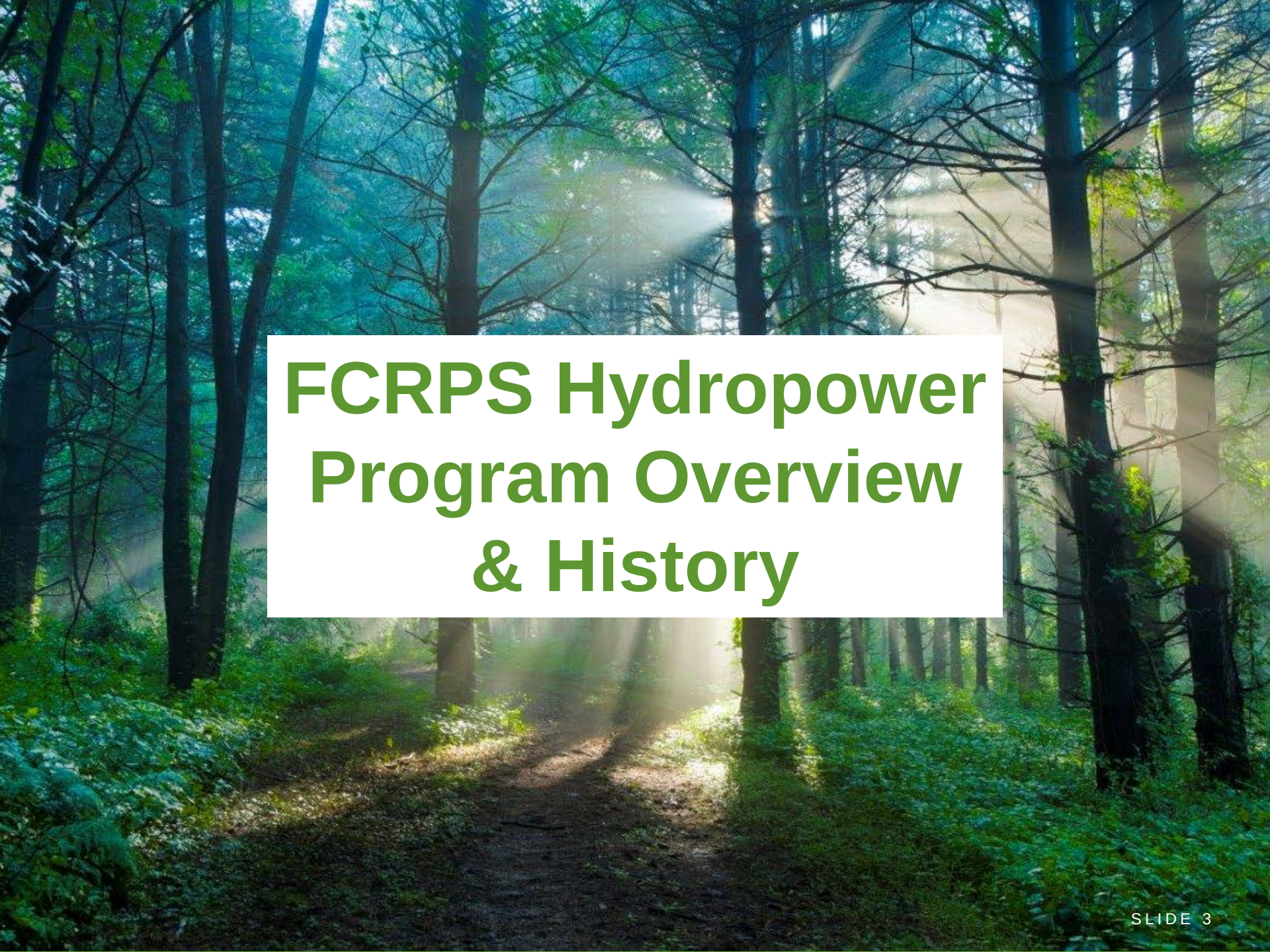
Bonneville
POWER ADMINISTRATION

INTEGRATED PROGRAM REVIEW
FED HYDRO WORKSHOP

June 19, 2018

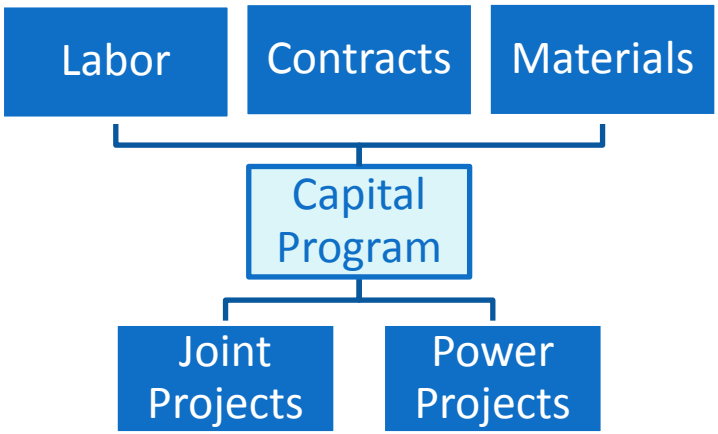
Agenda

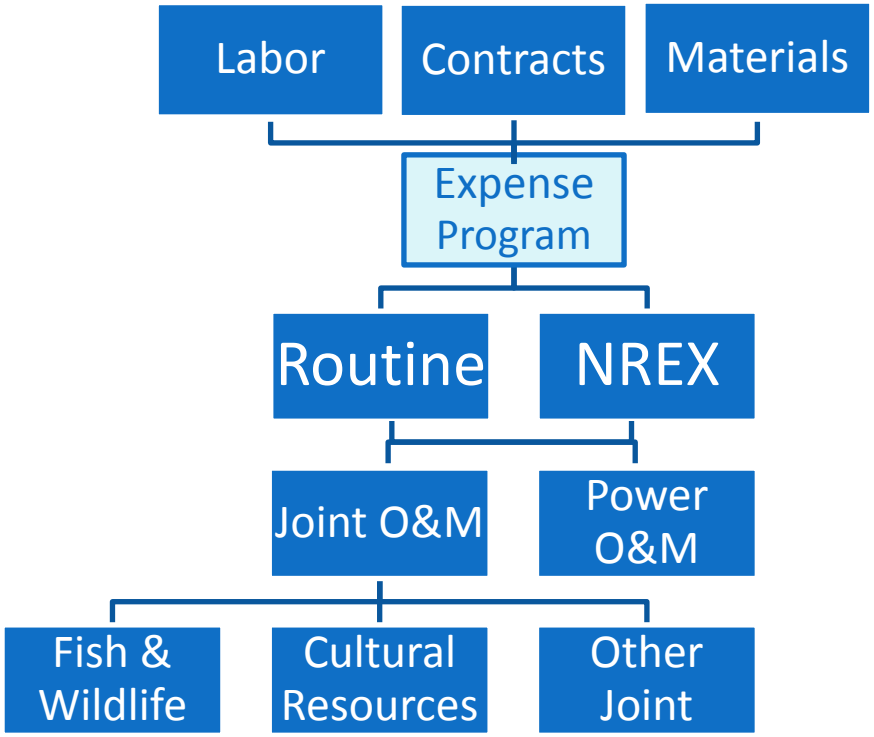
- FCRPS Hydropower Program Overview & History
- Capital Program Strategy
- O&M Program Strategy
- Asset Management and O&M Excellence
- The Future of Federal Hydropower



FCRPS Hydropower Program Overview & History

FCRPS Hydropower Program





FCRPS Hydropower Program

Evolutionary Changes

Top Down Funding Levels

Longer term strategic view

Risk Informed Decision Making

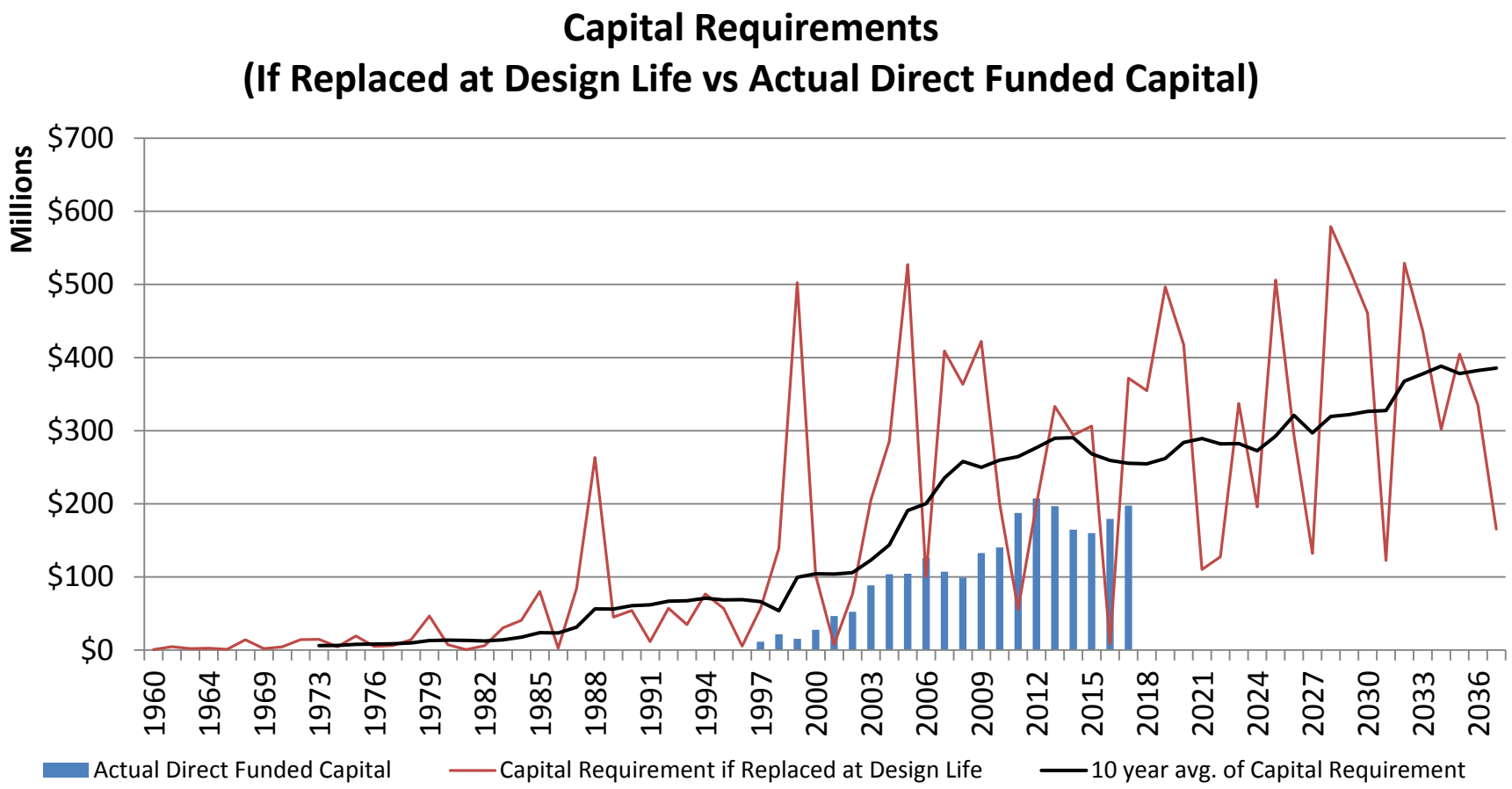
Focus on continuous improvements

Risk Management Strategy

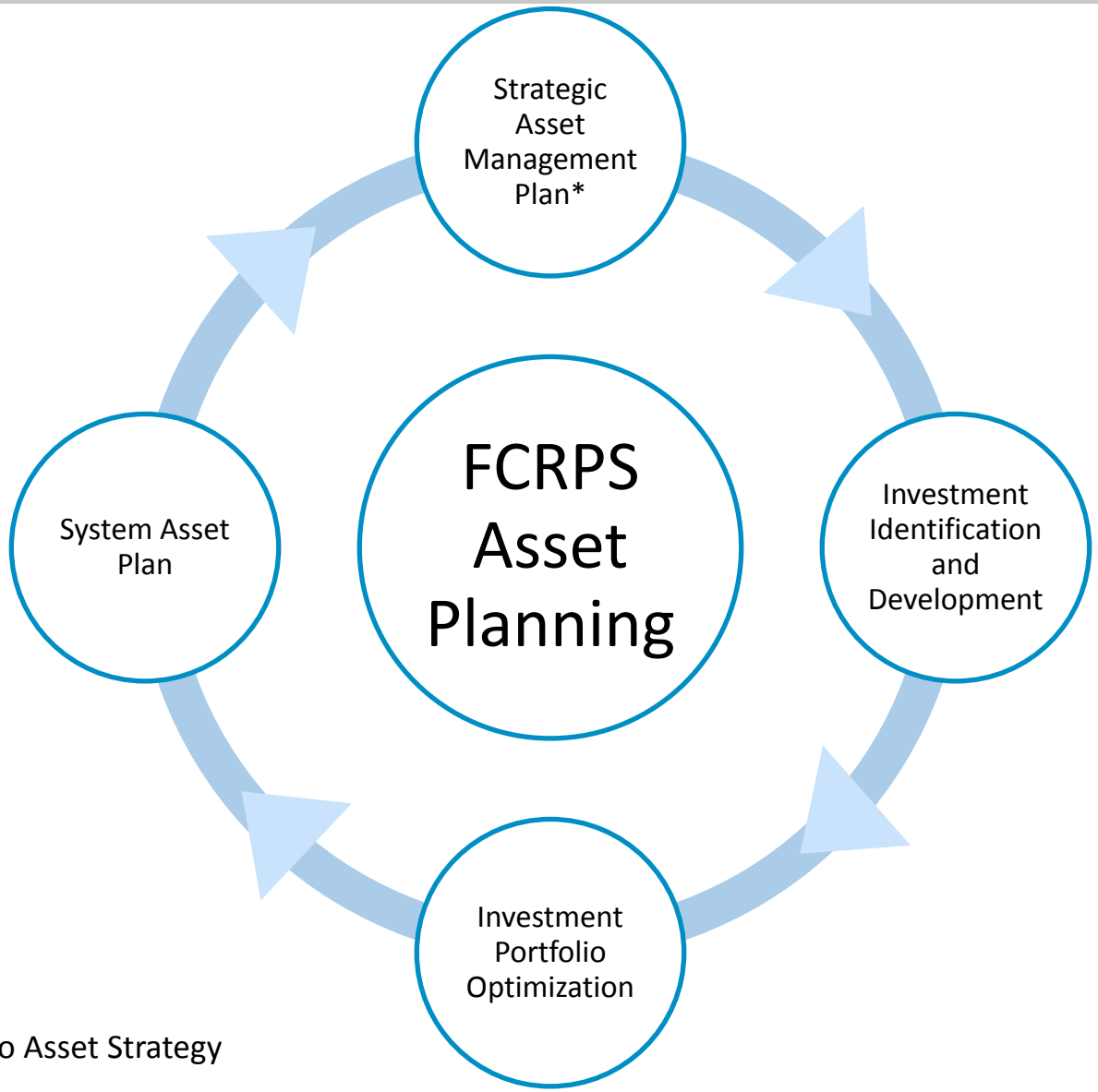
- The Past
  - Targeted specific classes of equipment
  - System-wide analysis of individual components prioritized “low-hanging fruit” equipment with very high NPV.
  - New O&M requirements were funded through budget increases when acceptable.
- The Future
  - Targeting critical plants with greatest risk of lost generation
  - Unit by unit analysis to drive decisions – replace vs. rehab vs. maintain vs. defer
  - Constrained O&M funds – absorb growth through efficiencies and accept additional short-term risk

Capital Program Strategy

Capital Program History

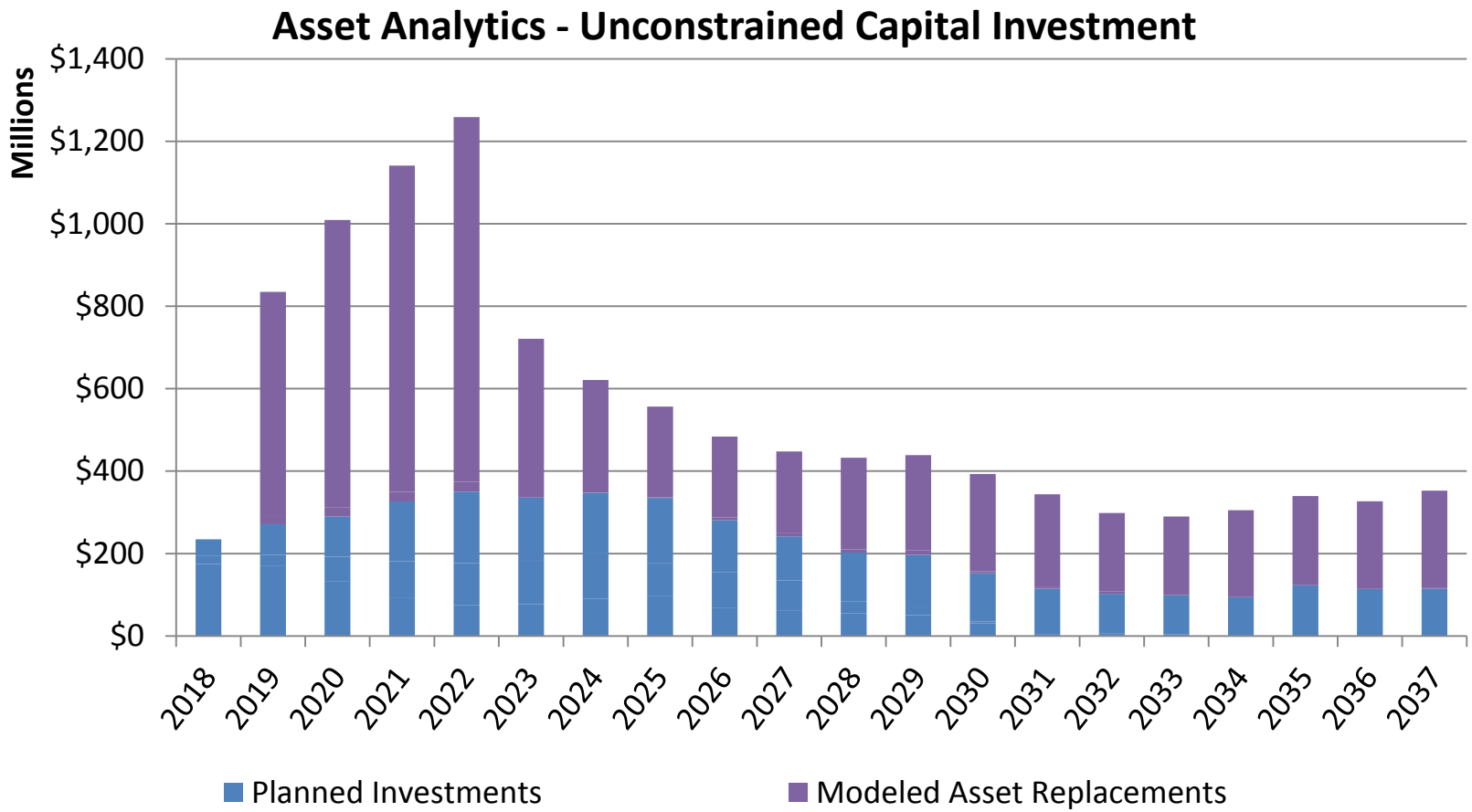


Capital Program Strategy



*Formerly the Hydro Asset Strategy

Unconstrained Capital Program



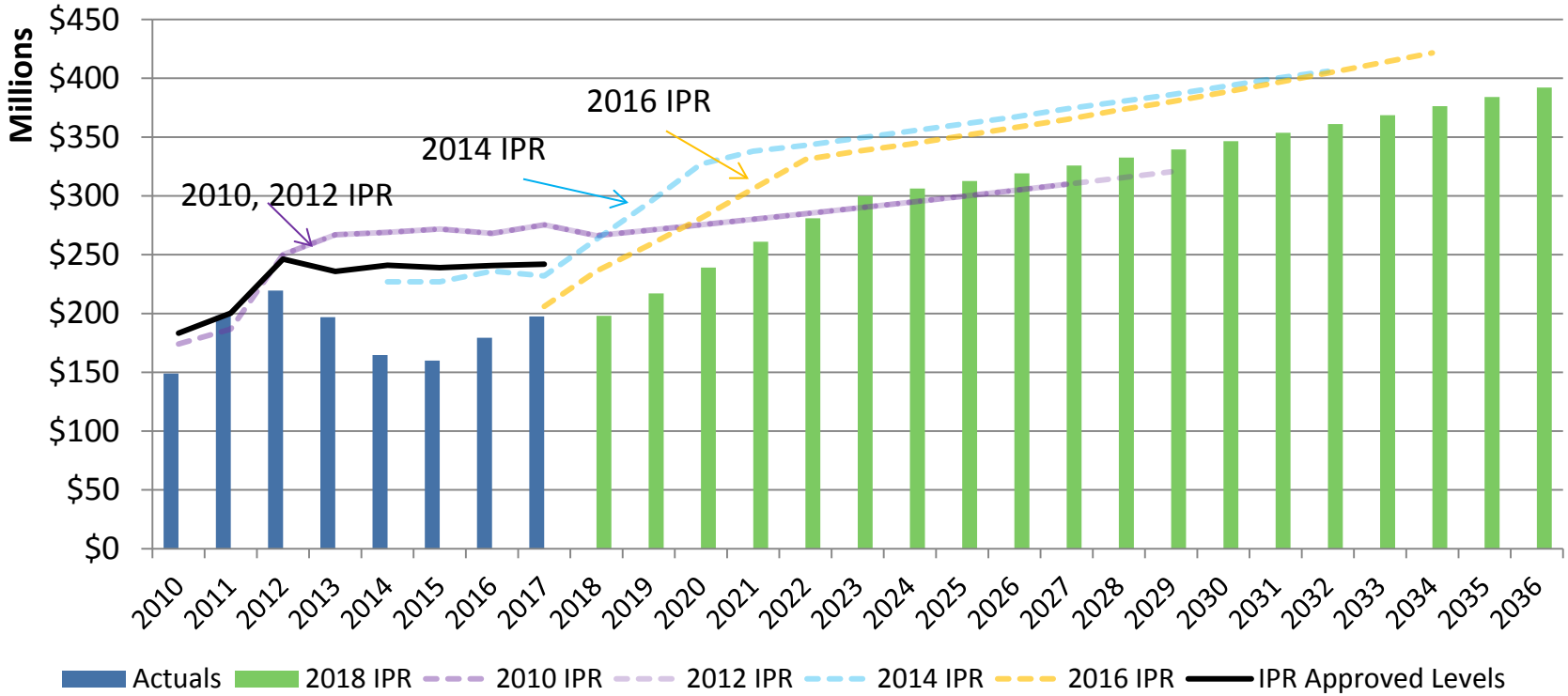
- Unconstrained: Running lifecycle cost minimization model for each asset without budget, resource or outage constraints

Recommended Capital Program

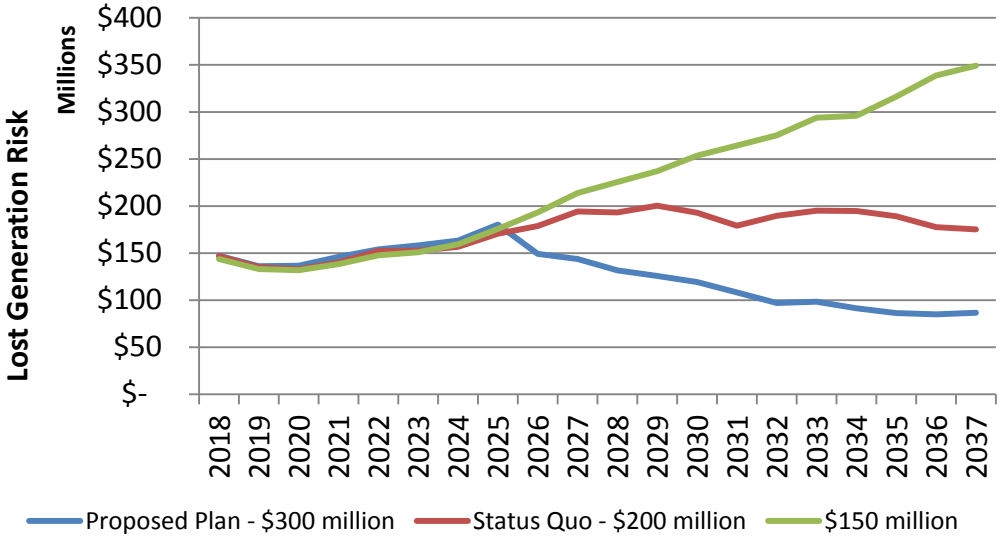
2018 IPR Recommended Capital Investment (Nominal $ Millions)

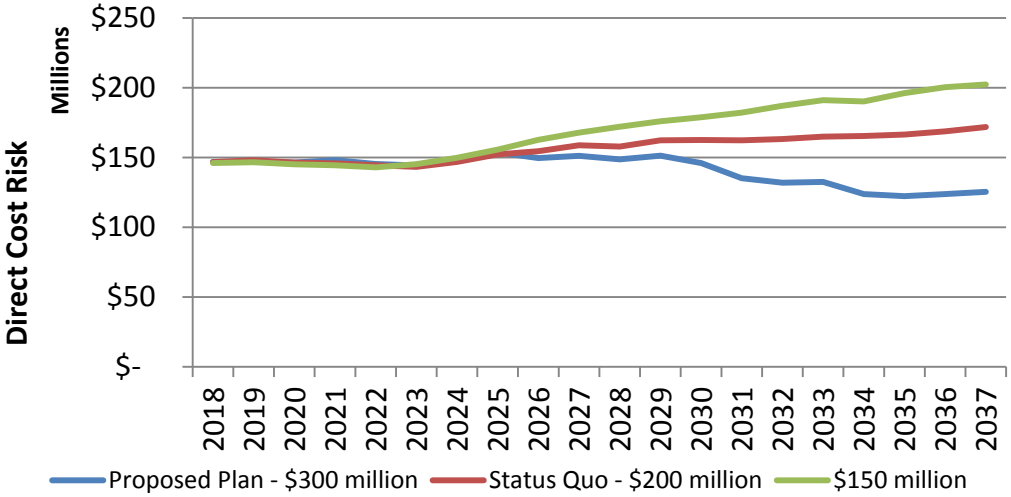
2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
206	217	238	256	281	300	306	313	319	326	333	340	347	354	362

Recommended Capital Investment Level History



Capital Program Results



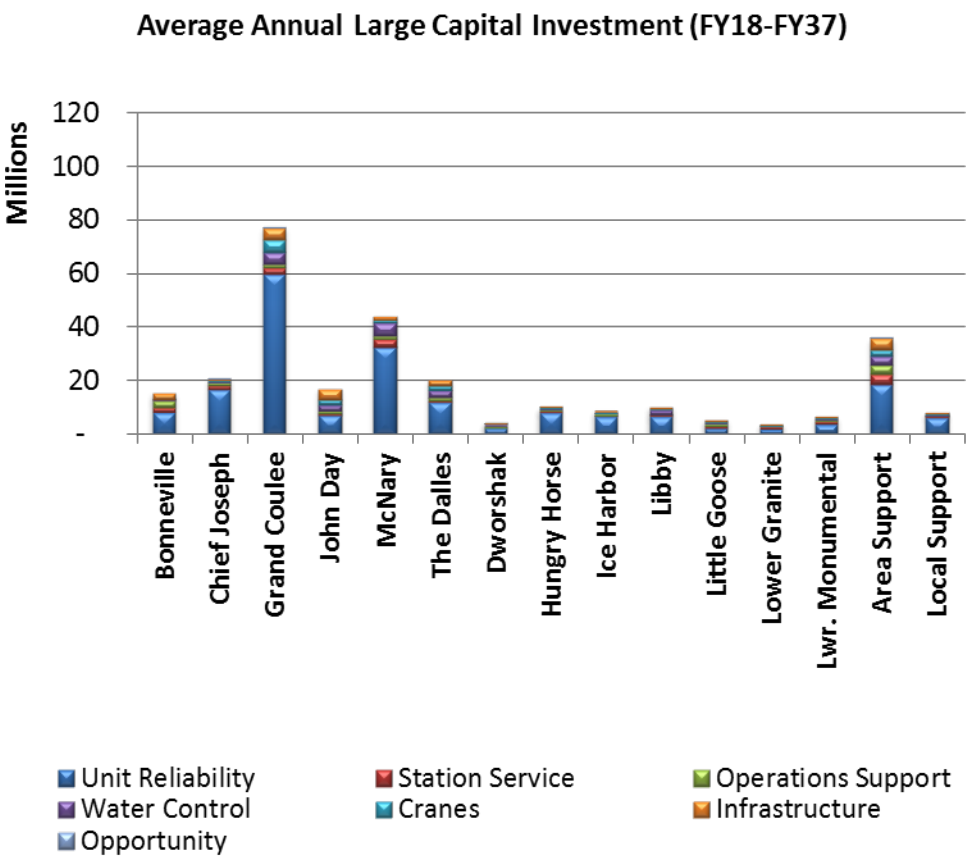


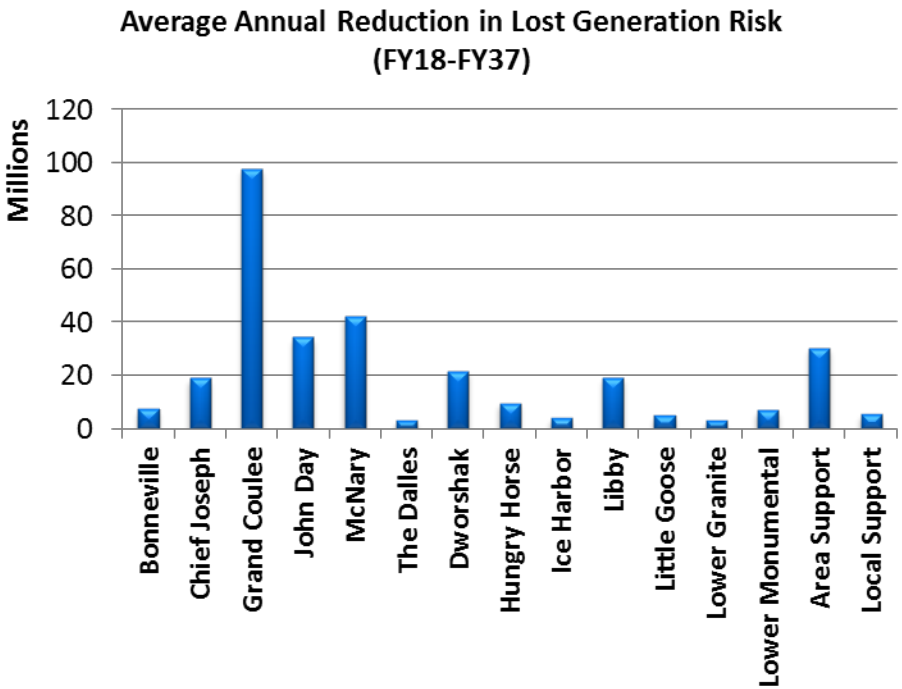
Proposed Plan

Reduces Lost Generation Risk beginning in the mid-2020s

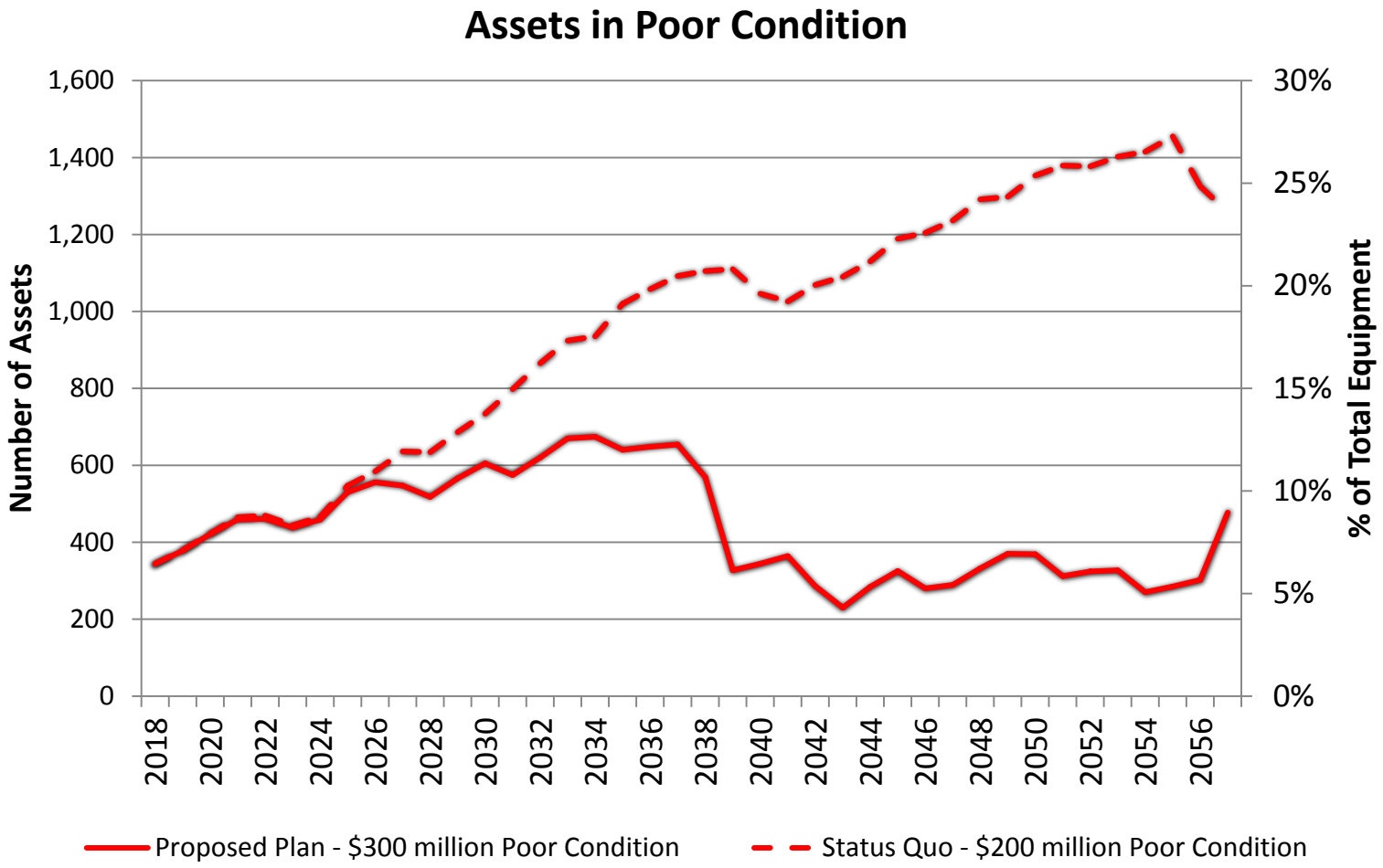
Risk mitigation results in an Incremental NPV of $500 million compared to Status Quo

Capital Program Strategy





Capital Program Results



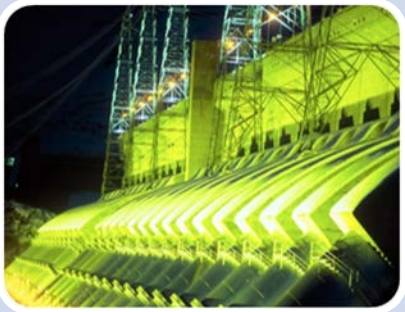
Major Capital Projects

Grand Coulee

- G19-21 Modernization (2022-2029)
- Grand Coulee Arc Flash Mitigation (2023-2045)
- G1-18 Electrical Modernization (2030-2038)

McNary

- Exciter and Governor Upgrades (2020 to 2022)
- Turbine Replacement (2023 – 2030)



Chief Joseph

- Generator Rewinds (2022 – 2032)
- Currently in preliminary design and scoping

John Day

- Turbine Replacement and Generator Rewinds (2032 – 2043)
- Currently in preliminary design and scoping

*Dates reflect the current Asset Plan – timelines may change

Capital Program Efficiencies

Smart Investment Decisions

Efficiency and Capacity Improvements

Minimize Planned Outages

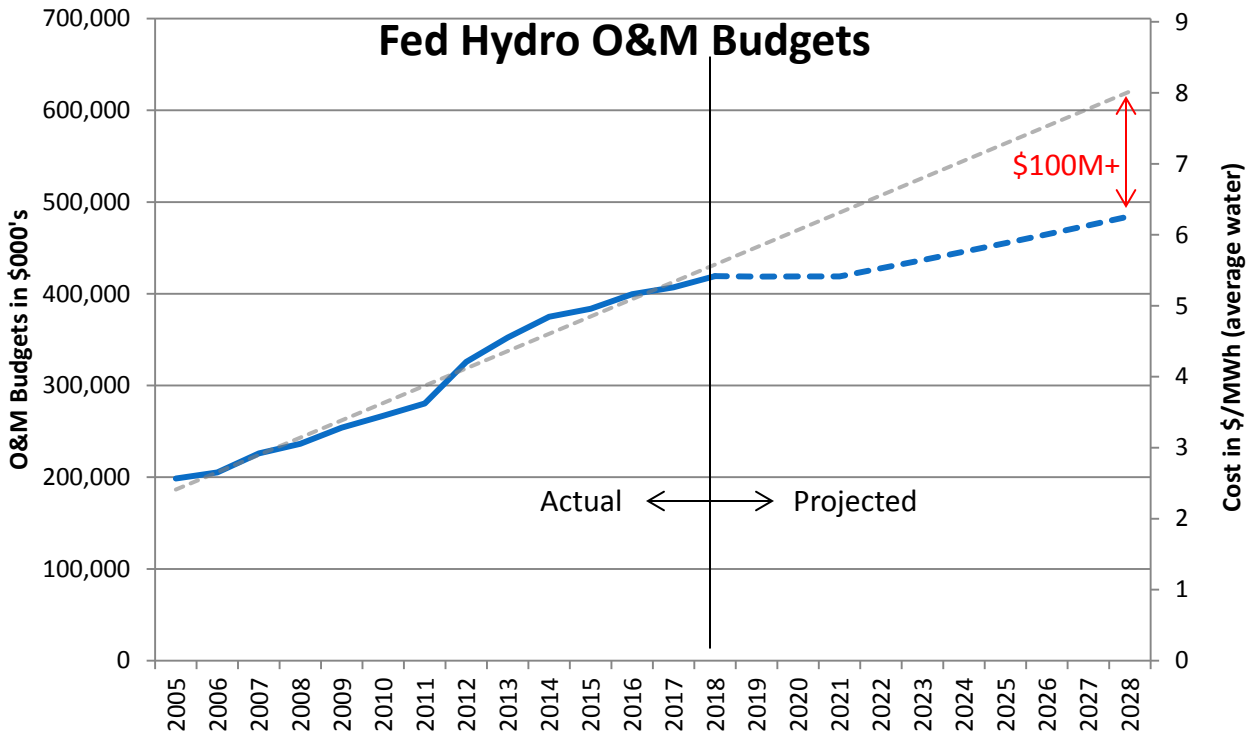
Regional Strategies

O&M Program Strategy

O&M Cost Management Strategy

- Strategy
  - Top down funding level approach
  - Staffing
  - Travel and training
  - Prioritize preventative maintenance
  - Optimize outage plans
  - O&M efficiencies
- Additional needs being absorbed
  - Trades and crafts wage increases
  - OPM – approved special engineering salary rate
  - Material cost increases
- Communication via road shows

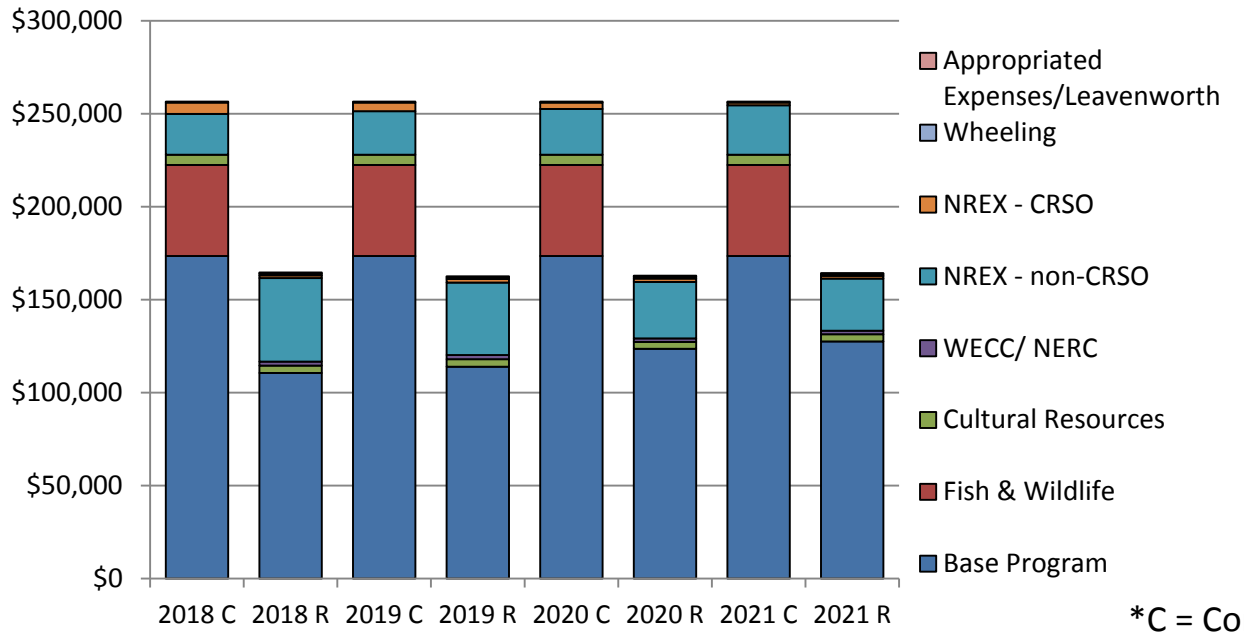
Hydropower O&M Long Term Plan



- Future Plan:
  - FY20 and FY21 held to FY18-19 average
  - FY22 to FY28 levels will be contained to inflation or less

Proposed O&M Funding Levels

Agency	Year	Total Budget	Base Program	Fish & Wildlife	Cultural Resources	WECC/ NERC	NREX - non-CRSO	NREX - CRSO	Wheel-ing	Appropriated Expenses/Leavenworth
Corps	2018	$256,057	$173,553	$48,894	$5,510		$22,000	$6,100		$500
Reclamation	2018	$164,609	$110,621		$3,966	$2,164	$44,928	$1,430	$1,000	$500
Corps	2019	$256,057	$173,553	$48,894	$5,510		$23,400	$4,700		$500
Reclamation	2019	$162,623	$113,962		$4,084	$2,228	$38,990	$1,859	$1,000	$500
Corps	2020	$256,057	$173,553	$48,894	$5,510		$24,600	$3,500		$500
Reclamation	2020	$162,899	$123,625		$3,707	$1,859	$30,378	$1,830	$1,000	$500
Corps	2021	$256,057	$173,553	$48,894	$5,510		$26,600	$1,500		$500
Reclamation	2021	$164,333	$127,566		$3,833	$1,920	$28,058	$1,456	$1,000	$500



*C = Corps; R = Reclamation

Corps O&M Cost Management

- Current actions
  - Operating Project Road Shows
  - Prioritization of work
  - Culture
  - Maintenance Management

Corps O&M Cost Management

- Corps Cost Management Areas
  - Staffing
  - Overtime
  - Investment planning
  - Compliance Programs
  - Travel & Training
  - Performance Awards

Reclamation O&M Cost Management

- Regional Prioritization Process
  - Purpose
    - Increase internal detail and transparency
    - Align program with budget targets
    - Prioritize and balance non-routine activities
  - Labor/Staffing
    - Analyzes impacts at 1%, 3%, 5% reductions
  - Non Routine
    - Risk Based Budgeting
      - Risk factors are assigned to impact and ability to execute
      - Statistical model assists determination of priorities

Reclamation O&M Cost Management

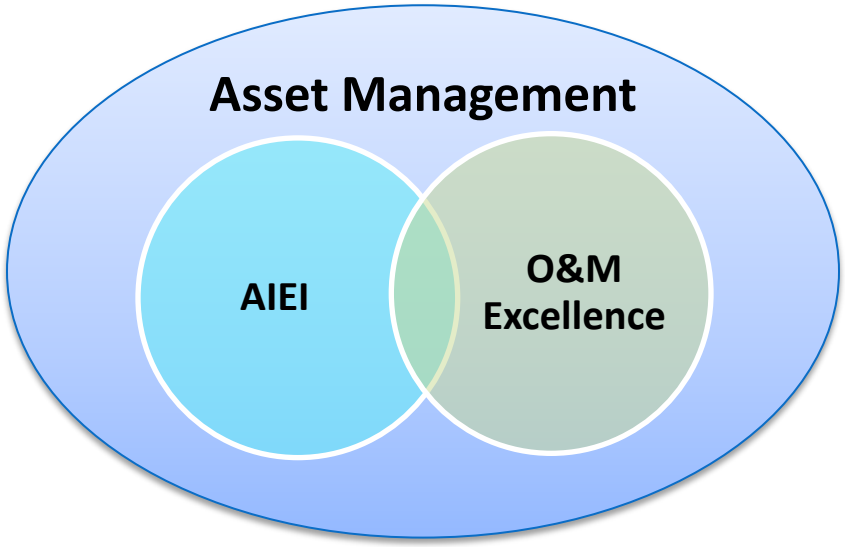
- Reclamation Reductions in FY20 and FY21

Facility	Activity	Reduction (000's)	Risks
Grand Coulee	Third Power Plant Overhaul	$9,900	Does not provide funding for G-22 potential contract modifications. Any needed modifications will require additional funding.
Grand Coulee	Non Routine Unscheduled	$2,200	Limits ability to respond to non-routine unforeseen circumstances. Risk of increased forced outage rates.
Grand Coulee	World Class Hydro	$1,000	Prolong implementation of initiatives which impacts planning, documentation, and knowledge capture initiatives.
	Cultural Resources	$1,000	Reschedule large stabilization projects.
	Leavenworth Fish Hatchery	$800K	Limits ability to perform infrastructure maintenance efforts important for mission accomplishment.
	FCRPS Performance Awards	$650	Suspend for foreseeable future. Potential impacts to recruitment and retention.

FCRPS Asset Management and O&M Excellence

Asset Management

- Goals
  - Focus on value: Identify and implement processes to extract value from assets
  - Holistic approach: Align the activities of both the O&M and Capital programs with assets' criticality and value



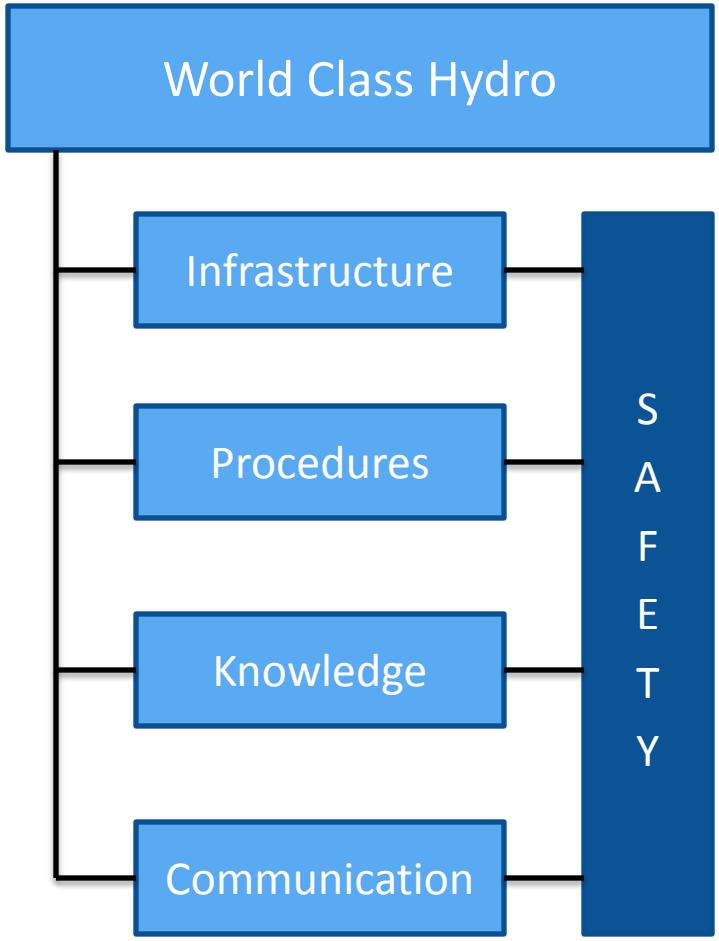
O&M Excellence

- Goal - Sustain the value of hydro assets with constrained funds by improving efficiencies
  - Build a culture of value-focused work
  - Eliminate redundant or lower-priority efforts
  - Align costs with benefits
  - Examine and implement the use of alternative technologies and business practices to reduce cost
  - People – knowledge, training, safety
  - Maintenance practices and effectiveness

O&M Excellence – Corps

- Future Actions
  - Management controls
  - Tiered Approach
  - Benchmarking
  - Remoting Studies

O&M Excellence – Reclamation

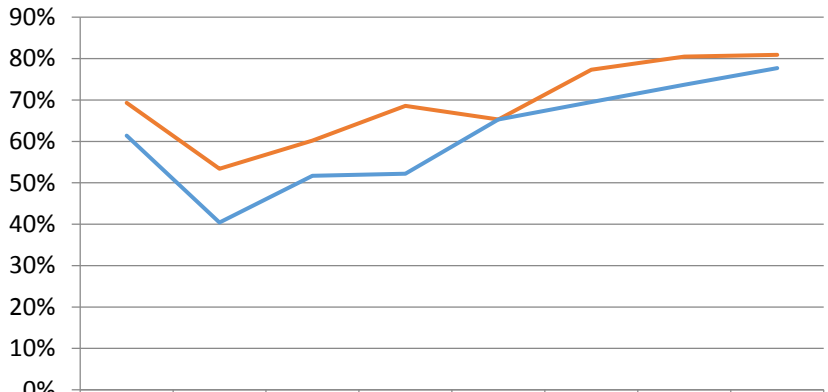


- Infrastructure
  - Assets, equipment, tools
- Procedures
  - Practices, procedures, manuals
- Knowledge
  - Training and experience
- Communications
  - Communications plan
- Safety

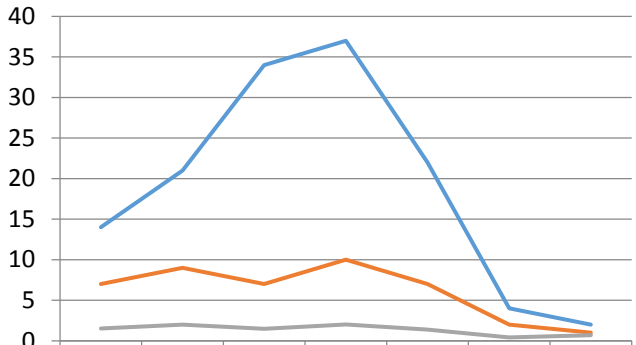
O&M Excellence – Reclamation

- World Class Hydro Accomplishments
  - Unit Availability
    - 22 of 24 Units Available
    - 5 of 6 in Third
  - Safety
    - Reorganized training office
    - Created training database
    - Provided specialized training

Grand Coulee Availability FY18



	YTD	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Actual	69.3%	53.4%	60.2%	68.6%	65.3%	77.3%	80.5%	80.9%
Target	61.4%	40.4%	51.7%	52.2%	65.3%	69.5%	73.7%	77.7%



	2012	2013	2014	2015	2016	2017	2018
Recordable Cases	14	21	34	37	22	4	2
DART Cases	7	9	7	10	7	2	1
DART Rate	1.52	2	1.48	2.01	1.39	0.41	0.7

O&M Excellence – Reclamation

- World Class Hydro Next Steps
  - Develop:
    - Infrastructure planning, execution, and closeout process
    - Action plans to address inadequate procedures
    - Knowledge Capture process
  - Implement recommendations regarding:
    - Recruitment and Retention
    - Warehousing Strategy report
    - Fleet Management Strategy report
  - Continue to develop CARMA policies and procedures

The Future of Federal Hydropower

Future Cost of Hydropower

- O&M and Capital funding plans are heavily weighted towards plants with highest risk of lost generation.
- Based on these plans, cost of production for FCRPS hydro generation should average below $11/MWh over the next 30 years

Asset Class	% of Average Annual Generation	% of Capital Forecast	% of O&M Forecast	Levelized Cost of Generation ($/MWh)
Main Stem Columbia	77%	68%	65%	$9.03
Headwater/Lower Snake	18%	17%	22%	$11.41
Area Support	4%	12%	10%	$30.83
Local Support	1%	3%	3%	$44.28
FCRPS TOTAL	***100%***	***100%***	***100%***	***$10.56***

The Way Ahead

- Our goal
  - Reliable, cost-effective hydropower
  - Safe and efficient operation of the FCRPS
  - Ensure environmental compliance obligations are met
- Economic Efficiency
- Commitment to cost management
- Strategic investment in reliability

QUESTIONS?

FINANCIAL DISCLOSURE

This information was publicly available on June 18, 2018, and contains information not sourced directly from BPA financial statements.