## Potential Risk

There are two possible risks that could arise in the context of the FY 2012-13 base budgets - 1) an unplanned failure within the system that requires a significant investment to begin the recovery effort, which cannot be accommodated within the current budget level without displacing planned activities or requesting a higher base budget; or 2) investment funds are programmed for expenditure in these fiscal years but due a variety of reasons, the actual end-of-year expenditure is less than the planned amount.

There is little to no mitigation tool for the first risk. However, for the second risk, two mitigation tools can be employed, namely over programming (or planning to expend more than the base budget), so that by year's end the entire budget is used; or 2) if the "under run" occurs in the first year of the two-year rate period, unexpended funds can be rolled over for use in the second year of this rate period.

## FY 2014-2017 Drivers of Proposed Spending Forecast

The drivers for program investment in subsequent years remain the same as those for the upcoming rate period. The need to maintain the system through capital investment persists for indefinite future since the generation equipment continues to age and the risk of failure increases. One possible addition to the scope of the program is the assessment and development of energy storage resources to assist in renewable resource integration for system/area balancing.



Next Steps



# Detailed Workshop Schedule



## 2010 Integrated Program Review (IPR) Workshop Schedule

\*All workshops are subject to change as necessary\*

	Workshop Topic	Date	Time
-	<b>Asset Management Overview</b> <i>Pre-IPR meeting held at the Quarterly Business Review</i>	May 3, 2010	3:00-4:00 PM
1	<b>Executive Welcome and Overview</b> <i>Executive Welcome, Introductions, Process Overview Power, Transmission, Corporate overview</i>	May 10, 2010	9:00-1:00 PM
2	<b>Federal Hydro Asset Strategy &amp; Capital Discussion</b> <i>FCRPS Hydro Asset Strategy Federal Hydro Capital Program for FY 2012-17</i>	May 13, 2010	9:00-12:00 PM
3	<b>Transmission Asset Strategies &amp; Capital Discussion</b> <i>Transmission Asset Strategies Transmission Capital Programs for FY 2012-17</i>	May 17, 2010	9:00-4:00 PM
4	<b>Transmission Expense</b> <i>Transmission Expense Programs for FY 2012-13</i>	May 18, 2010	9:00-12:00 PM
5	<b>Transmission Overflow</b> <i>Discuss Remaining Topics, Follow Ups, Etc.</i>		1:00-4:00 PM
6	<b>Power Internal Operating Costs, Acquisition/Ancillary Services &amp; Residential Exchange</b> <i>Power Internal Operating Cost for FY 2012-13 Power Acquisition and Ancillary Services for FY 2012-13 Residential Exchange Program for FY 2012-13</i>	May 19, 2010	9:00-12:00 PM
7	<b>Columbia Generating Station (CGS)</b> <i>CGS Expense and Capital Program for FY 2012-17</i>		1:00-4:00 PM



# Detailed Workshop Schedule



## 2010 Integrated Program Review (IPR) Workshop Schedule

\*All workshops are subject to change as necessary\*

	Workshop Topic	Date	Time
8	<b>FCRPS Hydro Operation &amp; Maintenance Program and Cultural Resources</b> <i>FCRPS Hydro O&amp;M Program for FY 2012-13</i> <i>Cultural Resources Program</i>	May 20, 2010	9:00-12:00 PM
9	<b>Fish &amp; Wildlife, Lower Snake River Comp (LSRC) and Northwest Power Planning Council (NWPPC)</b> <i>F&amp;W Expense &amp; Capital Program for FY 2012-17</i> <i>LSRC Program for FY 2012-13</i> <i>NWPPC Expense Program for FY 2012-13</i> <i>Columbia River Fish Mitigation (CRFM) FY 2012-17</i>		1:00-4:00 PM
10	<b>Power Overflow</b> <i>Discuss Remaining Topics, Follow Ups, Etc.</i>	May 24, 2010	9:00-12:00 PM
11	<b>Energy Efficiency &amp; Renewable Resources</b> <i>Energy Efficiency Expense &amp; Capital Program for FY 2012-17</i> <i>Renewable Resources for FY 2012-13</i>		1:00-4:00 PM
12	<b>Facilities Asset Strategy</b> <i>Facilities Asset Strategy</i>	May 25, 2010	9:00-10:30 AM
13	<b>Information Technology (IT) Asset Strategy</b> <i>IT Asset Strategy</i>		10:30-12:00 PM
14	<b>Agency Services</b> <i>Agency Services Expense &amp; Capital Programs for FY 2012-2017</i>		1:00-4:00 PM
15	<b>General Manager Meeting</b>	June 8, 2010	9:00-12:00 PM
16	<b>General Manager Meeting</b>	July 13, 2010	9:00-12:00 PM



## Ways to Participate

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All forums are open to the public and will be noticed on the Integrated Program Review (IPR) external website at: <http://www.bpa.gov/corporate/Finance/IBR/IPR/>.

Representatives from the Corps of Engineers, Bureau of Reclamation and Energy Northwest will be participating in the IPR process including presentations.

All technical and managerial workshops will be held at BPA Headquarters.

Interested Public can call into the workshops, please contact Debbie Halffman at (503) 230-4188. Presentation material will be posted on the IPR external website prior to the workshop taking place.

The IPR process will include a public comment period for proposed program spending levels. The comment period opens May 10, 2010 and will close on July 29, 2010.

Comments can be submitted at any of the scheduled workshops or submitted in writing to:

- Bonneville Power Administration, P.O. Box 14428, Portland, OR 97293-4428,
- Email to [comment@bpa.gov](mailto:comment@bpa.gov),
- Faxed to (503) 230-3285



## BPA's Financial Disclosure Information

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All FY 2010-2017 information has been made publicly available by BPA on May 7, 2010 and does not contain Agency-approved Financial Information.

All FY 2000-2009 information has been made publicly available by BPA and contains Agency-approved Financial Information.

All FY 2011 Rate Case data has been developed for publication in rates proceeding documents and is being provided by BPA.