NUSCALE™
Power for all humankind

Technology Overview

Presented to: TPU Board of Public Utilities,
Tacoma, Washington

November 13, 2019

Dr. José N. Reyes
Co-Founder and Chief Technology Officer

Who is NuScale Power?

- NuScale Power was formed in 2007 for the sole purpose of completing the design and commercializing a small modular reactor (SMR) – the NuScale Power Module™.
- Initial concept had been in development and testing since the 2000 U.S. Department of Energy (DOE) MASLWR program.
- Fluor, global engineering and construction company, became lead investor in 2011.
- In 2013, NuScale won a $226M competitive U.S. DOE Funding Opportunity for matching funds.
- >450 patents granted or pending in nearly 20 countries.
- >350 employees in 6 offices in the U.S. and 1 office in the U.K.
- Making substantial progress with a rigorous design review by the U.S. Nuclear Regulatory Commission (NRC).
  - Phase 4 of NRC Review is on schedule for completion December 2019.

NuScale Engineering Offices Corvallis

One-third scale NIST-1 Test Facility

NuScale Control Room Simulator

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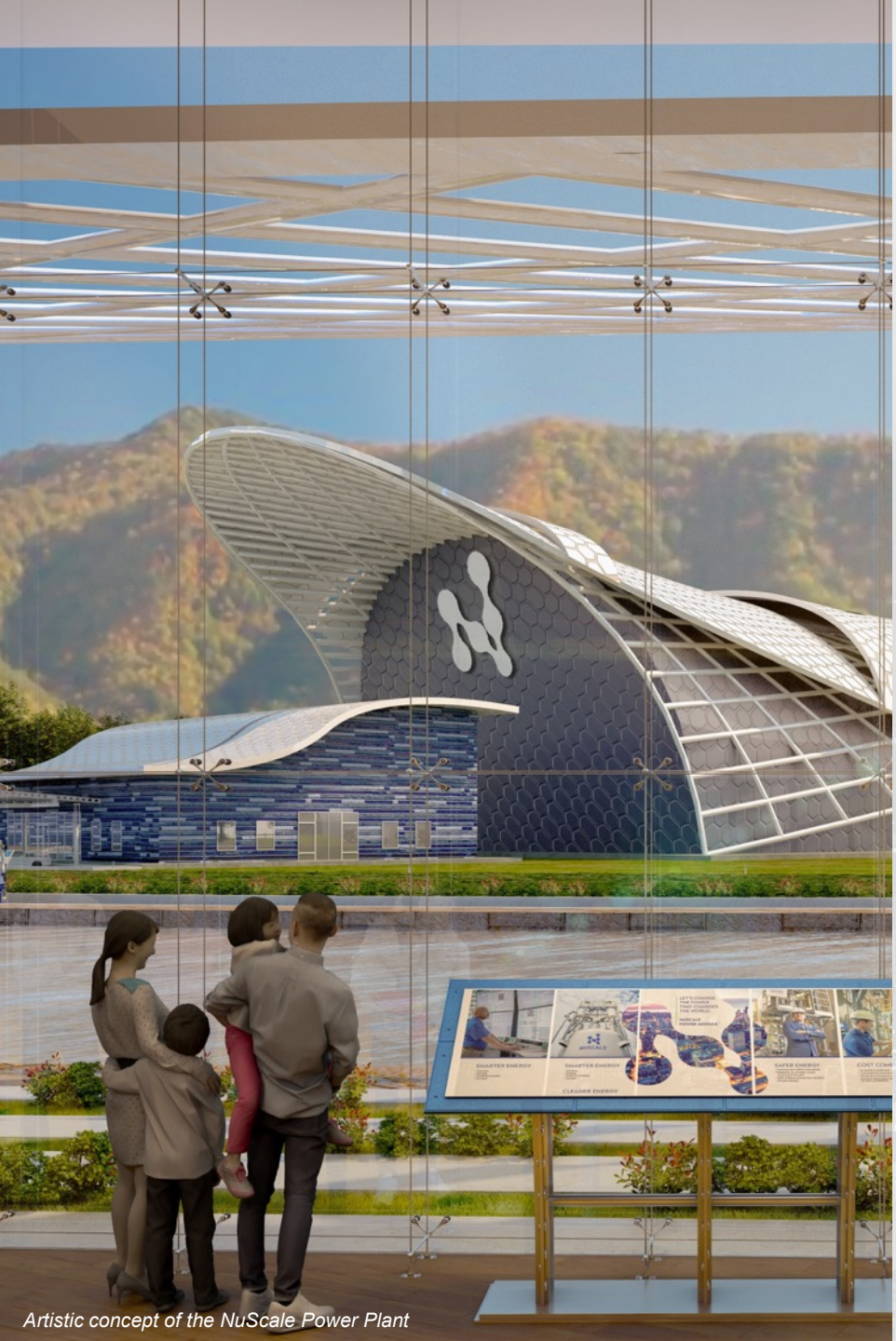
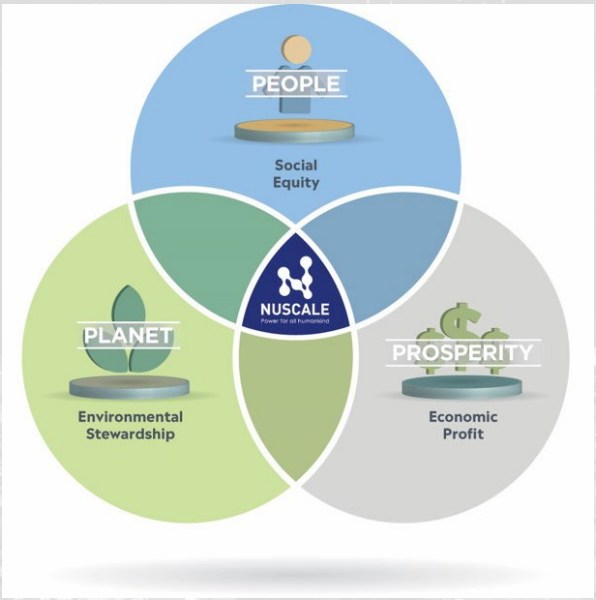

Artistic concept of the NuScale Power Plant

NuScale's Mission

NuScale Power provides scalable advanced nuclear technology for the production of electricity, heat, and clean water to **improve the quality of life for people around the world.**



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Artistic concept of the NuScale Power Plant

Helping Utilities Meet Clean Energy Goals

- Providing carbon-free flexible power to balance the grid allowing increased penetration of renewable power such as wind and solar.
- Providing highly reliable, scalable, and cost-effective carbon-free power for repurposing fossil-fuel power plants and personnel.

When energy sources are evaluated over their **entire life cycle**, from mining of materials and fuel, to construction, and eventual D&D and waste storage – **nuclear energy has a carbon footprint lower than solar PV and about the same as wind.**

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Clean Air

- Nuclear energy produces **no harmful emissions** during operation and all wastes are taken care of during the entire life cycle of the plant and incorporated into the cost.
- When energy sources are evaluated over their entire life cycle, from mining of materials and fuel, to construction, and eventual decommissioning and waste storage – **nuclear energy has one of the lowest carbon footprints** – lower than solar PV and about the same as wind.
- NuScale's operational flexibility can **enable more renewables and batteries on the grid** and help decarbonize industrial and transportation sectors – making the transition to a clean energy system faster.

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Industry Interest and Support

- Positive attributes of a flexible, carbon-free baseload generating technology scaled for customer needs bringing significant market enthusiasm
- NuScale has engaged with multiple utilities and other end users to potentially deploy NuScale SMR technology domestically and internationally
- To support engagement with the domestic utility market, NuScale created the NuScale Advisory Board ("NuAB") in 2008, which initially had 8 members
  - Over 29 companies have participated in NuAB since its inception
  - NuAB meets about two times a year to contribute to design discussions that will meet their operational needs

What Makes NuScale Different than Conventional Nuclear Power Plants?

- Much Simpler Design with Fewer and Smaller Components
  - New level of safety and resilience
  - New level of operational flexibility meets much broader market needs
  - Leverages economies of small and scalable
- Factory Fabrication of Entire Power Module greatly reduces site construction time.
- Teamed early with an experienced Engineering, Procurement, Construction firm to advise on construction process.
- Expect ~80% design completion before construction starts
  - Higher fidelity cost estimates
  - Reduces likelihood of schedule delays
- Leverages existing supply chain by using conventional fuel and materials.
- Key innovative features being tested at full scale. Significant collaboration with DOE Joint Use Module Program.

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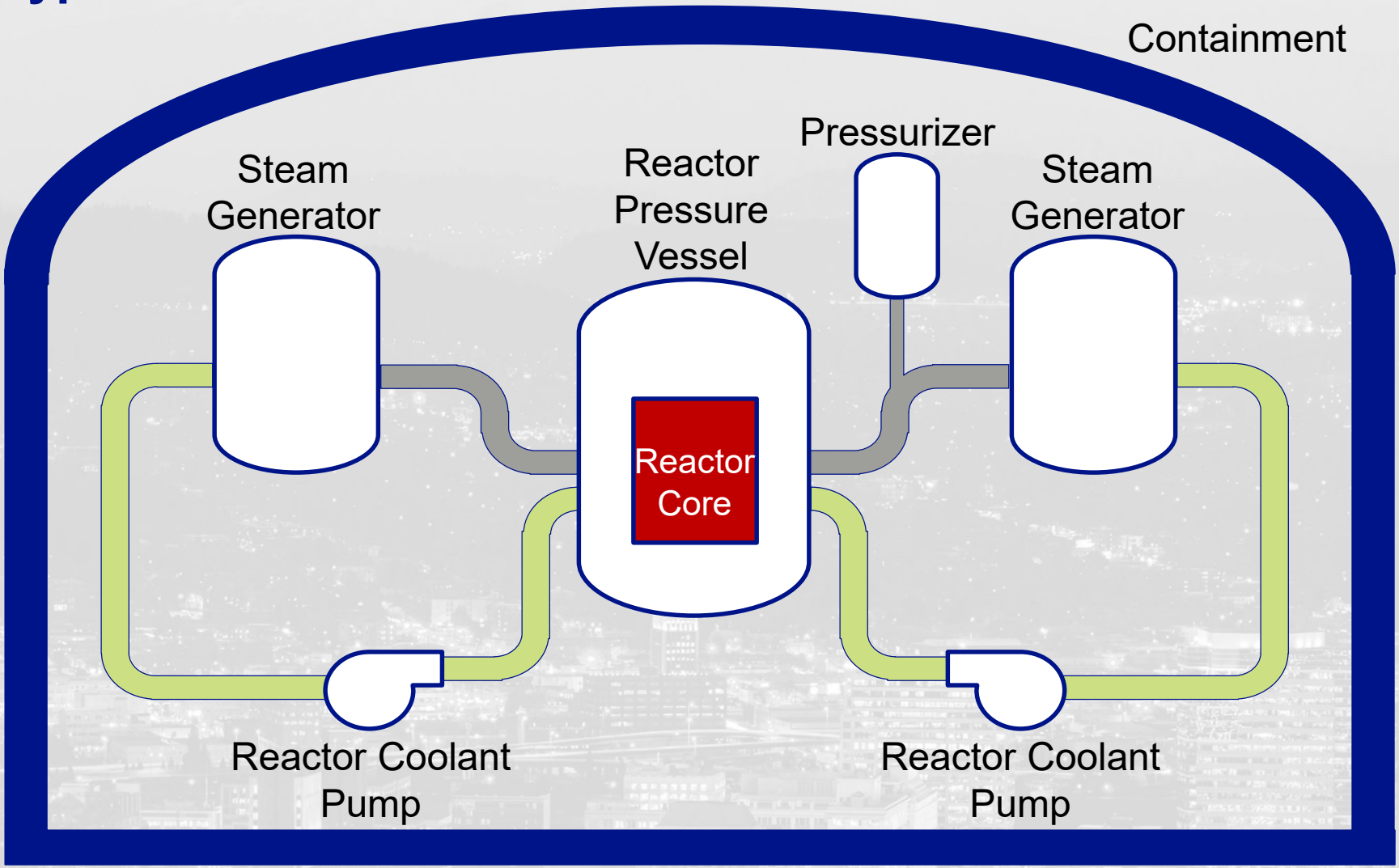
Typical Pressurized Water Reactor



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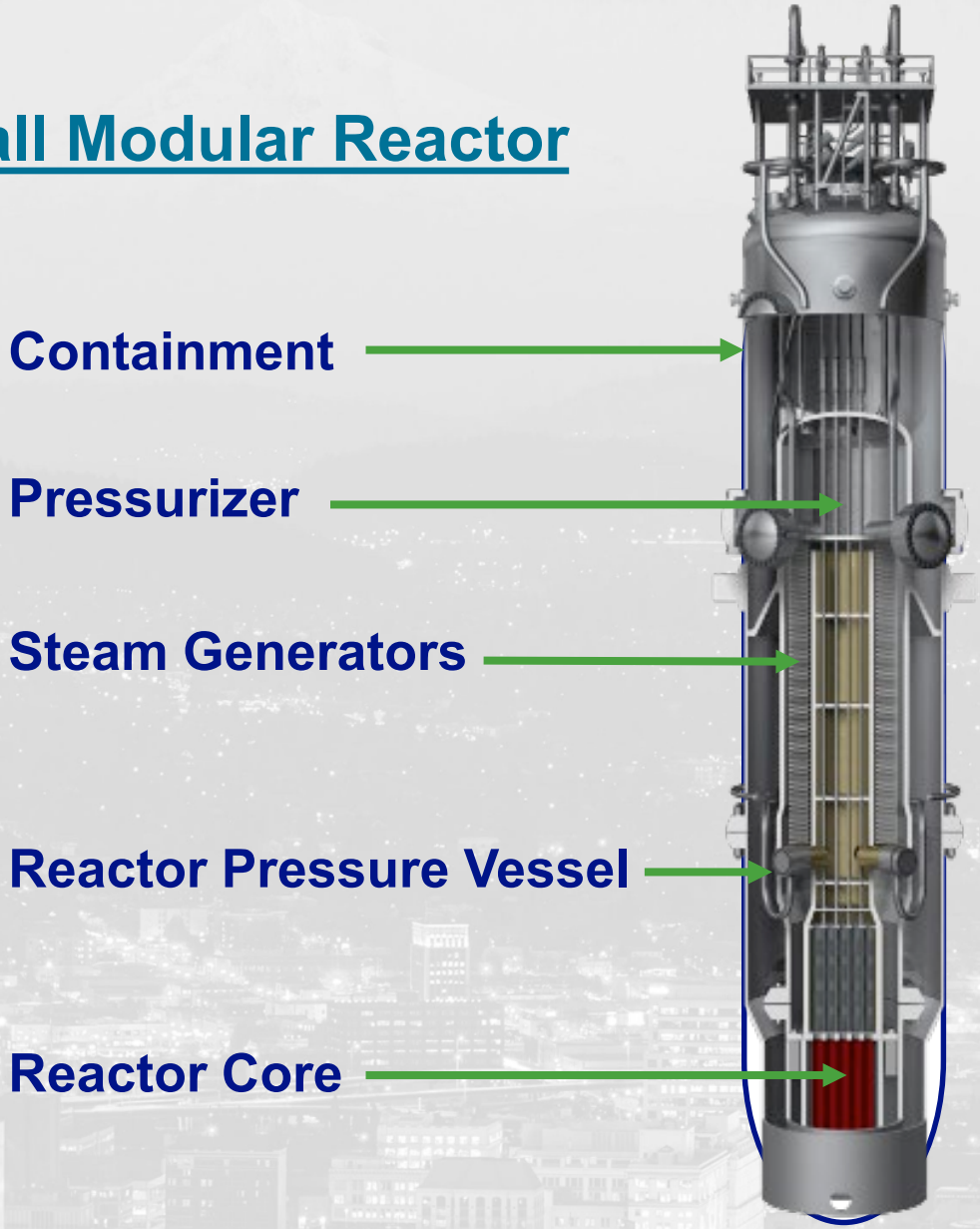
NuScale Small Modular Reactor



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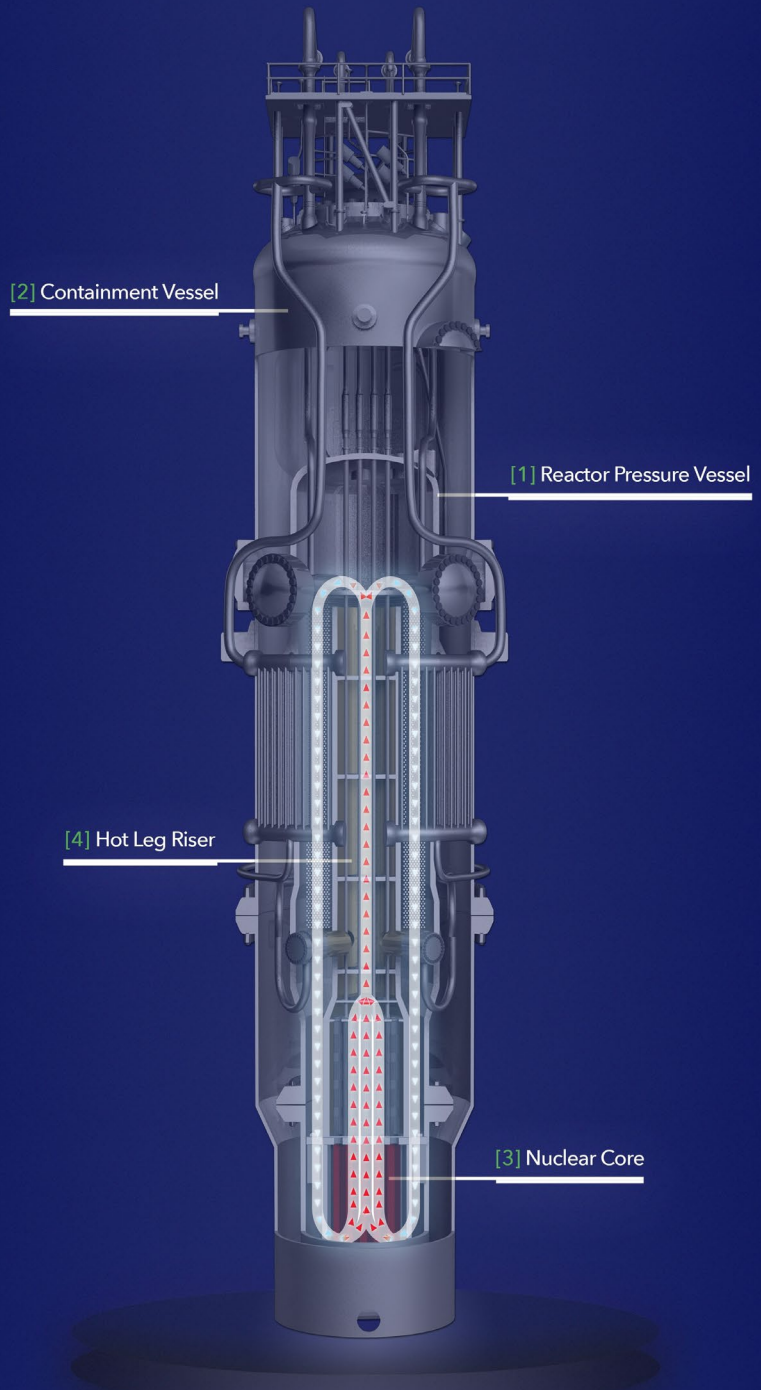

Core Technology: NuScale Power Module

- A **NuScale Power Module**™ (NPM) includes the reactor vessel, steam generators, pressurizer, and containment in an **integral package** – simple design that eliminates reactor coolant pumps, large bore piping and other systems and components found in large conventional reactors.

- Each module produces **up to 60 MWe**
  - small enough to be factory built for easy transport and installation
  - dedicated power conversion system for flexible, independent operation
  - incrementally added to match load growth – up to **12 modules for 720 MWe** gross (687 MWe net) total output

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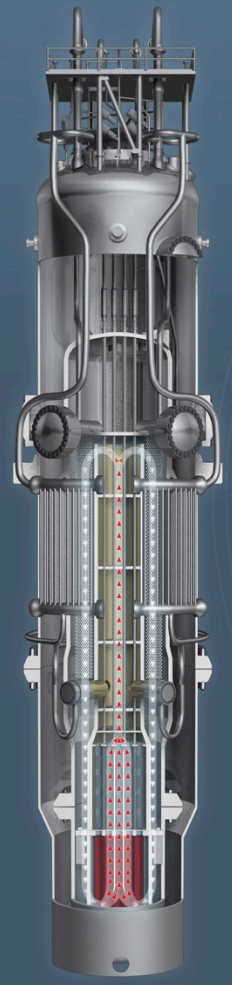
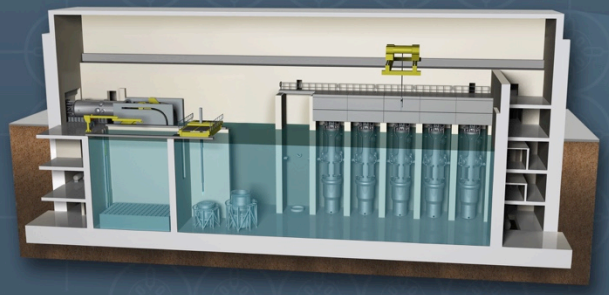
A New Approach to Construction and Operation



Factory Fabrication

NuScale Power Module™ including containment and reactor vessel



Housed in a 12 module reactor building

Shipped by truck, rail or barge

To the plant site

Low carbon, secure electricity

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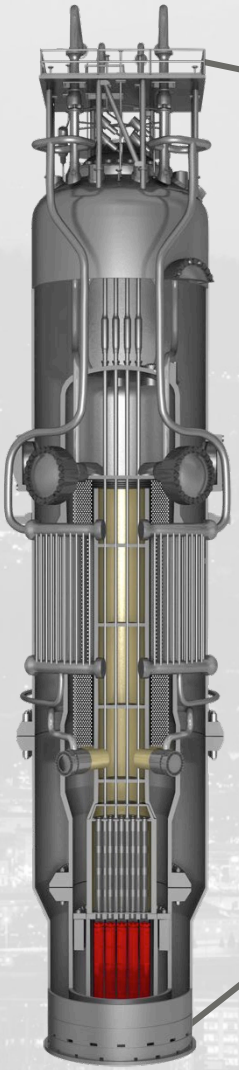
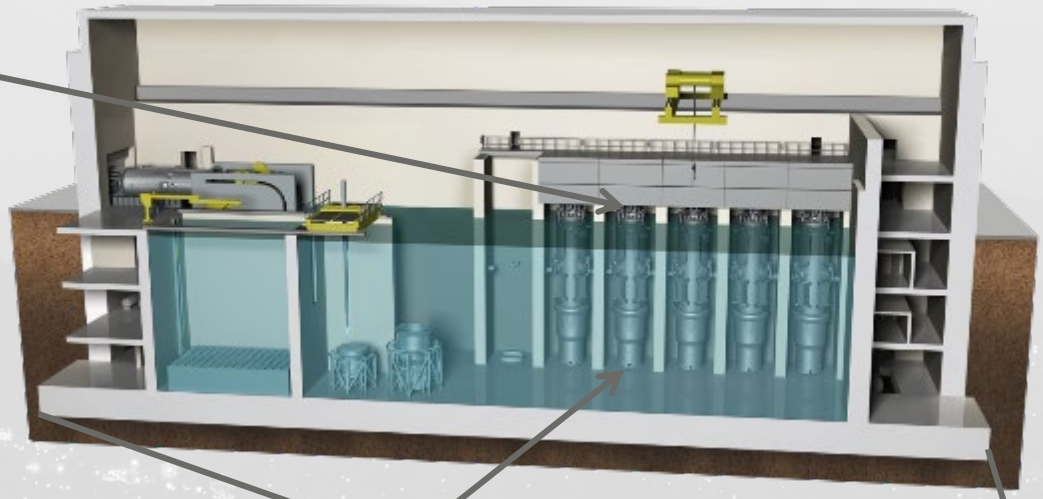
NuScale Plant Site Overview





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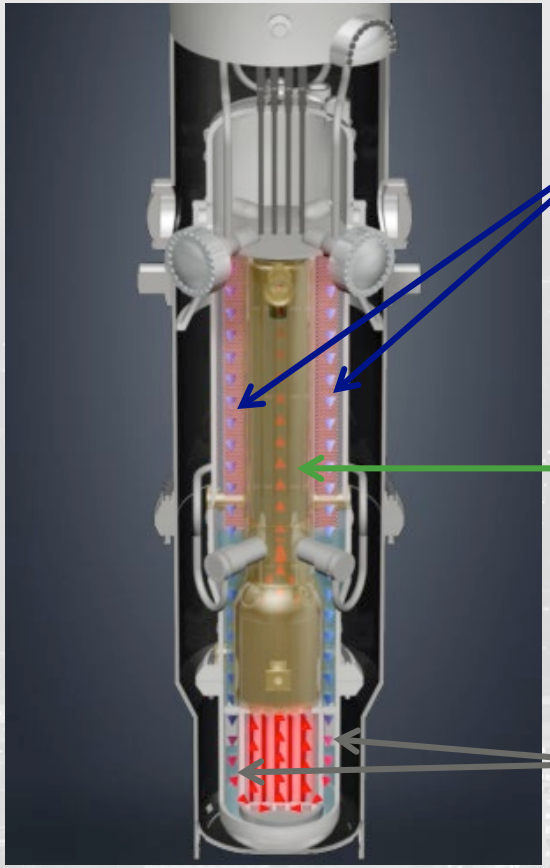
Simplicity Enhances Safety

Natural Convection for Cooling
- Passively safe, driven by gravity, natural circulation over the fuel
- No pumps, no emergency generators

Seismically Robust
- System submerged in a below-ground pool of water in an earthquake and aircraft impact resistant building

Simple and Small
- Reactor core is 1/20th the size of large reactor cores
- Integrated reactor design - no large-break loss-of-coolant accidents

Defense-in-Depth
- Multiple additional barriers to protect against the release of radiation to the environment



Conduction **– heat is transferred through the walls of the tubes in the steam generator, heating the water (secondary coolant) inside them to turn it to steam. Primary water cools.**

Convection **– energy from the nuclear reaction heats the primary reactor coolant causing it to rise by convection and natural buoyancy through the riser, much like a chimney effect**

Gravity **– colder (denser) primary coolant "falls" to bottom of reactor pressure vessel, cycle continues**

Second-to-none safety case – site boundary Emergency Planning Zone capable

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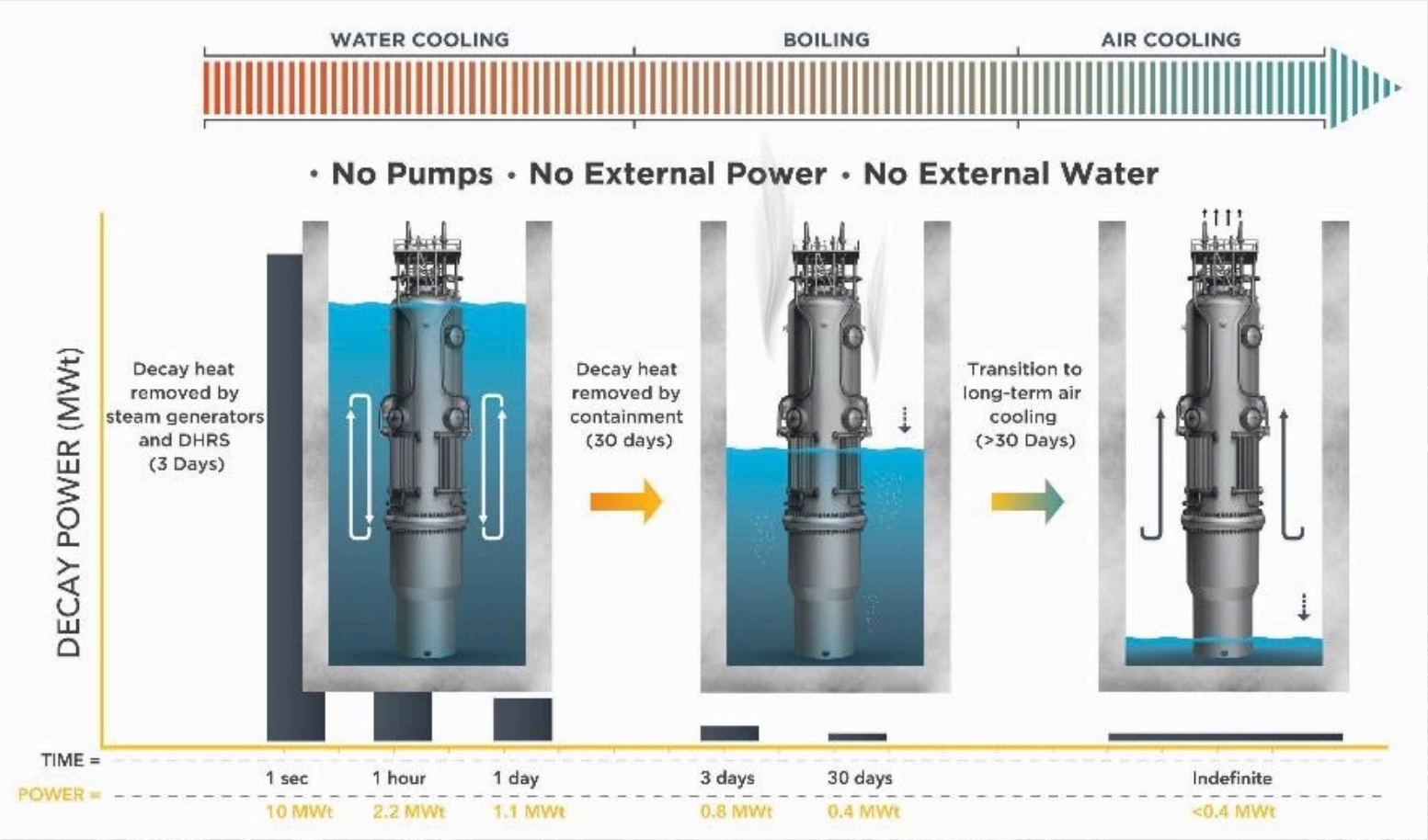
Innovative Advancements to Reactor Safety

Nuclear fuel cooled indefinitely without AC or DC power*



**Alternate 1E power system design eliminates the need for 1E qualified batteries to perform ESFAS protective functions – Patent Pending*

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Technology Validation

- **NuScale Integral System Test (NIST-1)** facility located at Oregon State University in Corvallis, Oregon
- **Critical Heat Flux** testing at Stern Laboratories in Hamilton, Ontario Canada
- **Helical Coil Steam Generator** testing at SIET SpA in Piacenza, Italy
- **Fuels Mechanical Testing** at AREVA's Richland Test Facility (RTF) in Richland, WA, USA
- **Critical Heat Flux** testing at AREVA's KATHY loop in Karlstein, Germany
- **Control Rod Assembly (CRA)** drop / shaft alignment testing at AREVA's KOPRA facility in Erlangen, Germany
- **Steam Generator** Flow Induced Vibration (FIV) testing at SIET SpA in Piacenza, Italy
- **Steam Generator Inlet Flow Restrictor** Test at Alden Laboratory, Holden, MA, USA
- **ECCS Valve** Proof of Concept and Demonstration Tests, Target Rock, NY, USA

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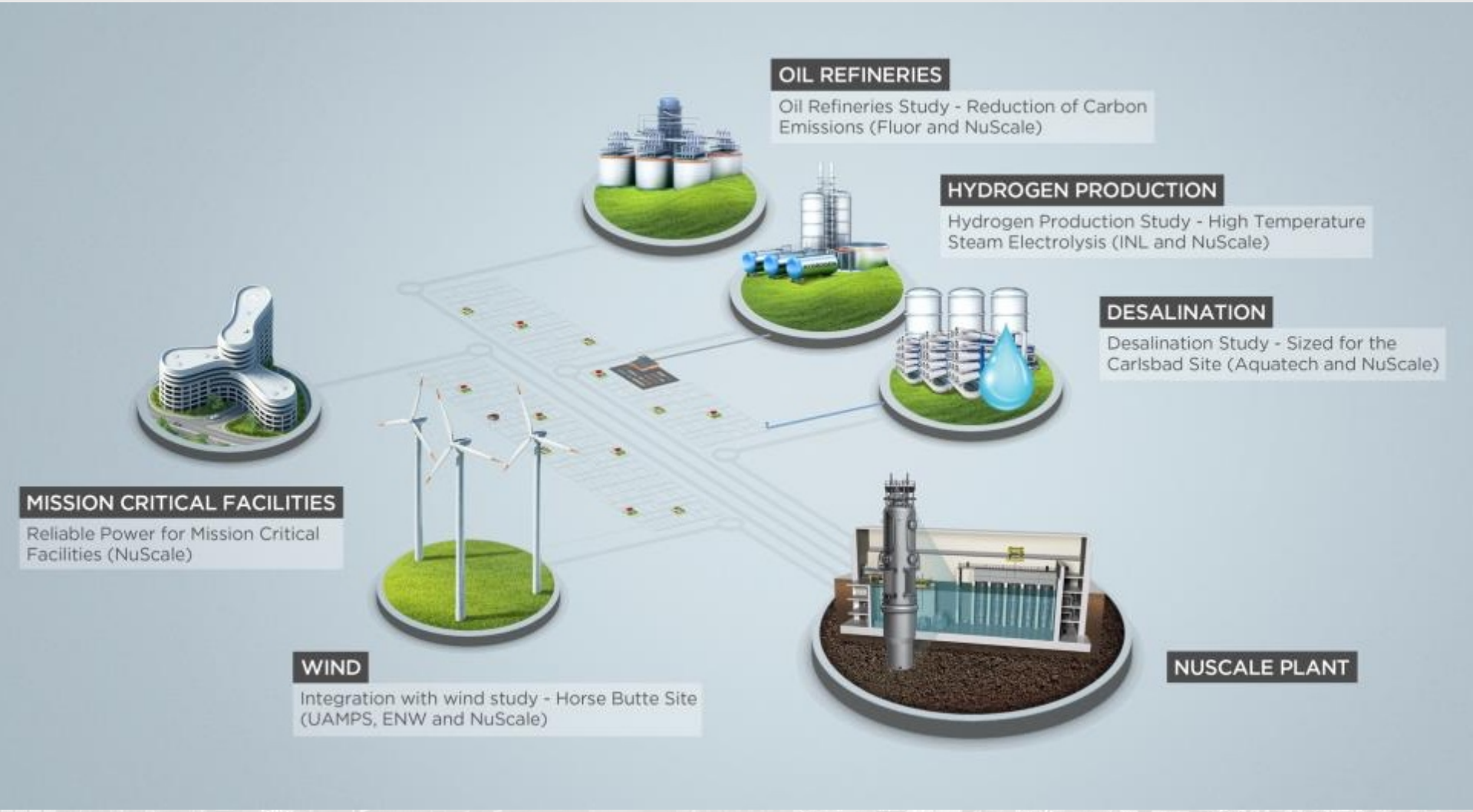
Beyond Baseload: NuScale Diverse Energy Platform



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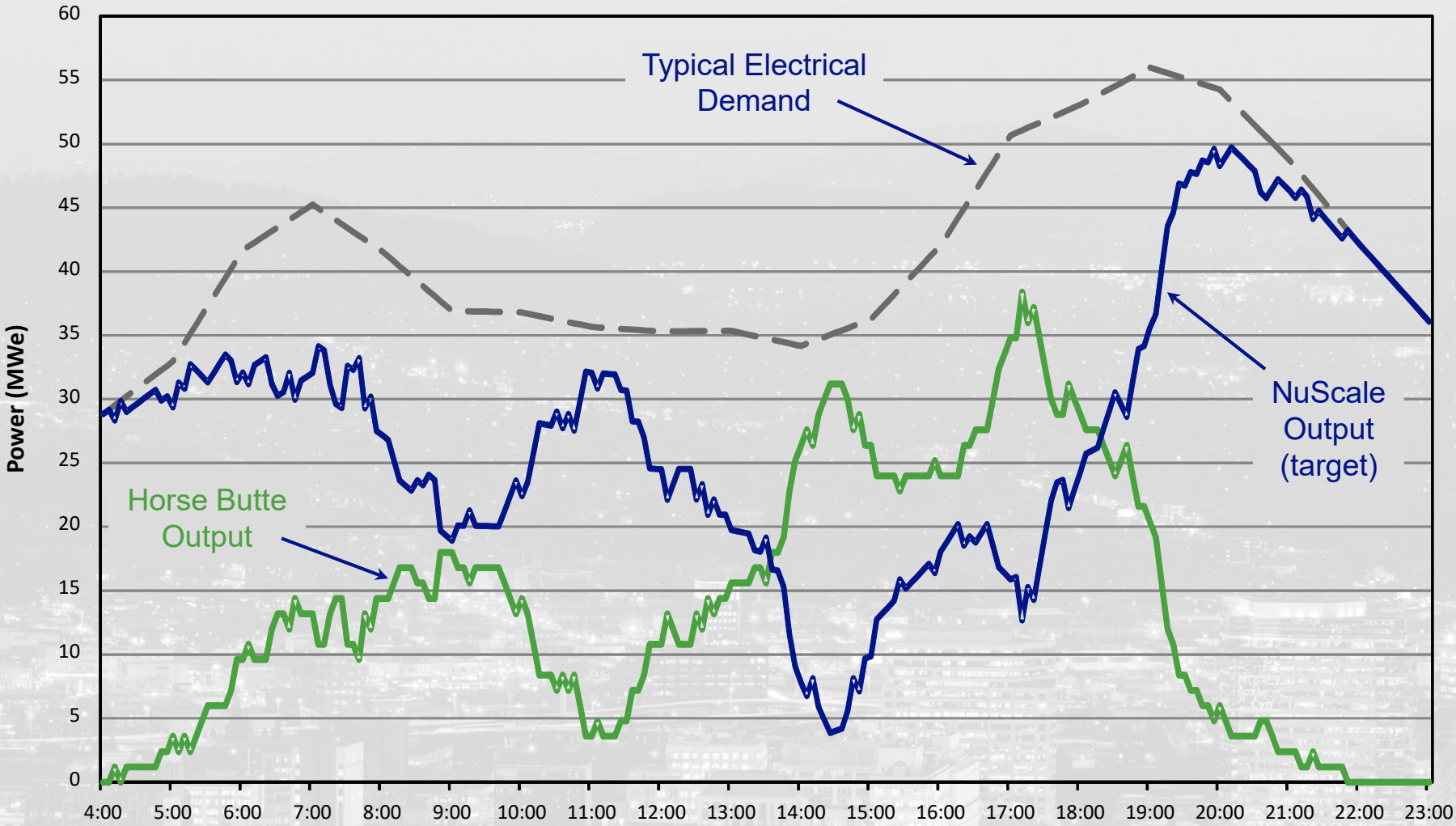
Load-Following with Wind



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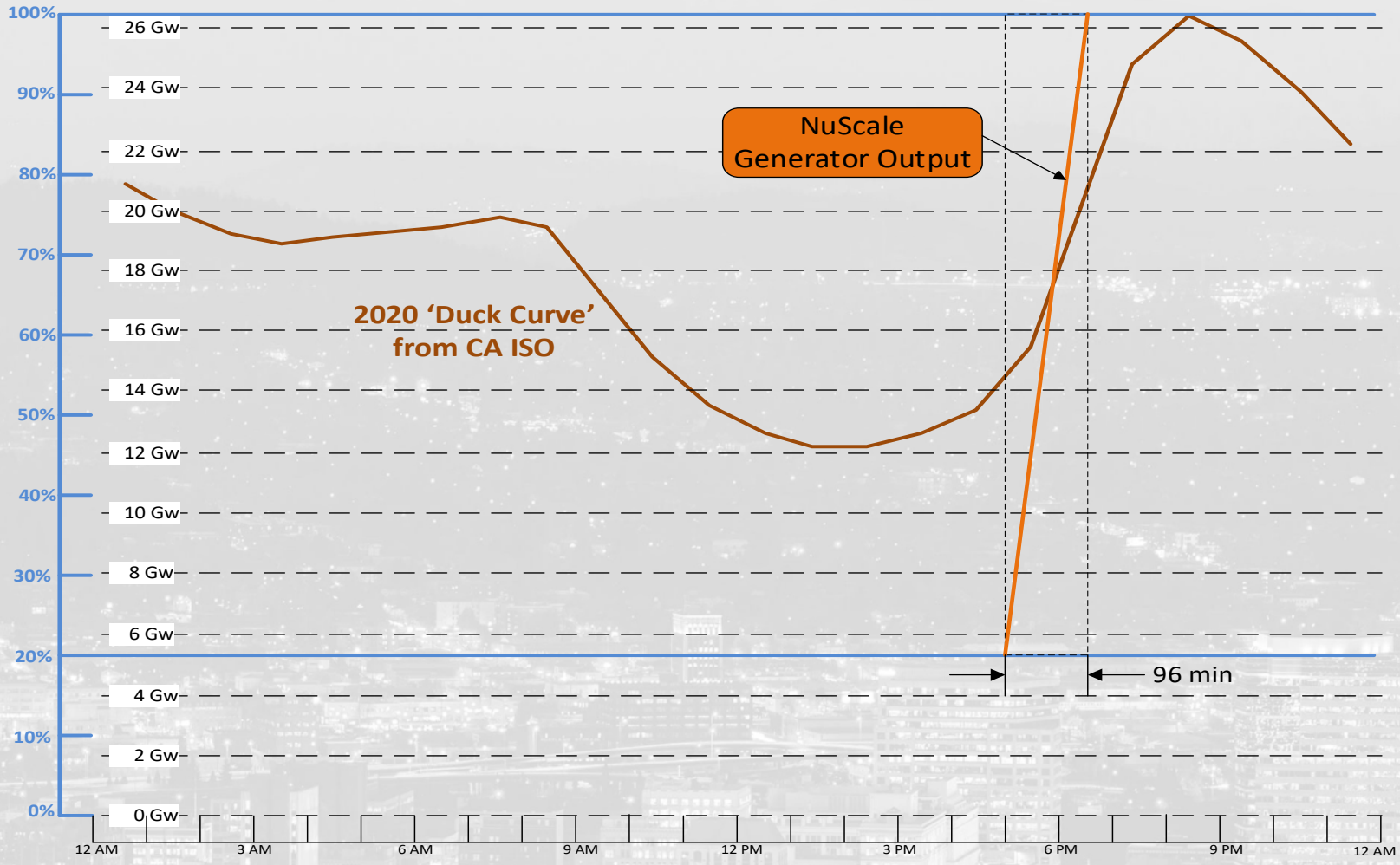
NuScale and the 2020 California “Duck Curve”



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A New Level of Plant Resiliency

Climate Adaptation

Island Mode/Loss of Offsite Power

A single module can power the entire plant in case of loss of the grid; no operator or computer actions, AC/DC power or additional water required to keep the reactors safe

First Responder Power

On loss of the offsite grid, through variable (0% to 100%) steam bypass, all 12 modules can remain at power and be available to provide electricity to the grid as soon as the grid is restored

Resilience to Natural Events

Reactor modules and fuel pool located below grade in a Seismic Category 1 Building

- Capable of withstanding a Fukushima type seismic event
- Capable of withstanding hurricanes, tornados, and floods

Resilience to Aircraft Impact

Reactor building is able to withstand aircraft impact as specified by the NRC aircraft impact rule

Cybersecurity

Module and plant protection systems are non-microprocessor based using field programmable gate arrays that do not use software and are therefore not vulnerable to internet cyber-attacks

Electromagnetic Pulse (EMP/GMD)

Resilience to solar-induced geomagnetic disturbances (GMDs) and electromagnetic pulse (EMP) events beyond current nuclear fleet.

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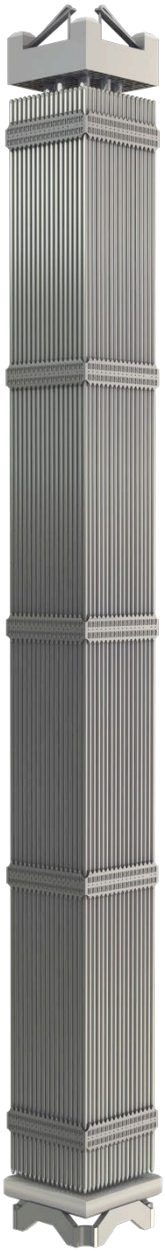

What about the waste, i.e., used fuel?

- What you normally hear about as nuclear waste is actually the “used fuel” removed from a reactor, which still contains **~96% of the unused energy** that can be recovered to produce new fuel. This used fuel is currently stored in pools of water or in robust containers on a concrete pad (dry cask storage).
- All of the used nuclear fuel produced by the nuclear energy industry in the last 60 years has been safely managed and stored, primarily at plant sites in pools or dry cask storage.
- The NuScale power plant design includes a proven **safe and secure used fuel management system**.
- Used fuel management, storage, and disposal is regulated by U.S. Nuclear Regulatory Commission (NRC) and the **U.S. Department of Energy (DOE)** has responsibility for its ultimate disposal.
- **Recycling used fuel** could significantly reduce the burden of mining and disposing of used fuel, making our nuclear fuel cycle more sustainable.

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Used Fuel Management at NuScale Plant

- NuScale reactor building and plant design incorporates a **proven** safe, secure, and effective used fuel management system
- **Stainless steel lined concrete pool** holds used fuel for at least 5 years under 60 feet of water.
- The used fuel is protected both by the ground and the **Seismic Category 1 reinforced concrete reactor building** designed to withstand an aircraft impact, and a variety of natural and man-made phenomena.

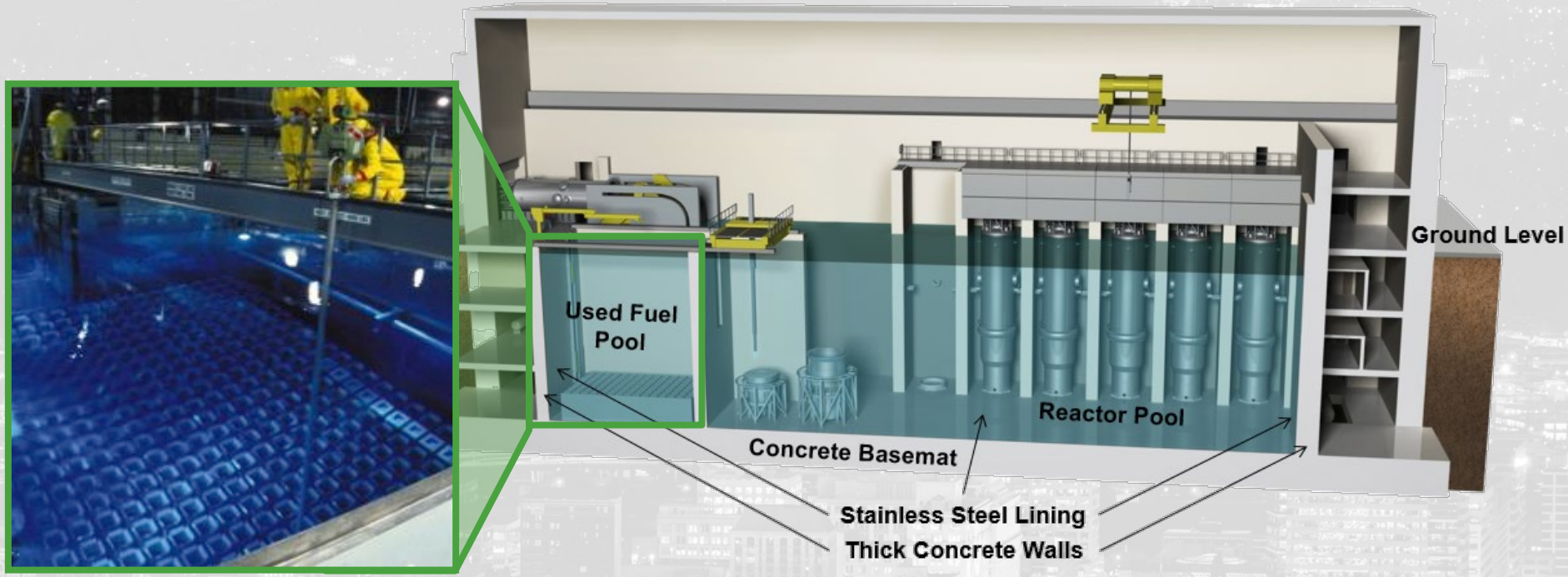

Image Credit: Nuclear Energy Institute

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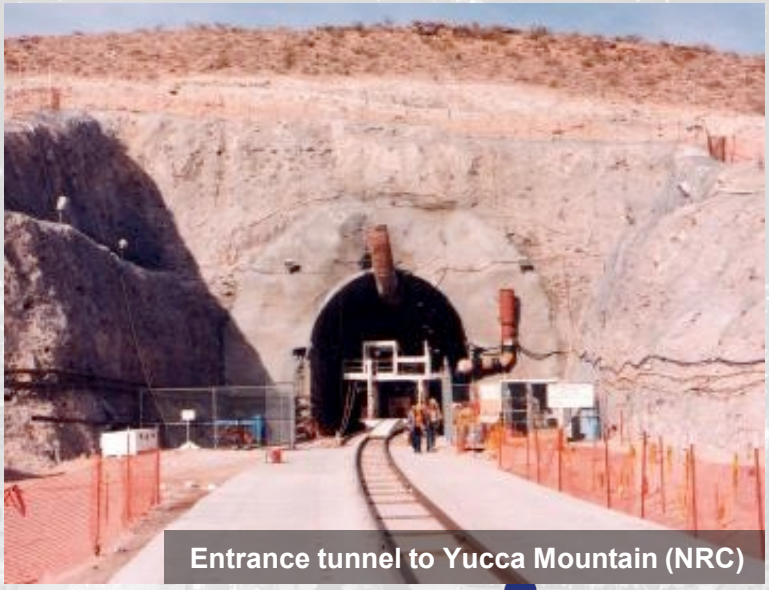
Used Fuel Storage & Disposal

- **After cooling in the spent fuel pool, spent fuel is placed into certified casks – steel containers with concrete shells – on site of the plant.**
  - NRC Waste Confidence Rule states that this is a safe and acceptable way to store used fuel for an interim period at the plant up to 100 years.
  - NuScale's standard facility design includes an area for the dry storage of all of the spent fuel for the 60-year life of the plant.
- **U.S. Department of Energy (DOE) has responsibility for the final disposal of used fuel under the Nuclear Waste Policy Act.**
  - Under the Act, the generators' of electricity from nuclear power must pay into a fund for the long term disposal of this used fuel; over $35 billion is currently in the Nuclear Waste Fund.

Inspectors examining vertical dry cask storage (NRC)



Entrance tunnel to Yucca Mountain (NRC)

Sources: U.S. NRC; U.S. DOE; Nuclear Energy Institute

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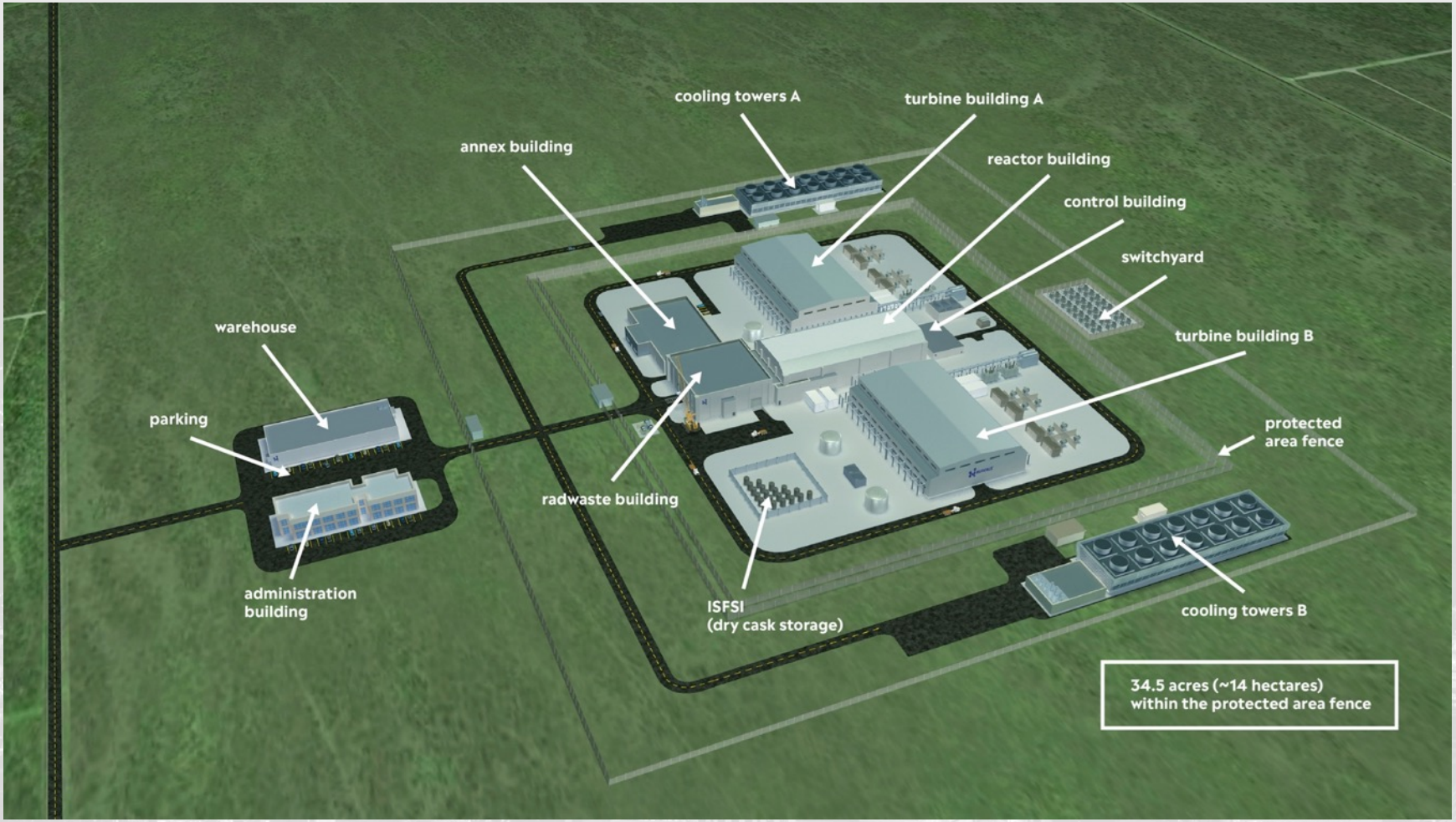
Plant Site Layout



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Used Fuel Recycling – A better option?

- Recycling used fuel could significantly reduce the burden of mining and disposing of spent fuel, making our nuclear fuel cycle more sustainable and further reducing the already-low carbon total footprint of nuclear power.

KEY FACTS

- **96% of the content of the used fuel is reusable energy**

Recycling used fuel:

- **Saves 25% of natural uranium resources**
- **Reduces the volume of high-level waste slated for disposal in a repository by 75%**
- **Reduces the waste's toxicity by about 90%**

Source: Framatome

- Recycled fuel, or mixed uranium-plutonium oxide (MOX) fuel, is a suitable fuel for the NuScale reactors.
- Recycling has been in successful use in several markets, such as France, for decades. Also, there are next generation designs that can utilize this used fuel in its reactors as a means to reduce the overall quantity.

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Current Progress in Commercialization: Licensing, Supply Chain, and Customers

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Design Certification Progress

- Design Certification Application (DCA) completed at the end of 2016
- Docketed and review commenced by U.S. Nuclear Regulatory Commission (NRC) in March 2017
- Phase 4 Review on schedule for December 2019
- Final Safety Evaluation Report on schedule for September 2019.

DCA stats

- 12,000+ pages
- 14 Topical Reports
- >2 million labor hours
- >800 people
- >50 supplier/partners
- Over $500M

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EPZ Sizing and Rulemaking Related to NuScale SMR

- **NuScale Topical Report TR-0915-17772**
  - "Methodology for Establishing the Technical Basis for Plume Exposure Emergency Planning zones at NuScale Small Modular Reactor Plant Sites," ML16067A090
- **Tennessee Valley Authority (TVA) Early Site Permit Demonstrates Site Boundary EPZ Possible for SMRs**
  - NuScale calculation package submitted with ESP application for Clinch river site.
  - Analysis provides basis for exemption from 10-mile EPZ. Shows any accident radiological impact would be limited to within site boundary as stated in NRC Staff Audit Summary Report (7/9/18)
- **Emergency Preparedness Rulemaking with Regard to Small Modular Reactors and Other New Technologies (RIN: 3150-AJ68; NRC Docket ID: NRC-2015-0225)**
  - Final rule and final guidance due to Commission - February, 2020

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The future of energy is here

NuFuel HTP2 Testing

One-third scale NIST-1 Test Facility

NuScale Control Room Simulator

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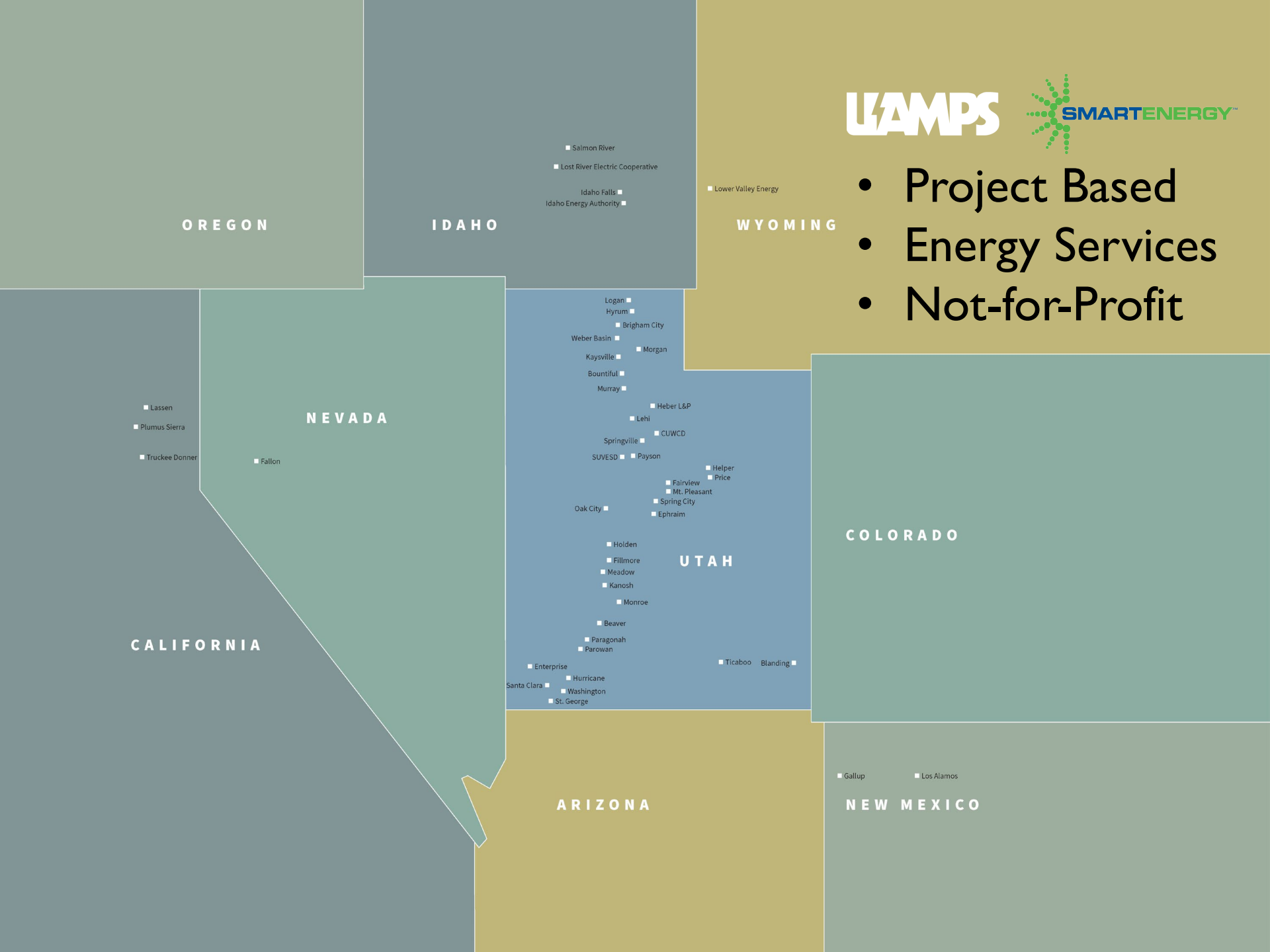
TACOMA PUBLIC UTILITIES
NOVEMBER 13, 2019

DESCRIPTION OF UAMPS

- UAMPS is an Energy Services Interlocal Agency
  - Not-for-Profit publicly owned utilities
  - 47 members in 6 Western states
    - Most are municipal electric utilities
    - Offer an array of various services and projects
      - Members are able to choose which projects they wish to participate
        - They are free to develop their own projects w/o the group

UAMPS SMARTENERGY


UAMPS
SMARTENERGY
• Project Based
• Energy Services
• Not-for-Profit
OREGON
IDAHO
WYOMING
NEVADA
CALIFORNIA
UTAH
COLORADO
ARIZONA
NEW MEXICO
Salmon River
Lost River Electric Cooperative
Idaho Falls
Idaho Energy Authority
Lower Valley Energy
Logan
Hyrum
Brigham City
Weber Basin
Morgan
Kaysville
Bountiful
Murray
Heber L&P
Lehi
CUWCD
Springville
SUVESD
Payson
Helper
Price
Fairview
Mt. Pleasant
Spring City
Oak City
Ephraim
Holden
Fillmore
Meadow
Kanosh
Monroe
Beaver
Paragonah
Parowan
Enterprise
Hurricane
Santa Clara
Washington
St. George
Ticaboo
Blanding
Lassen
Plumus Sierra
Truckee Donner
Fallon
Gallup
Los Alamos

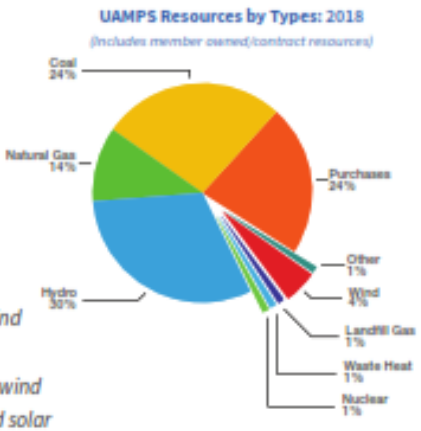
UAMPS PROJECTS

Generation Projects

Hunter Project – *coal-fired*
San Juan Project – *coal-fired*
IPP Project – *coal-fired*
Payson Project – *natural gas*
Natural Gas Project
CRSP Project – *hydro*
- **Provo River** - *hydro*
- **Olmsted** - *hydro*

Horse Butte Wind Project – *wind*
Firm Power Supply Project
- **Pleasant Valley Wind** – *wind*
- **Putua** – *geothermal and solar*
- **Red Mesa Tapaha** - *solar*

Veyo Heat Recovery Project – *waste heat*
Carbon Free Power Project – *small modular nuclear reactors*



Transmission Projects

Central-St. George Project
Craig-Mona Transmission Project

Service Projects

Pool Project – *dispatch and scheduling services*
Resource Project
- **Muddy Creek Waste Heat Study Project** – *waste heat*

Government and Public Affairs Project
Member Services Project

UAMPS APPROACH TO DECARBONIZATION: CARBON REGULATION IS A MATTER OF WHEN, NOT IF

- Provide cost effective solutions to decarbonize to its members
  - Approach assumes a decarbonized portfolio will be economically advantageous for its members
  - UAMPS platform provides member autonomy to select electric resource mix (60% decarbonized, 100% renewable, 100% clean energy) that meets their communities' needs
  - Carbon Capture and Sequestration not commercially viable
    - UAMPS existing coal assets are nearing the end of their economic lives—additional capital investment is speculative
  - Long Term Capital Investments focused on a flexible resource that can balance a system with a large penetration of renewables
    - UAMPS does have existing natural gas combined cycle which can be utilized as a flexible resource but not a zero carbon flexible resource

UAMPS SMARTENERGY

CFPP DEVELOPMENT HYPOTHESIS

- NuScale pursues Design Certification Application (DCA)
- UAMPS pursues development Combined Operating License Application (COLA)
- UAMPS pursues contractual subscription
- UAMPS, NuScale & DOE develop value proposition:
  - $55/MWh Economic Competitive Test as to a NGCC Plant
  - Flexible, resilient carbon free resource to integrate renewables
  - Project Development Risk: DOE 50%, 50% shared among UAMPS, NuScale, & Fluor on sliding scale
  - Construction Risk: shared, via EPC, UAMPS, NuScale, & Fluor; mitigated via high level of design completion and construction planning; AP1000 lessons learned

UAMPS SMARTENERGY

CFPP TEAM

UAMPS	NuScale Power/Fluor	Energy Northwest	Department of Energy (DOE)
Nuclear Regulatory Commission	U.S. Congress • Bi-Partisan Support	State of Idaho	Tennessee Valley Authority

DOE SUPPORT

- **UAMPS finalizing renewal of existing 50/50 cost sharing arrangement with DOE**
  - 5 year term through 2024
  - $59.5 M UAMPS and $59.5M DOE
- **Memorandum of Understanding**
  - Joint Use Modular Plant (JUMP)
  - Power Purchase Agreement
- **Site Support**
  - Site Agreement
  - Seismic Study (SSHAC)
- **NuScale Support**
  - $226M under original DOE award
  - $90M under recent awards

UAMPS SUBSCRIPTION EFFORTS

- Membership solicitation to enter into "hell or high water" power sales contracts commenced in January 2018
- Over 120+ public meetings with members participating in the project study
- Power Sales Contract became effective July 17, 2019
  - 35 participants
  - 213 MW

COST AND VALUE PROPOSITION

- Levelized Cost of Energy (LCOE)
  - Average cost of energy for 40 years
  - No higher than $55/MWh (2018$)
    - Projected Price Range $45-55/MWh (2018$)
- Competitive with NGCC at current natural gas prices
- Fits within the 100% clean power generation bills passed by California, Colorado, Nevada, New Mexico and Washington,
- Market based response to GHG, eliminates need for Federal Regulation
- Complements Electric Market Regulation (ISO/RTO)

COST AND VALUE PROPOSITION TO TACOMA

- CFPP fits within Washington SB 5116
  - E3 Northwest Capacity Study (2018) identifies capacity shortfall based on coal and gas retirements→ new NGCC needed for cost effective portfolio with low cost renewables
  - 2045 requirement to be off fossil fuels→ inadequate amortization period for new NGCC
  - CFPP, being cost competitive with new NGCC, provides an optimal resource to support Tacoma's resource diversification
    - Zero carbon flexible baseload resource
    - Geographic diversification
    - Resource diversification (additional carbon free resource that is not hydro)

TACOMA'S NEEDS TO EVALUATE THE CFPP

- What data/information would Tacoma need in order to evaluate the CFPP?
  - Handling of confidential information—potential to enter NDA

CFPP PROJECT LOCATION
IDAHO NATIONAL LABORATORY SITE

WATER RIGHTS

- Strategy: Secure water right options by late 2019
- Preliminary water analysis has identified potential water rights to be acquired from existing water right holders
  - Additional due diligence will be performed to understand available amounts due to change in use of water (agriculture industrial)
- Preliminary cooling option analysis has been performed—additional analysis to be performed to inform water acquisition amounts
  - Wet, evaporative cooling: 21,000 acre-feet
  - Dry, air cooled condensers; 2,000 acre feet
  - BOD is evaluating the economics of each decision expected by end of 2019


IDAHO
ENTERPRISE
HELLS CANYON
OXBOW
BROWNLEE
HORSE FLAT
WEISER
ONTARIO
EMMETT
LOCUST
LANGLEY GULCH
CALDWELL
HUBBARD
BOISE BENCH
DRAM
ANDERSON RANCH
BOWMONT
HEMINGWAY
RATTLESNAKE
JUSTICE
MT. HOME
C.J. STRIKE
DANSKIN
BENNETT MTN.
KING/ UPPER SALMON
TWIN FALLS
MIDPOINT
HUNT
ADELAIDE
WOOD RIVER
SPAR CANYON
ROUND VALLEY
SCOVILLE
LOST RIVER
AMPS
BORAH
BRADY
KINPORT
GOSHEN
ANTELOPE
JEFFERSON
BIG GRASSY
DRUMMOND
TARGHEE
TETON
SWAN VALLEY
PALISADES
CATTLE
CREEK
WOLVERINE
3 MILE KNOLL
MONSANTO
SODA
GRACE
ONEIDA
DON
AMERICAN FALLS
MINIDOKA
POPULUS
SUNBEAM
MALAD
TREASURETON
SALMON
TENDOY
AGENCY
PETERSON FLATS
DILLON
SHERIDAN
BOZEMAN
JACK RABBIT
ENNIS
FRANNIE
GARLAND
BIG GEORGE 1
OREGON BASIN
CARTER MTN.
GRASS CREEK
HAMILTON DOME
PILOT BUTTE
RIVERTON
WYOP
ATLANTIC CITY
JIM BRIDGE
SHUTE CREEK
BLACKS FORK
WESTVACO
FONTENELLE
NAUGHTON
RAVEN
MONUMENT
ROCK SPRINGS
FIREHOLE
BRIDGER PUMP
SOUTH TRONA
UINTA WIND RAILROAD
BIRCH CREEK
BEN LOMOND
WHEELON CUTLER
SYRACUSE
TERMINAL
MIDVALLEY
FLAMING GORGE
GETCHEL
ROVADA
RABBIT CREEK
INDEPENDENCE
HUMBOLDT
COYOTE CREEK
VALMY
BOULDER BASIN
EIGHT MILE CREEK
WELLS
ADOBE
QUARY
BARRICK
CARLIN
MAGGIE CREEK
ELKO
LONE TREE
FALCON
T.S.

TRANSMISSION

- Transmission limitations exist from Eastern Idaho to WA and OR loads
- Opportunities for energy and capacity exchange
  - South Idaho Exchange
  - BPA/UAMPS/NW public power utilities
- Alternative to BPA participation in Boardman to Hemmingway transmission project

DEVELOPMENT WORK TO DATE SUMMARY

No fatal flaws have been identified

Continued development work will continue in a phased approach to minimize the cost of developing the CFPP as a resource option

Objective=Increase cost certainty before submitting COLA and further de-risk permitting by continued development work

PHASED DEVELOPMENT APPROACH

- Phased development approach
  - Budget monetary caps for each phase
- Cost estimates will be revised at the end of each phase
- Each participant has a unilateral right to exit the project at the end of each phase
- Budgets for each phase will be approved by the PMC before proceeding to the next phase
  - If budget exceeds cap then a Participant may withdraw
- Final right to exit the project will be at PMC decision to proceed to construction (2023)
- Each participant's governing board approval is required to proceed to construction

POWER SALES CONTRACTS OVERVIEW

- The Power Sales Contracts are based upon the power sales contracts for UAMPS' other projects
- New provisions added to address CFPP-specific items
- Most significant additions relate to the continued phased Development Work on the Project to the point in time when development is complete and the CFPP can move to construction
- Reviewed by the CFPP Legal Committee, including PMC Representatives, city attorneys and outside counsel

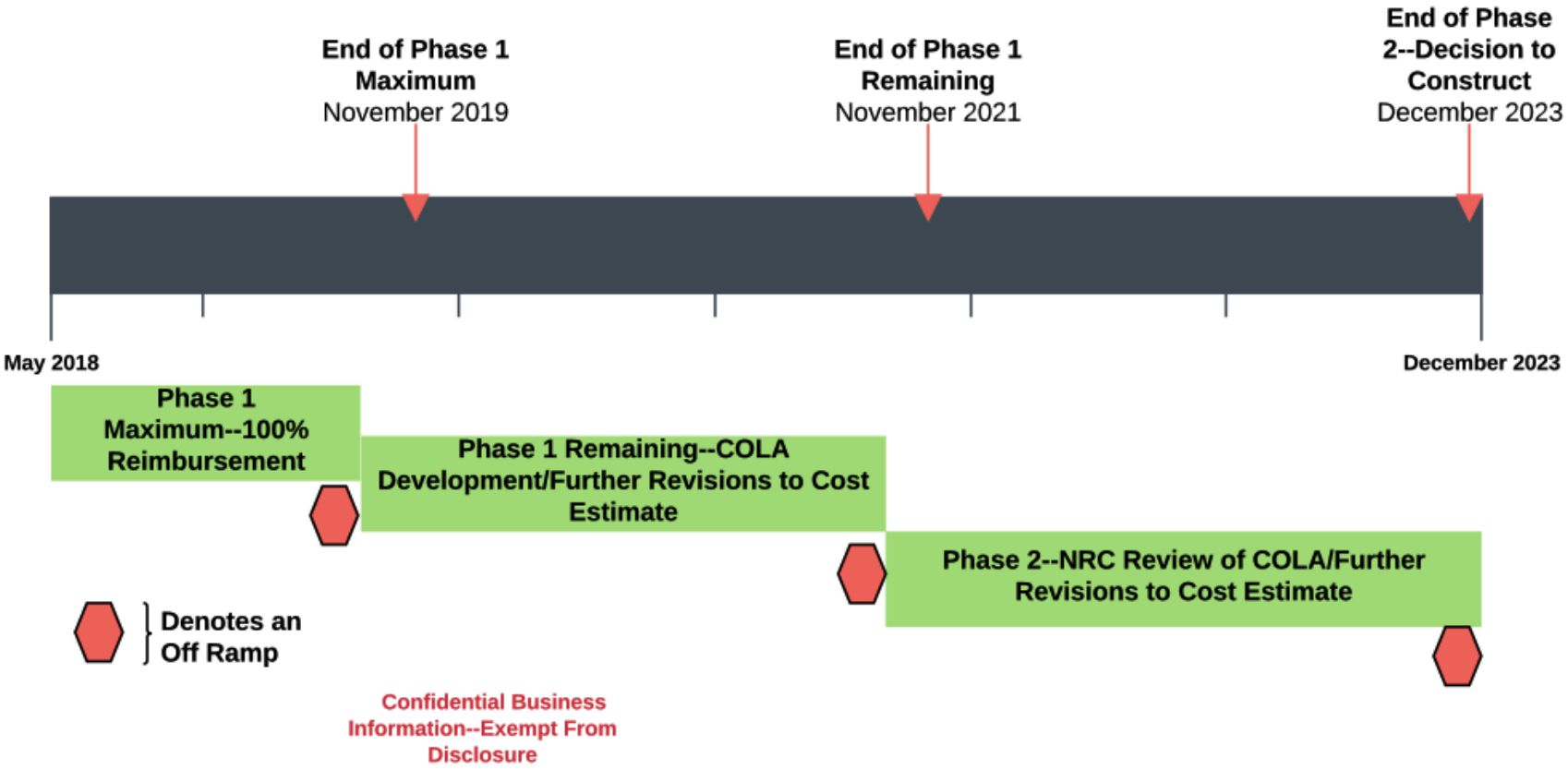
BASIC TERMS AND PROVISIONS

- "Take-or-pay" payment obligation, the Participants are obligated to pay the amounts due under the PSCs
- Payments made solely from each Participant's electric system revenues as an operating expense of the Participant's electric system
- Rate covenant, Participant agrees to charge and collect rates for electric service that produce revenues sufficient to meet its payment obligations under the PSC
- Step-up obligation, non-defaulting Participants can be required to take a portion of a defaulting Participant's Entitlement Share, subject to a maximum increase of 25%

PROJECT MANAGEMENT COMMITTEE (PMC)

- PMC has complete decision-making authority, including:
  - approve each Budget and Plan of Finance and all Project Agreements,
  - review of the results of each run of the Economic Competitiveness Test,
  - review and authorize all financings,
  - review and determine whether to submit the COLA, and
  - determine whether the Project is feasible or whether it should be terminated or suspended
- Certain decisions are required to be made by a Super-Majority Vote (75% by number and Entitlement Share)

CFPP Development Phases



HOW TO PARTICIPATE

UAMPS Membership

Power Purchase Agreement

- Same terms as membership

Undivided Ownership

Other

- Power Marketer or hedge funds

QUESTIONS

Tacoma Power

Energy Risk Management/Power Supply Update – Q3'2019

Ying Hall
Energy Risk Manager

Todd Lloyd
Assistant Power Manager, Resource Operations & Trading

November 13, 2019

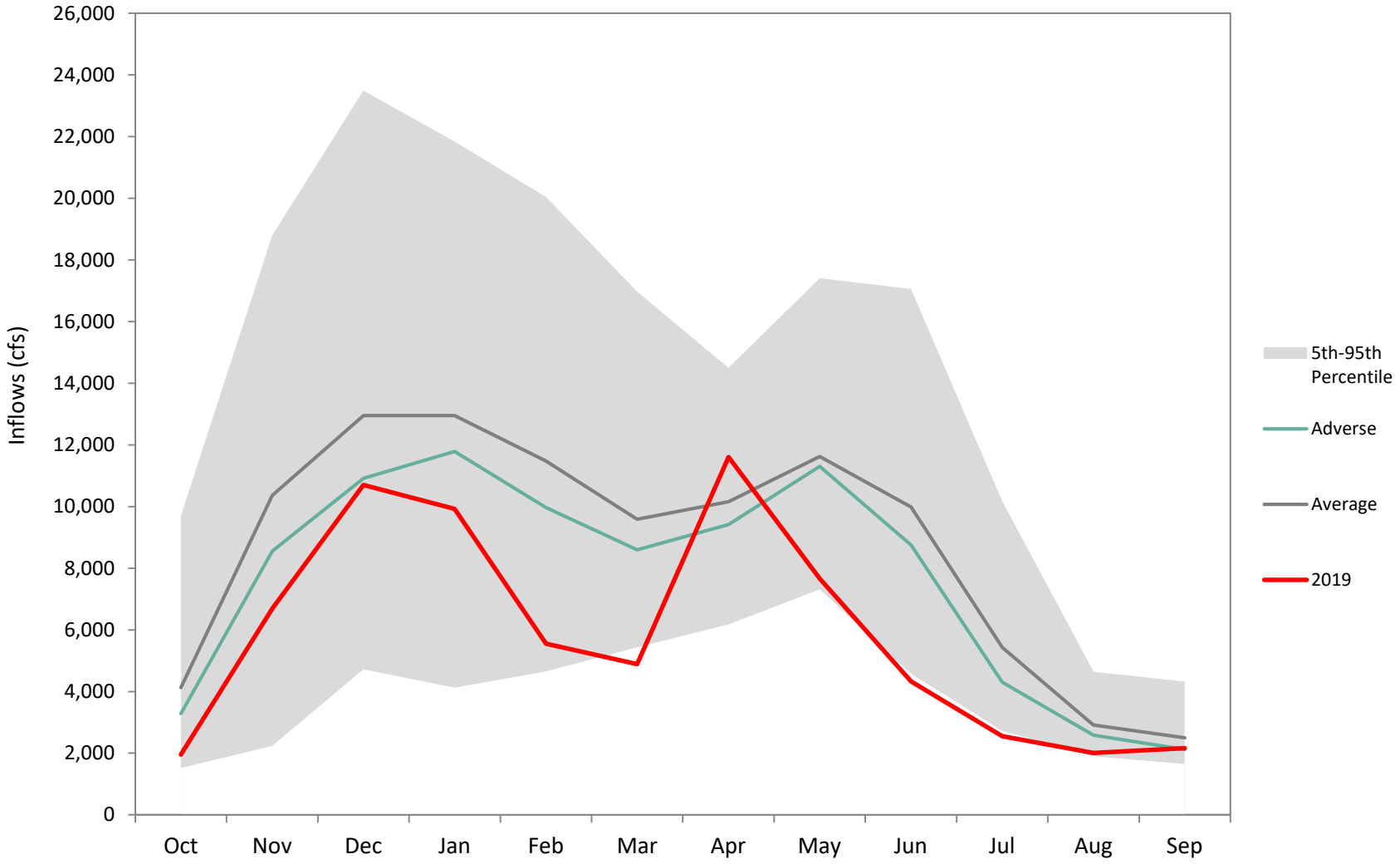
TACOMA POWER
TACOMA PUBLIC UTILITIES

Power Supply

Section 1

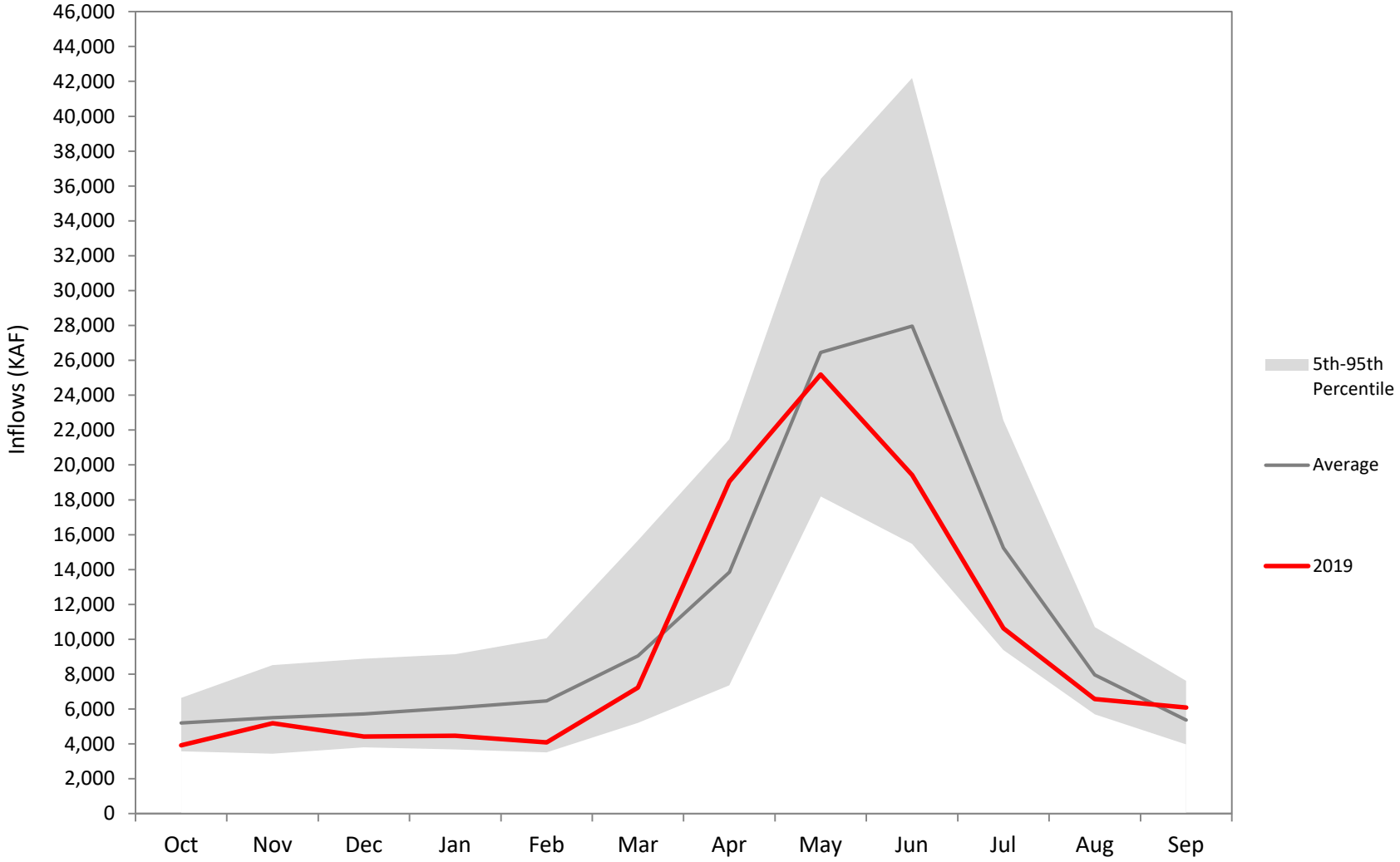
Graph 1: Tacoma System Flows at 6th Percentile for Water Year 2019

(Tacoma System Hydro Flows, Water Year 1929 – 2019)



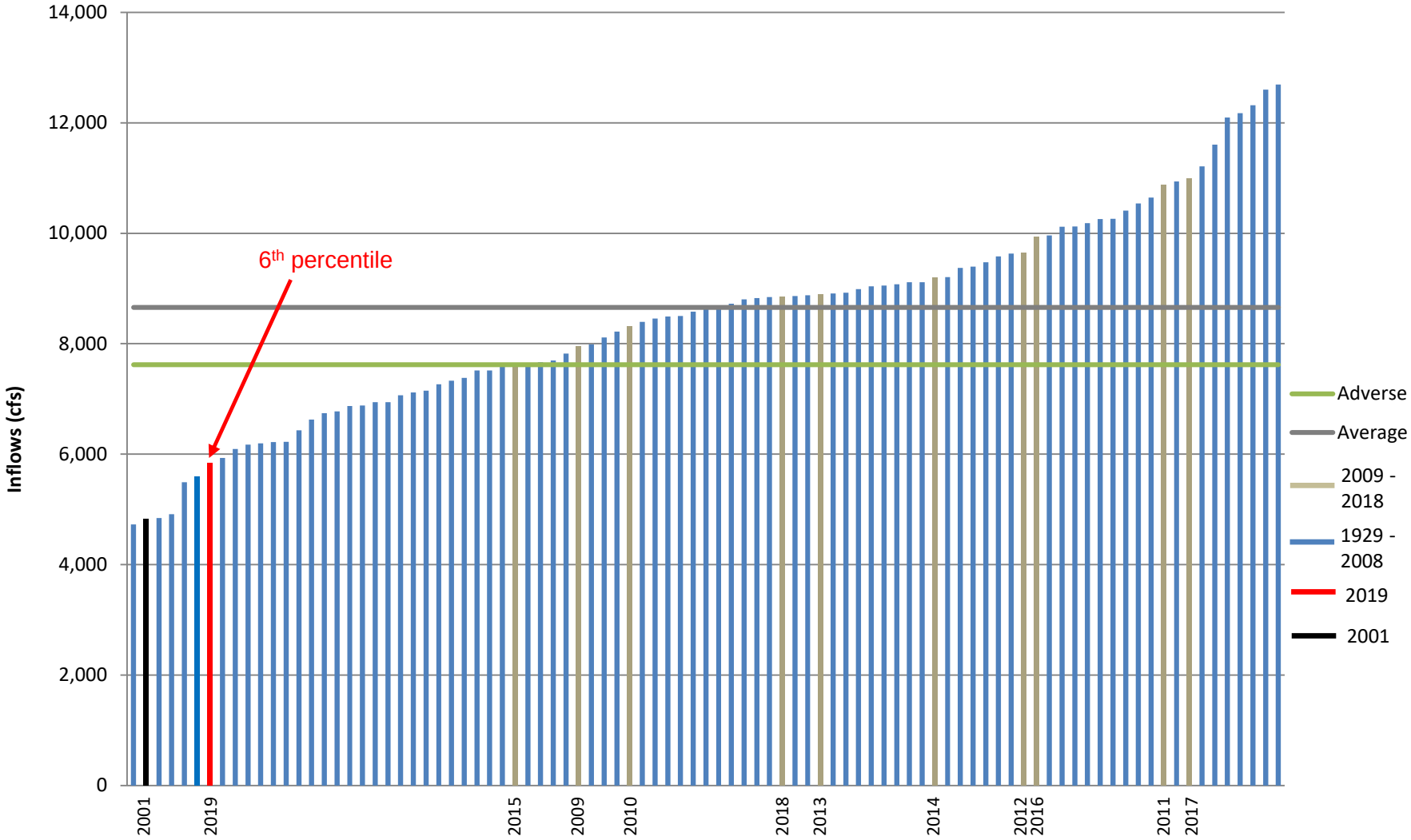
Graph 2: Federal System Flows 90% of Average (22nd percentile)

(Federal System Hydro Flows, Water Year 1961 – 2019)



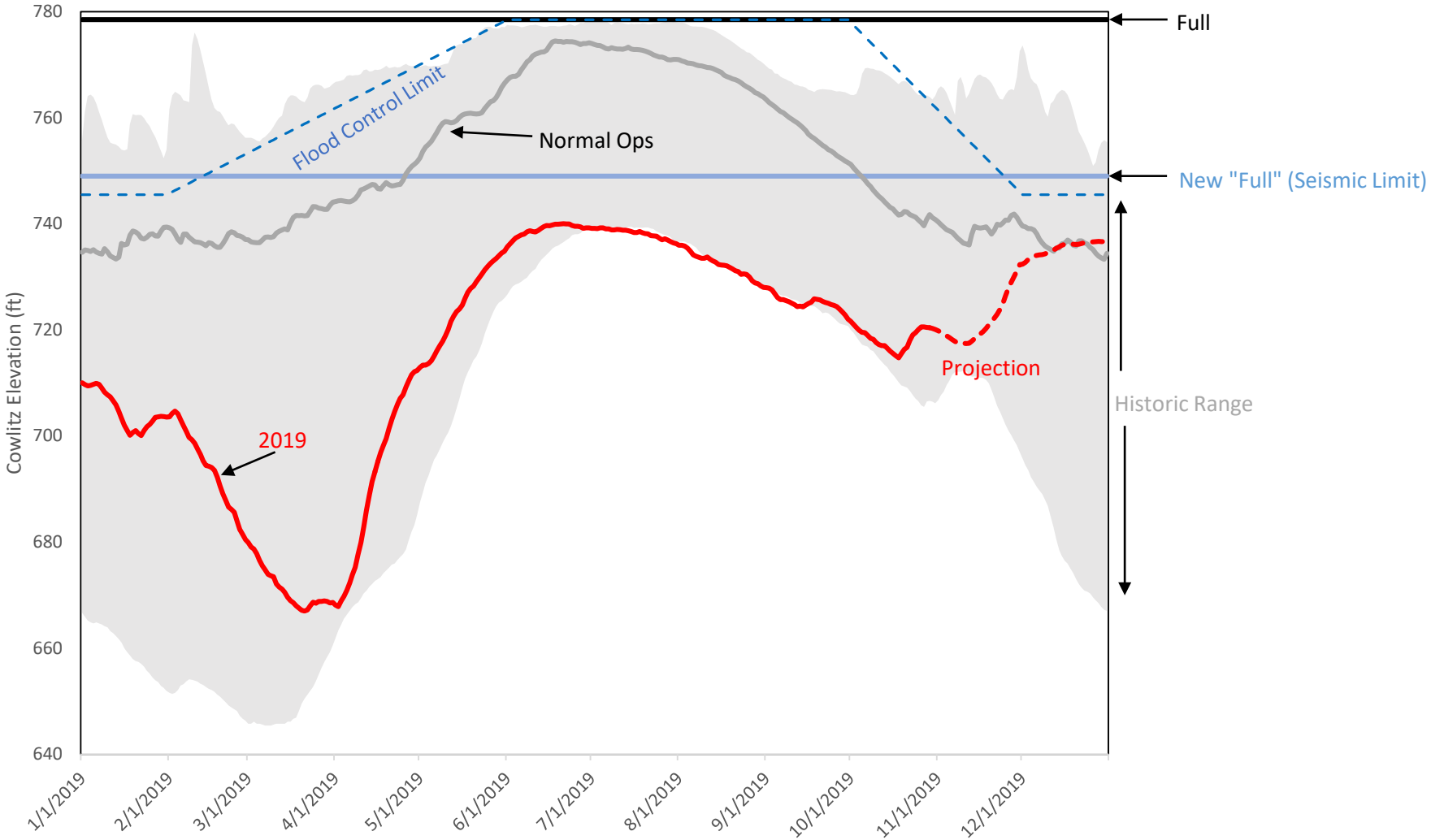
Graph 3: 2019 Tacoma System Flows were Near Lowest on Record

(Tacoma System Flows Annual Avg., Water Year 1929 – 2019)



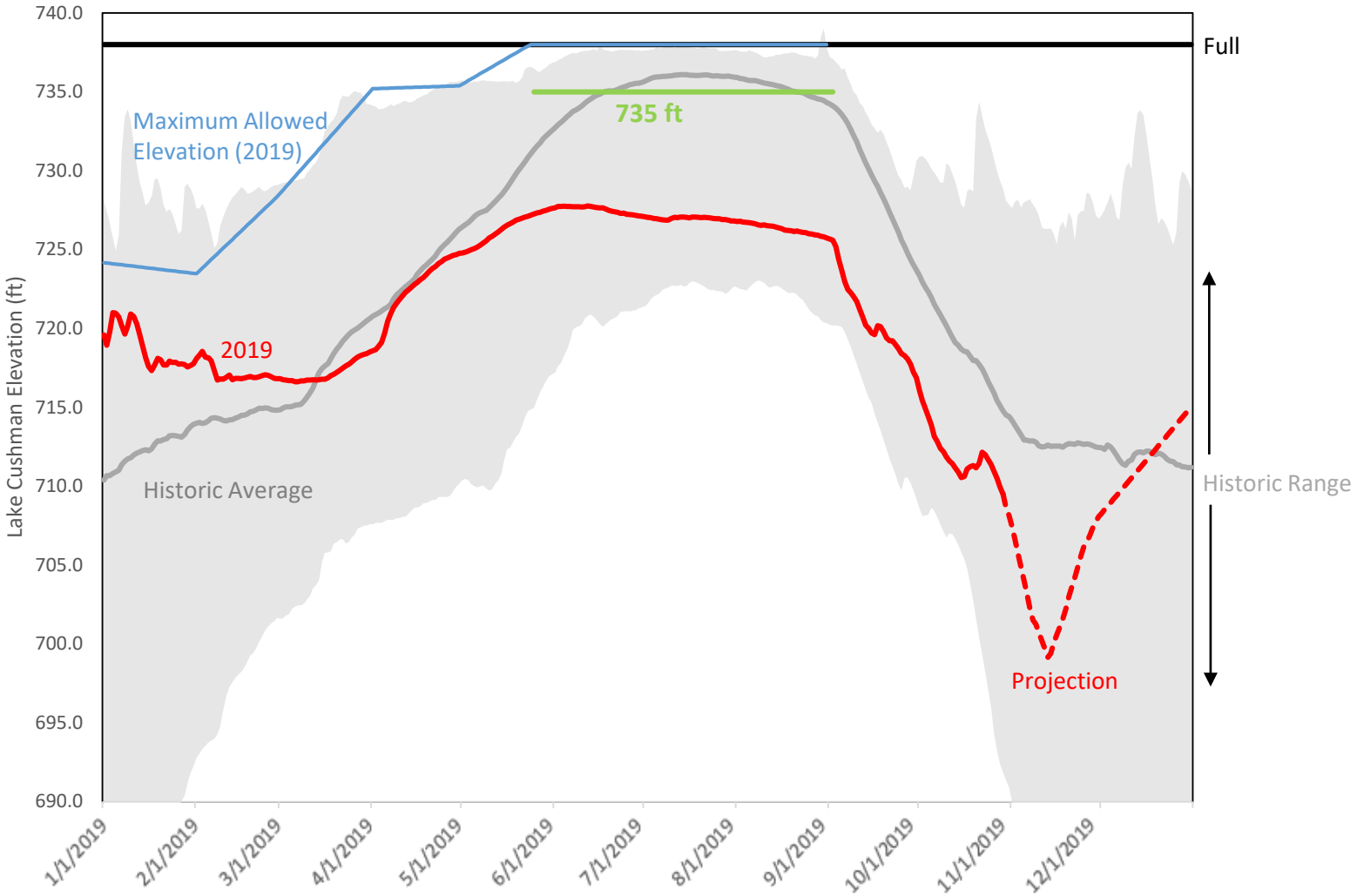
Graph 4: Cowlitz is Projected to Reach Normal Levels by December

(Cowlitz Elevation, Current vs. Historic)



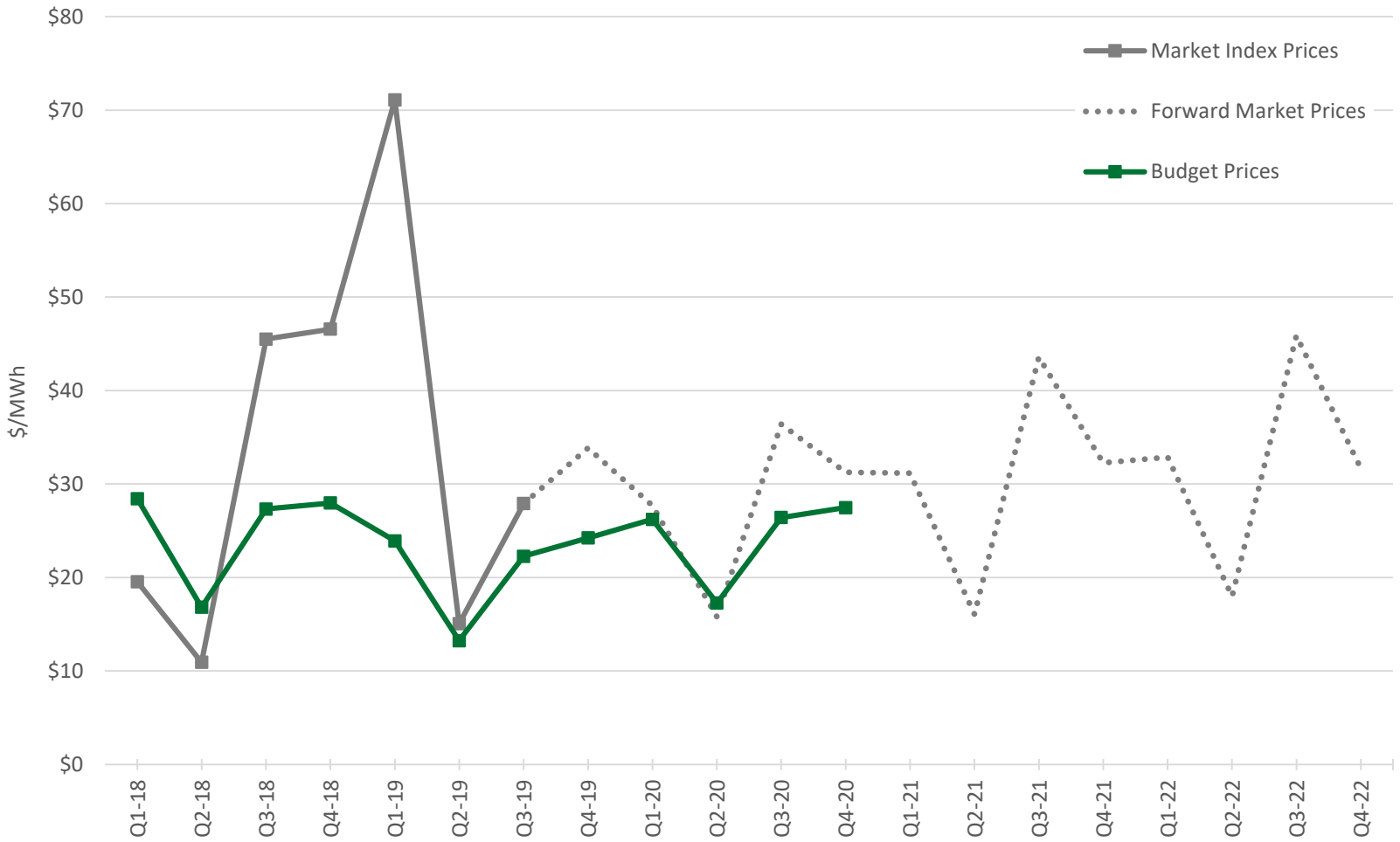
Graph 5: Lake Cushman Projected to Reach Normal Levels by Mid-Dec

(Cushman Elevation, Current vs. Historic)



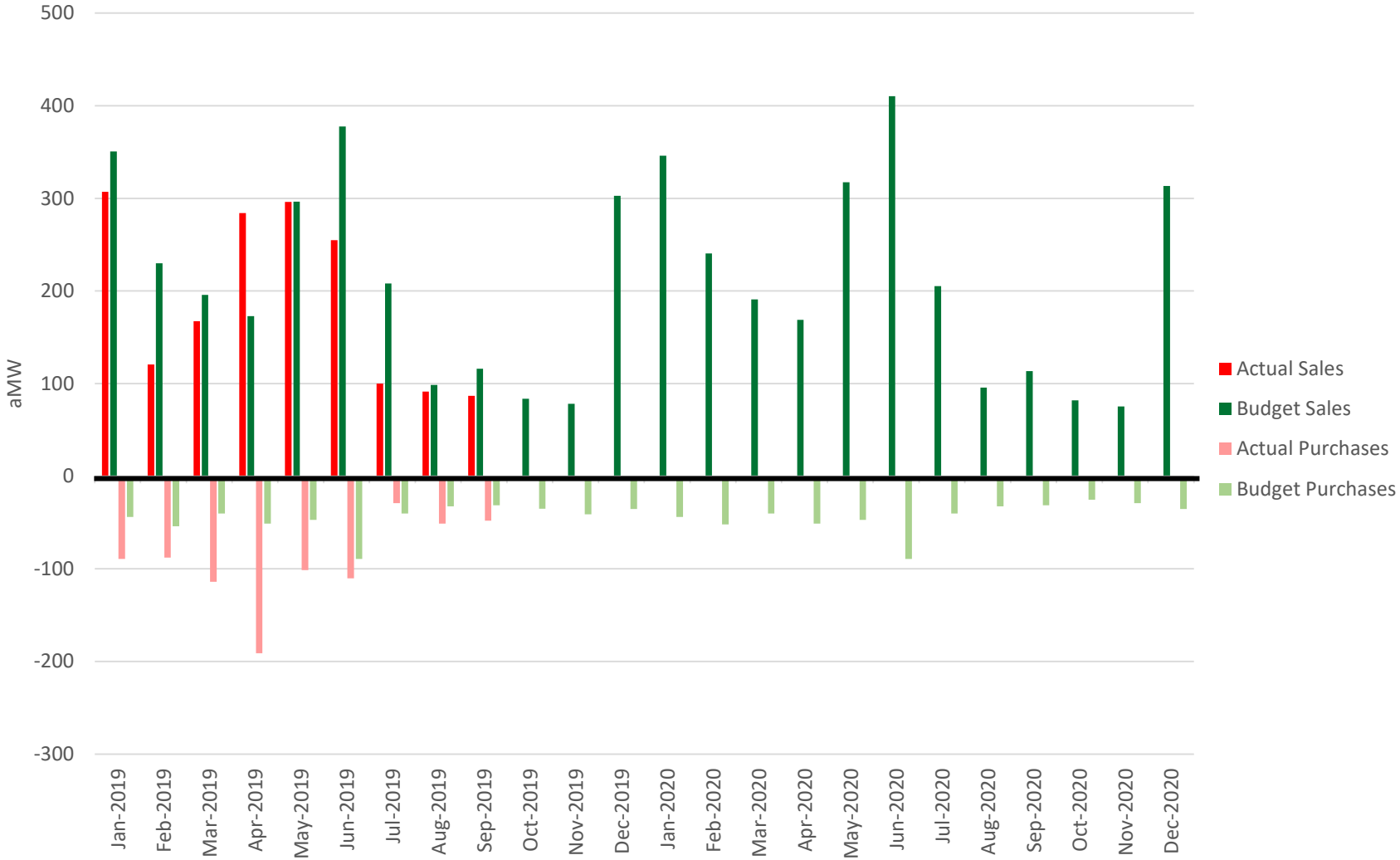
Graph 6: Market Prices are Near or Above Budget

(Market vs. Budget Prices, 2018 – 2022)



Graph 7: We've Been Selling Less than Budgeted, Purchasing More

(Actual vs. Budget Wholesale Volumes, 2019 – 2020)



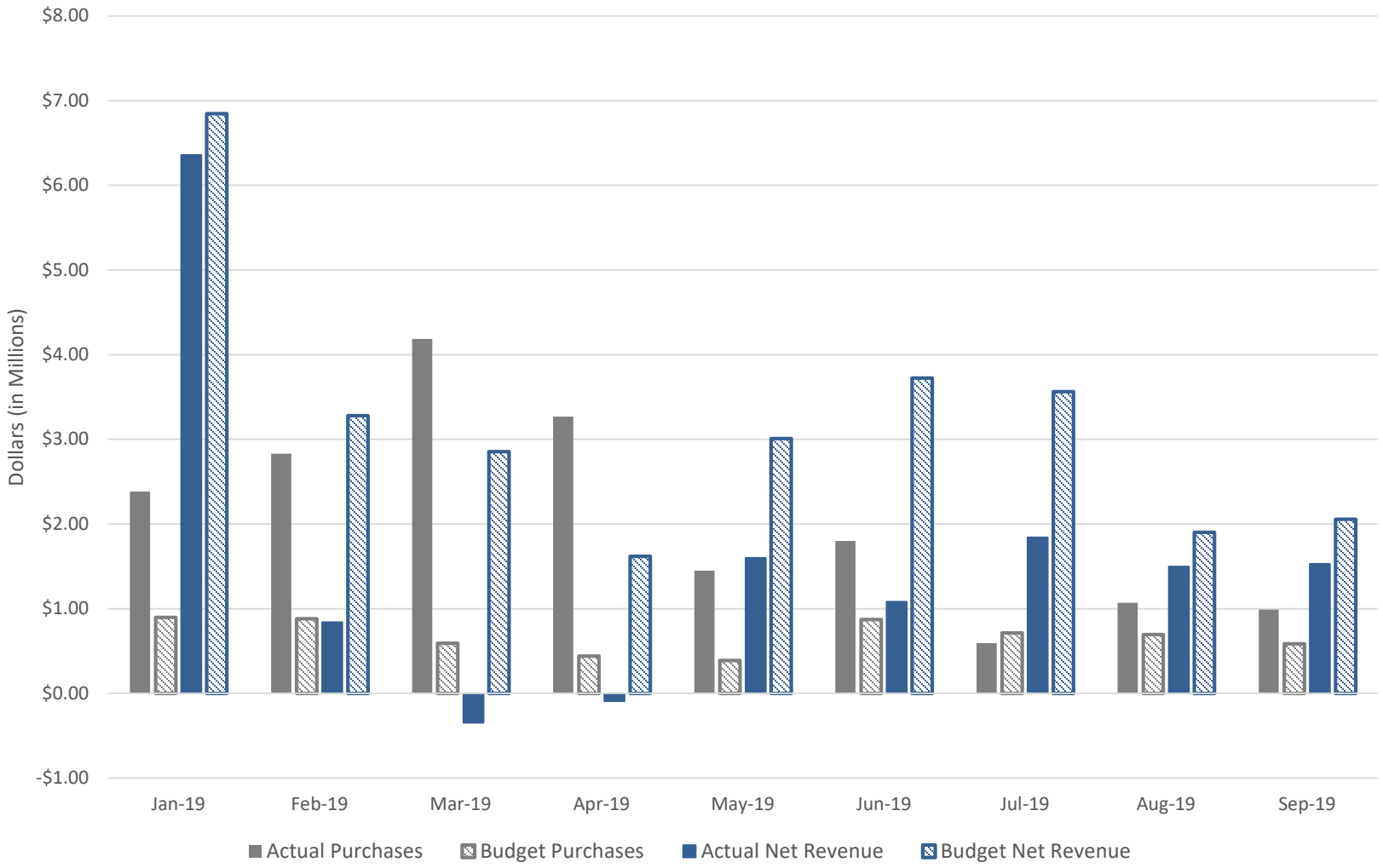
Wholesale Net Revenues

Section 2

Wholesale Net Revenues

Graph 8: Actual Wholesale Net Revenue is $14.6M Below Budget YTD

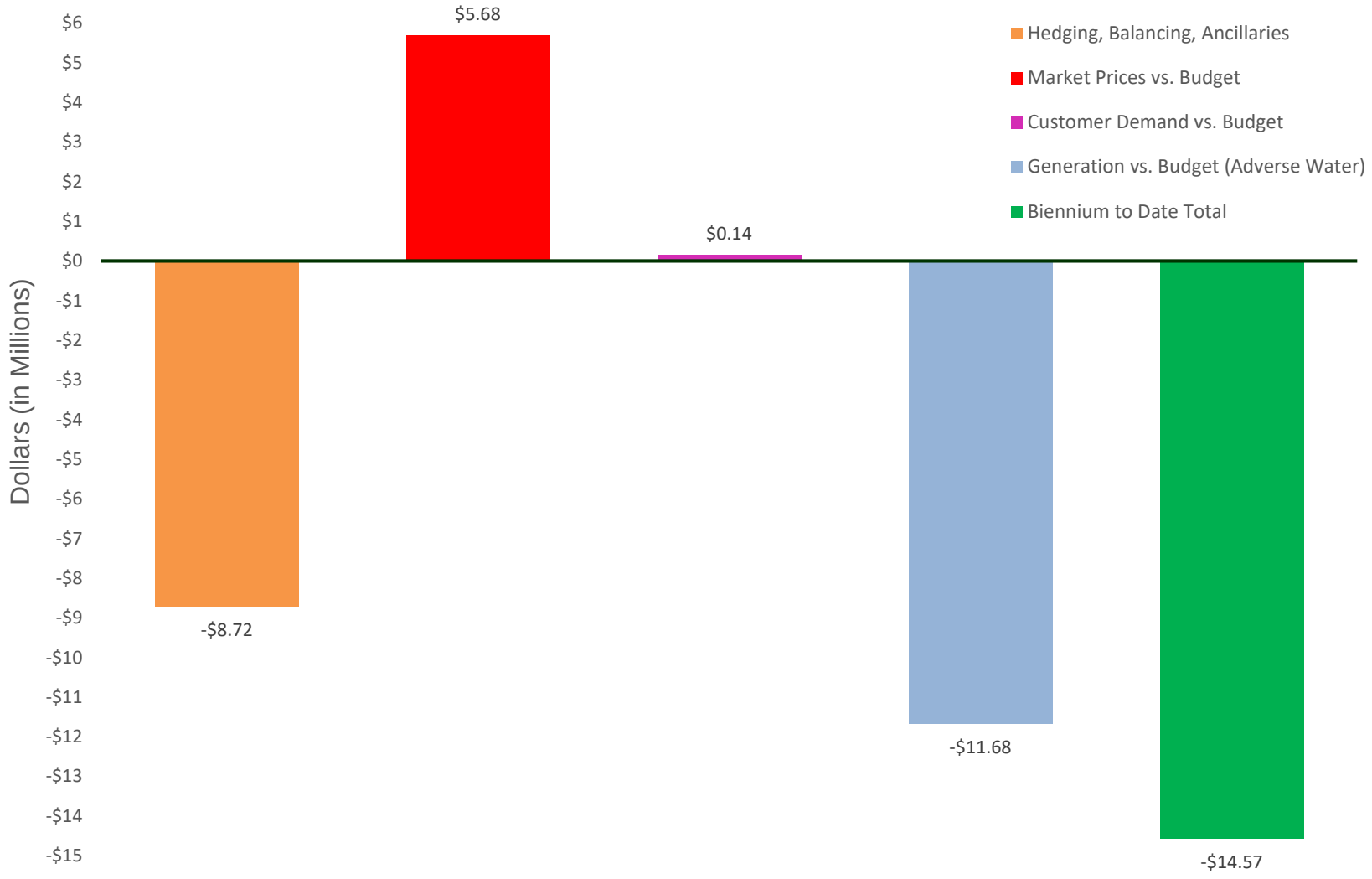
(Monthly Actual vs. Budget Wholesale Purchases and Net Revenues)



Wholesale Net Revenues

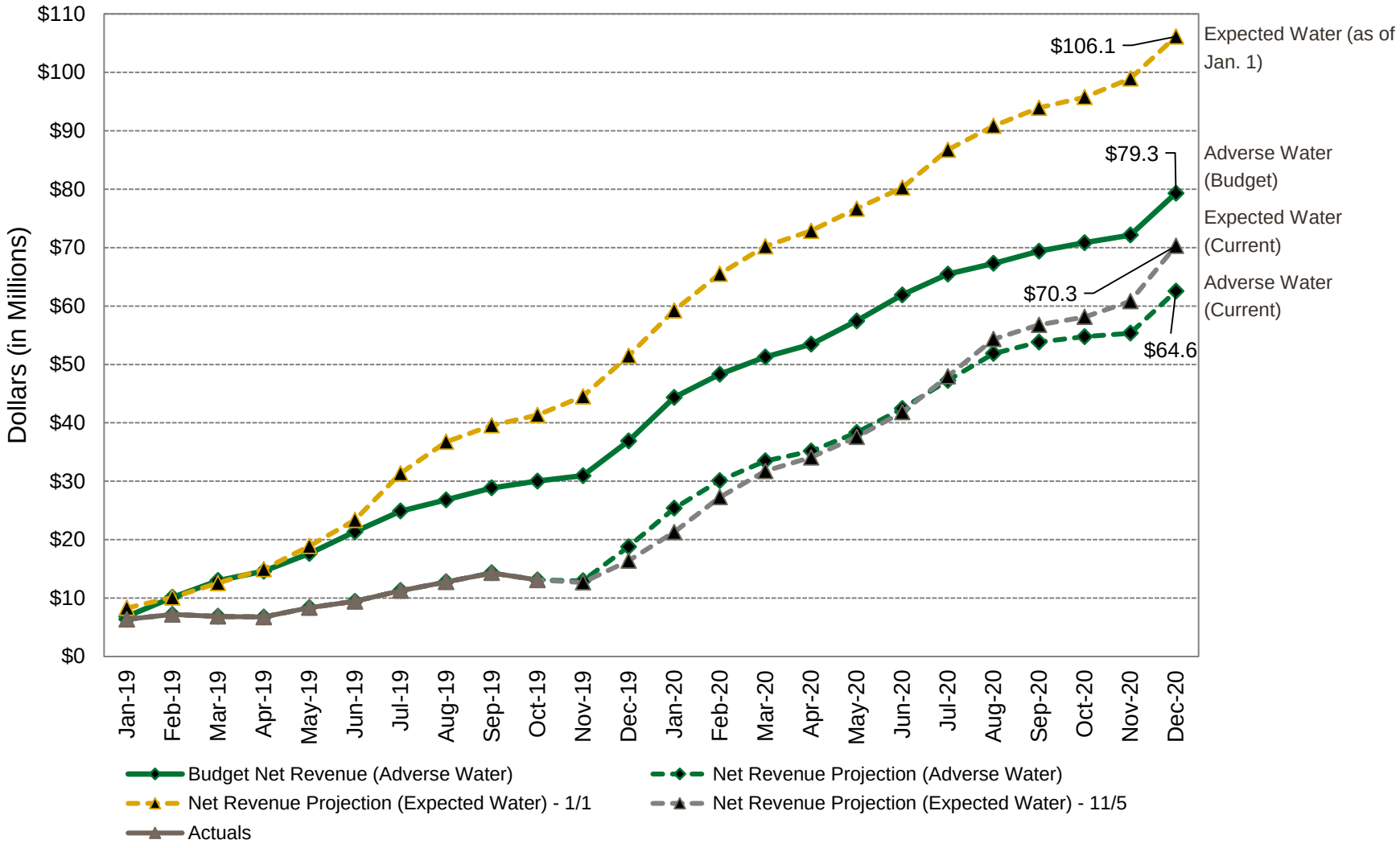
Graph 9: $14.6M Below Budget Due to Poor Hydro, Purchases

(Cumulative Wholesale Net Revenue Variance, Jan – Sep 2019)



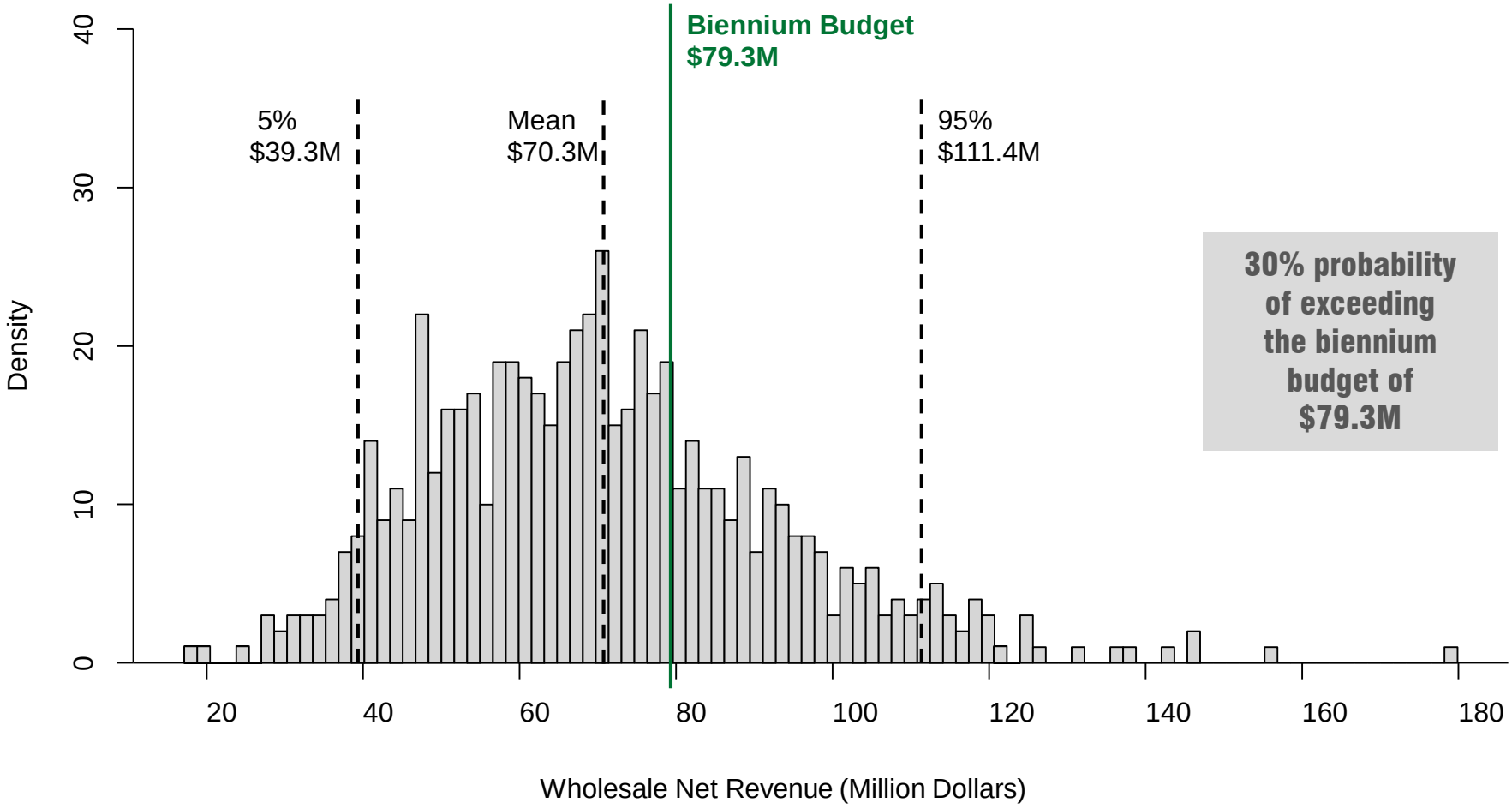
Graph 10: Low Q3 Revenues, Projections Below Budget

(Cumulative Actual vs. Budget Wholesale Net Revenues, 2019 – 2020)



Graph 11: Probability of Making Budget Has Decreased to 30%

(Risk Model Simulation of Biennial Net Revenues, 2019 – 2020)



Hedging Program & Credit Risk Management

Section 3

Overview

Hedging Program Objective

A hedging program is part of Tacoma Power's energy risk management policy.

The objective of the hedging program is to:

- ✓ Stabilize net revenues from wholesale operations
- ✓ Protect against very low wholesale revenue outcomes

Hedging Program Design

The hedging policy enforces dollar cost averaging of surplus sales and prohibits holding deficit positions.

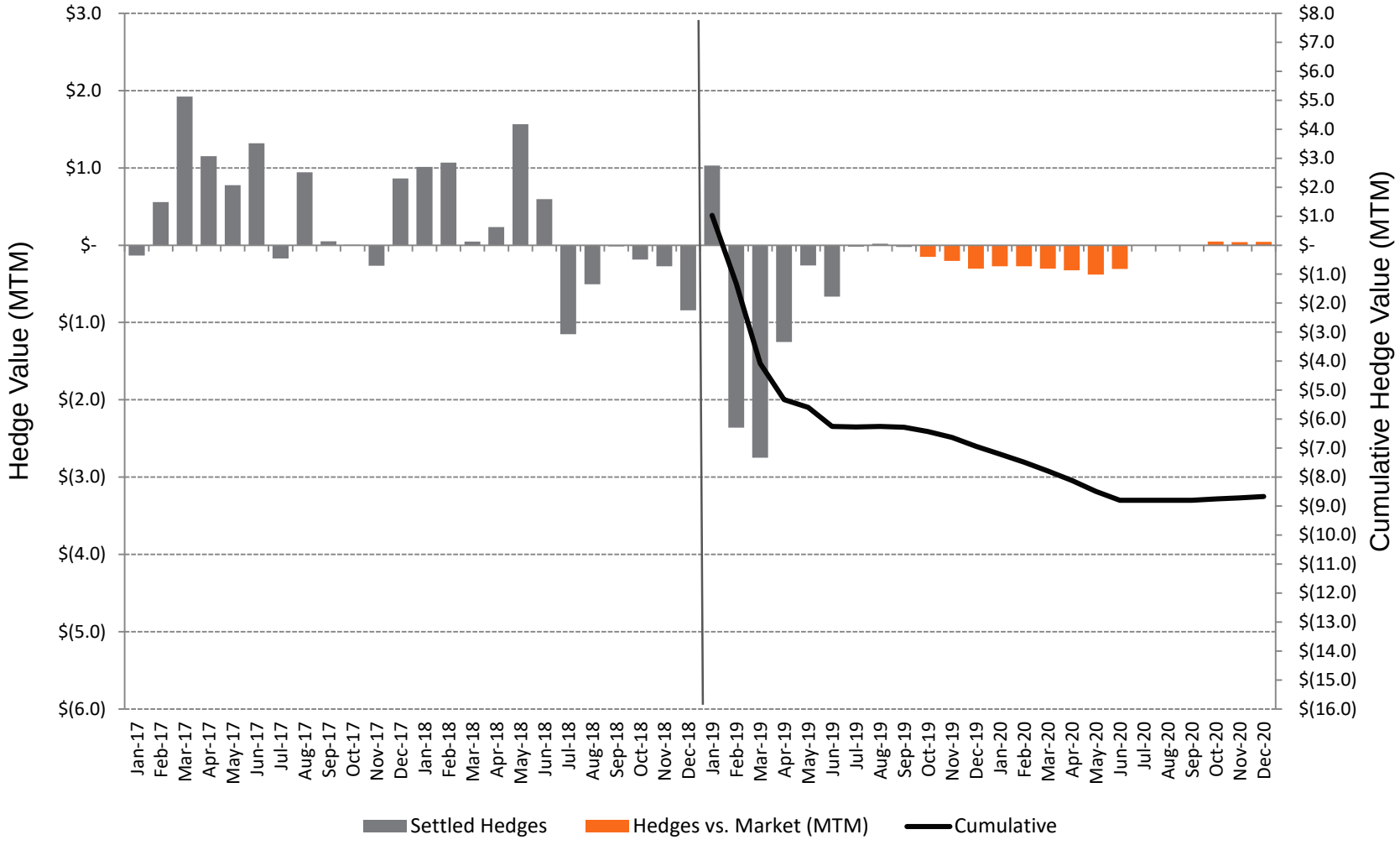
The program has a two year horizon, and utilizes physical forward contracts.

Allowable hedge ratio governed by "hedging bands" that:

- ✓ Limit the maximum amount hedged far into the future
- ✓ Require progressively more surplus be hedged as time to delivery gets closer

Graph 12: Current Hedging Program Values Are Not Typical

(Hedging Program, 2017 – 2020)



Overview

Background

- ✓ Tacoma Power frequently sells electricity to wholesale trading partners or "counterparties"
- ✓ Tacoma Power incurs credit exposure – money that the utility could lose in the event of a counterparty default

Credit Risk Management Program

Tacoma Power manages credit risk by:

- ✓ Extending credit to investment grade counterparties only
- ✓ Setting exposure limits based on creditworthiness
- ✓ Daily monitoring of credit quality
- ✓ Daily monitoring of exposure
- ✓ Actions include stopping trading with a specific counterparty, requesting collateralization

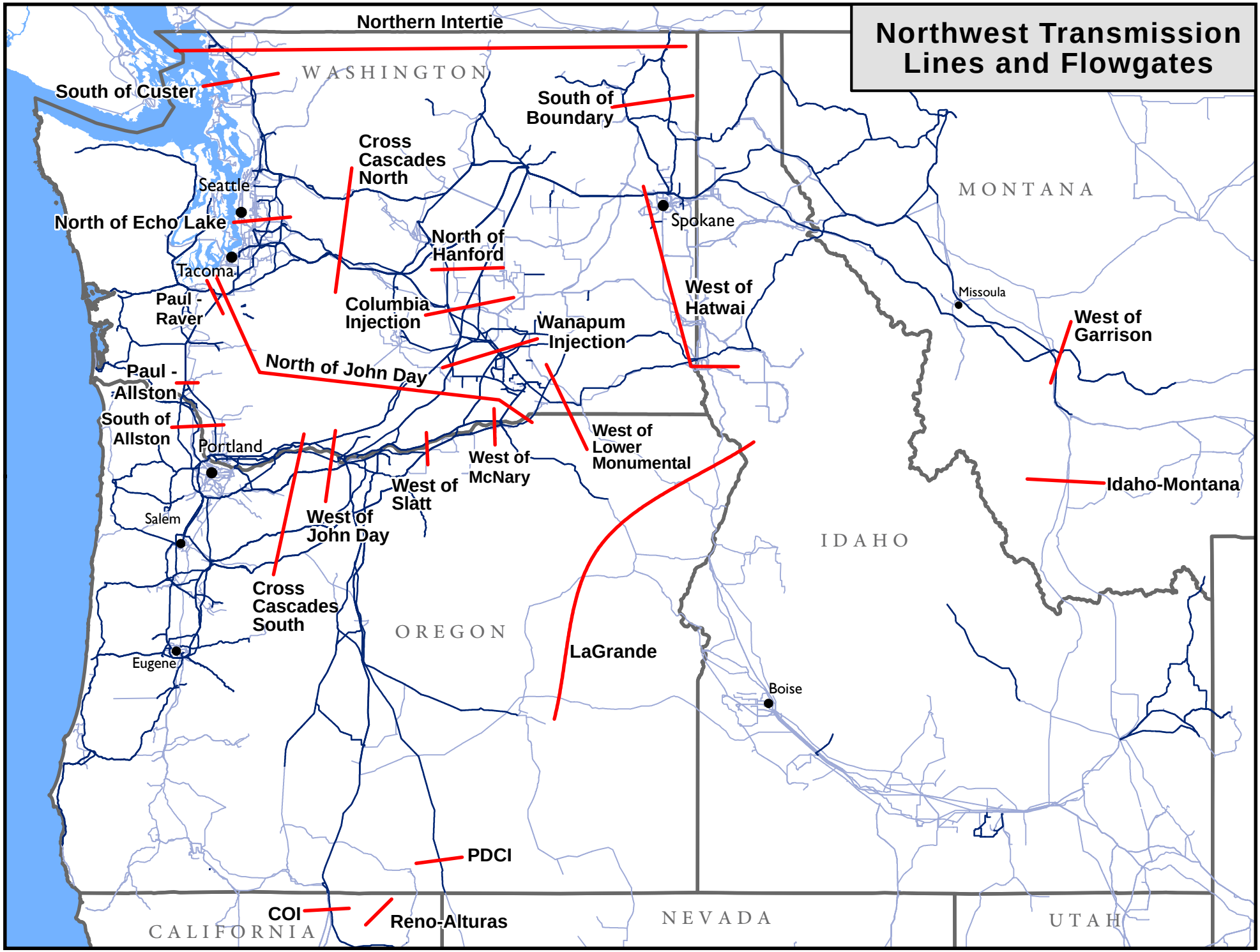
Graph 13: Current Credit Exposures Are at Typical Levels

(Top 10 Counterparty Credit Exposures)

Rank	Counterparty	Internal Model Rating	S&P/Moody's Rating	Loss in Event of Default
1	Puget Sound Energy, Inc.	BBB	BBB	$672,040
2	Portland General Electric Co.	BBB+	BBB+	$541,811
3	Powerex Corp.	A+	N/A	$503,164
4	Citigroup Energy, Inc.	A-	BBB+	$334,276
5	Eugene Water & Electric Board	A+	AA	$317,336
6	Avangrid Renewables, LLC	BBB+	BBB+	$212,354
7	California ISO	AA-	A+	$193,600
8	Sacramento Municipal Utility District	AA-	Aa3	$129,737
9	NorthWestern Energy	BBB	BBB	$27,550
10	Avista Corporation	BBB	BBB	$20,205

Wildfire Briefing

Section 4


Northwest Transmission Lines and Flowgates
Northern Intertie
WASHINGTON
South of Custer
South of Boundary
Cross Cascades North
Seattle
North of Echo Lake
Spokane
MONTANA
North of Hanford
Tacoma
Paul - Raver
Columbia Injection
Wanapum Injection
West of Hatwai
Missoula
West of Garrison
North of John Day
Paul - Allston
South of Allston
Portland
West of McNary
West of Lower Monumental
Idaho-Montana
West of Slatt
Salem
West of John Day
IDAHO
Cross Cascades South
OREGON
LaGrande
Eugene
Boise
PDCI
COI
Reno-Alturas
CALIFORNIA
NEVADA
UTAH
GIS Analyst: RLW Map Production Date: 6/23/2015

TPU Legislative Policies & Legislative Agenda

November 13, 2019

- Clark Mather, Community and Government Relations Manager
- Marian Dacca, State Relations Manager

TACOMA POWER TACOMA WATER TACOMA RAIL
TACOMA PUBLIC UTILITIES

Overview

- **TPU's Legislative Policies**
  - **TPU's legislative policies provide staff direction on a variety of utility-related issues**
- **TPU's Legislative Agenda**
  - **TPU's legislative agenda includes some of the specific policy outcomes that TPU staff will be seeking**
- **Upcoming schedule milestones**

Proposed Legislative Policies

- **Staff recommends maintaining TPU's current legislative policies**

- **Existing/proposed policies are consistent with City's Legislative Policies**

Proposed Federal Agenda

TPU-Wide

- Protecting/amending tax exempt financing

Water

- Support implementation of the Howard Hanson Dam – Additional Water Storage Project
- Support funding of the Water Infrastructure Finance and Innovation Act
- Support funding for the Drinking Water State Revolving Fund

Rail

- Support permanent extension of the '45G' tax credit
- Establish capital grant program for short line railroads

Proposed Federal Agenda

Power

- Increase funding for the Low Income Home Energy Assistance Program
- Provide funding for the Hydropower Incentive Program
- Support improvements to hydroelectric relicensing statutes
- Actively engage and seek to support proposals that decarbonize the economy at reasonable costs to customers and appropriately acknowledge the value of carbon-free hydropower
- Support proposals to improve BPA's cost competitiveness
- Support legislation to maintain control over pole attachments
- Support programs to improve broadband access for lower-income residents

Proposed State Agenda

Power

- Actively engage and seek to support proposals that decarbonize the economy at reasonable costs to customers and appropriately acknowledge the value of carbon-free hydropower

- Support efforts to treat all carbon-free resources in an equal manor

Water

- Support the Public Works Trust Fund

- Support Improvements to the Underground Utility Damage Prevention Act

Rail

- Support Tacoma Rail's application for funding through the State Rail Grant Program

What's Ahead…

PUB Study Session – Legislative Policies & Agendas

- Wednesday, November 13, 2019

Scheduled PUB adoption of Legislative Policies & Agendas

- Wednesday, December 4, 2019

Joint staff presentation on City-wide legislative agendas to Joint PUB/Mayor & Council Study Session

- Tuesday, December 10, 2019

Scheduled Mayor & Council adoption of City-wide legislative agendas

- Tuesday, December 10, 2019

2020 State Legislative Session

- 2020 Legislative Session: Monday, January 13, 2020
  - » *Short Session,* scheduled for 60 calendar days

Contacts

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State Relations Manager

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TACOMA POWER TACOMA WATER TACOMA RAIL
TACOMA PUBLIC UTILITIES

TPU Legislative Policies – current and proposed for future

TPU General Issues – Comprehensive

- TPU supports consistency between federal and state policies affecting utilities.
- TPU supports economically sound policies that encourage and reward energy and water conservation and that assist efficiencies in utility delivery and use.
- TPU supports programs that assist lower-income customers.
- TPU supports policies for protection of the natural environment, including stream protection, and that support public stewardship of fishery resources and wildlife habitat.

TPU General Issues – Federal

- TPU supports policies that allow for and protect tax-exempt financing for publicly-owned utilities.
- TPU supports federal cybersecurity policies that complement utility actions to deter cyberattacks.

TPU General Issues – State

- TPU supports local control of municipal utilities and opposes unfunded mandates and mandated rate structures.
- TPU opposes the diversion by the State of utility tax revenues to non-related uses, as well as diversion of revenues intended for infrastructure financing assistance to non-related programs.
- TPU supports retention and protection of municipal utility lien authority.
- TPU supports the approval and funding of utility facilities and services consistent with state policies of growth management and regional efficiencies.
- TPU opposes authority for counties to impose taxes on utility service already subject to local utility or gross earnings taxes.
- TPU opposes policies that would shift the obligations of building and construction parties onto utility providers (including undergrounding utilities).

Tacoma Power – Comprehensive

- TPU supports consistent statutory recognition of hydropower as a renewable, emissions-free resource.
- TPU supports proposals for greenhouse gas emissions reduction that achieve the most efficient carbon emission reduction at reasonable cost to utility customers, and are market based, economy wide, and coordinated with regional or national strategies. If policymakers implement greenhouse gas reduction polices, they should appropriately acknowledge and credit hydropower as a carbon-free generating resource and recognize the role the electricity sector could play in reducing carbon emissions in the transportation sector. Any changes in federal or state policy must be sensitive to rate pressures, especially on lower income customers.
- TPU opposes the imposition by federal or state government of pole attachment requirements and ratemaking formulas.

Tacoma Power – Federal

- TPU supports retention of primary authority for energy reliability with the North American Electric Reliability Corporation (NERC).
- TPU supports efficiencies and streamlining of Federal Energy Regulatory Commission (FERC) hydropower licensing and relicensing policies.
- TPU supports reasonable regulation of trading markets, including under the Dodd-Frank Act, and accommodations for utilities by the Commodity Futures Trading Commission (CFTC).
- TPU opposes the imposition of regional power markets in the Pacific Northwest that would lead to additional jurisdiction by FERC and add costs to ratepayers.
- TPU supports modifications to, or related to, the Columbia River Treaty that would equitably distribute the power benefits gained from the Treaty between the United States and Canada.
- TPU supports policies that appropriately acknowledge and credit ongoing ratepayer investment in emissions-free hydropower electric generating resources.

Tacoma Power – State

- TPU supports reasonable amendments to reporting and portfolio statutes that would better recognize energy efficiency and renewable hydropower.
- TPU supports the recognition of energy efficiency in statutes, regulations, and codes relating to building construction and operation.
- TPU supports distributed generation policies that facilitate customer choice for on-site generation and provide utility flexibility to design equitable price structures that balance costs and benefits.
- TPU supports the development of evolving distribution level services and technologies.
- TPU supports in-lieu of tax payments to local governments by power generators that are predictable, equitable, and justified.
- TPU supports current law provisions on preemption of local land use, development regulations, or rights-of-way provisions dealing with location of transmission or distribution facilities or lines.
- TPU supports additional state funding that would make residential solar generation and community solar projects financially feasible for low-income customers and TPU's broader customer base.

Tacoma Water – Comprehensive

- TPU supports policies that assist public utilities in developing, upgrading, and maintaining infrastructure.
- TPU supports policies to protect drinking water sources and supplies, including requirements for spill prevention and reporting.

Tacoma Water – Federal

- TPU supports adequate funding of the Water Infrastructure Finance and Innovation Act (WIFIA).
- TPU supports adequate funding of the Drinking Water State Revolving Fund (DWSRF).
- TPU supports maintenance, enforcement, and funding of federal commitments related to the Howard Hanson Dam, including for downstream fish passage.

Tacoma Water – State

- TPU supports retention of the Public Works Trust Fund (Public Works Assistance Account) and continued use of its revenue streams for utility-related infrastructure financing, and opposes diversion of those funds based on inequitable considerations or formulas.
- TPU supports policies that recognize and protect the reasonable use of municipal water rights and allow for flexible mitigation options.
- TPU supports modernization of provisions on state water rights permitting, and opposes efforts to weaken notice requirements for such decisions.
- TPU supports adequate and reliable funding of water programs administered by the Departments of Ecology and Health.
- TPU supports policies encouraging regional water supply and delivery, and state assistance for small system consolidation. TPU is committed to participate with other governments in efforts to deal with comprehensive regional and state water management.

Tacoma Rail – Comprehensive

- TPU supports reasonable safety policies, and opposes proposals that would unfairly burden short line carriers or inhibit their shipment of materials and goods.
- TPU opposes policies that would inhibit the ability to serve its customers.
- TPU supports policies that recognize that rail transportation of freight and goods is the most effective, efficient, and environmentally friendly mode of transportation.

Tacoma Rail – Federal

- TPU supports retention and expansion of federal policies that would lead to infrastructure maintenance and construction, such as inclusion of funding programs for short-line rail infrastructure in the federal surface transportation reauthorization legislation or as stand-alone legislation.

Tacoma Rail – State

- TPU supports policies that would provide incentives for rail transportation and ongoing funding of grant and loan programs for rail infrastructure upgrades.

Click! – Comprehensive

- TPU opposes proposals to prohibit or inhibit the provision of telecommunications by municipalities.
- TPU supports reforms to federal retransmission consent policies that provide local cable operators an equal footing in negotiations on retransmission consent agreements.
- TPU supports net neutrality.

Proposed Tacoma Public Utilities 2020 Legislative Agenda

TPU-Wide – Federal

- **Protecting/amending tax exempt financing:** TPU supports legislation that promotes the availability of tax-exempt municipal bonds. TPU will support proposals that revoke recent changes relating to the advanced refunding of bonds. Tax exempt municipal bonds keep costs low for customers.

Tacoma Power – Federal

- **Increase funding for the Low Income Home Energy Assistance Program:** Tacoma Power continues to support federal appropriations for the Low Income Home Energy Assistance Program (LIHEAP).

- **Provide funding for the Hydropower Incentive Program:** Tacoma Power continues to support federal appropriations for the Department of Energy's Hydropower Incentive Program. The program provides payments to hydropower utilities, including Tacoma Power, for hydroelectric production that was added to an existing dam or conduit.

- **Support certain improvements to federal hydroelectric relicensing statutes:** Tacoma Power supports efficiencies and streamlining of the Federal Energy Regulatory Commission (FERC) hydropower licensing and relicensing policies, similar to bipartisan proposals put forward by Sen. Maria Cantwell and Sen. Lisa Murkowski in the 115th Congress.

- **Carbon reduction policies:** TPU will actively engage in and seek to support proposals that decarbonize the economy at reasonable costs to customers and that appropriately acknowledge and credit hydropower as a carbon-free generating resource.

- **Support proposals to improve BPA's competitiveness:** TPU will continue to support federal proposals to improve BPA's competitiveness. Specific examples include legislation that would more accurately allocate Federal Columbia River Power System (FCRPS) costs to BPA customers and authority to directly purchase carbon allowances as a result of wholesale power sales.

- **Support legislation to maintain municipal utility control over poles and pole attachment rate setting:** TPU supports legislation that would ensure that municipally-owned utilities maintain their historic authority to safely manage pole attachments on utility poles.

- **Support federal programs to improve broadband access for lower-income residents:** TPU will support federal programs, including the FCC's Lifeline Program, that help make broadband services more affordable for low-income residents.

Tacoma Water – Federal

- **Support implementation of the Howard Hanson Dam – Additional Water Storage Project:** Tacoma Water continues to support federal authorization, appropriations, and actions necessary to complete the Howard Hanson Dam – Additional Water Storage Project. Any federal action must respect federal/non-federal cost share agreements already in place. TPU believes Howard Hanson Dam fish passage and the Additional Water Storage Project are critical to salmon and orca recovery as a construction-ready project with broad impact.

- **Support full funding of the Water Infrastructure Finance and Innovation Act (WIFIA)**: Tacoma Water is supportive of appropriations to fully fund the Water Infrastructure Finance and Innovation Act (WIFIA).

- **Support funding for the Drinking Water State Revolving Fund:** Tacoma Water supports adequate appropriations for the Drinking Water State Revolving Fund.

Tacoma Rail – Federal

- **Support permanent extension of the Railroad Track Maintenance Credit:** Tacoma Rail supports permanent extension of the Railroad Track Maintenance Credit – or "45G" tax credit. Tacoma Rail receives about $250,000 in annual revenues from the 45G tax credit. Those funds have been used for a number of safety upgrades as well as to comply with unfunded federal requirements mandated by the 2008 Rail Safety Act.

- **Establish capital grant program for short line railroads:** Tacoma Rail seeks to work with Congress to establish a short line specific freight railroad state-of-good-repair program as part of the federal freight/rail title and other federal programs. Specifically, establishment of a competitive capital grant program for short line regional railroad infrastructure improvement projects.

Tacoma Power -- State

- **Carbon reduction policies:** Washington lawmakers have indicated that they will continue to focus on legislative solutions aimed at decarbonizing Washington State's economy. TPU will actively engage in and seek to support proposals that decarbonize the economy at reasonable costs to customers and that appropriately acknowledge and credit hydropower as a carbon-free generating resource.

- **Support equal treatment of hydropower:** Tacoma Power customers have invested in renewable, carbon-free hydroelectric generating facilities for decades. These facilities will continue to require significant reinvestment to ensure their future safe and reliable operation. During the 2019 Legislative Session, other renewable generating resources were given special tax treatment. TPU will continue to advocate for consistent tax

treatment or alternative approaches that support equal treatment of all renewable, carbon-free resources.

Tacoma Water – State

- **Support the Public Works Trust Fund:** More than 6.2 million Washington State residents, 85 percent of the state's population, get their drinking water from public water systems. Nationally, $4.8 trillion needs to be invested over the next 20 years to support a resilient system and keep up with aging water infrastructure. The Public Works Trust Fund (PWTF) is a crucial funding program for many communities around our state providing low-interest loans to help maintain vital public infrastructure. TPU supports public water systems and city partners in their request to fully restore funding to the PWTF.

- **Support improvements to the Underground Utility Damage Prevention Act**: The Underground Utility Damage Prevention Act, also referred to as the "Call Before You Dig Law," governs safe excavation practices near underground utility facilities. TPU supports the interim work of the Dig Law Safety Committee to bring forward four changes to update the current law.

Tacoma Rail – State

- **Support funding for East End Locomotive Facility:** The State of Washington administers both a grant program and a loan program designed to support freight rail capital needs. Tacoma Rail has applied for one project under the Freight Rail Assistance Program. If awarded, the funds would be used to help update the East End Locomotive Facility.