



Nuclear Power Upgrades

Planning for the future:
Columbia Generating Station
Extended Power Uprate

Tammi Oldham, EPU Dept. Manager
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Many ways to produce more Nuclear Power

- Build New Nuclear Plants
- Fuel & Core Optimization Uprates
- Extend Operating license
- Update Existing Nuclear: (focus of discussion)
 - MUR
 - Stretch
 - Extended Power Uprates
 - Thermal Efficiency Uprates

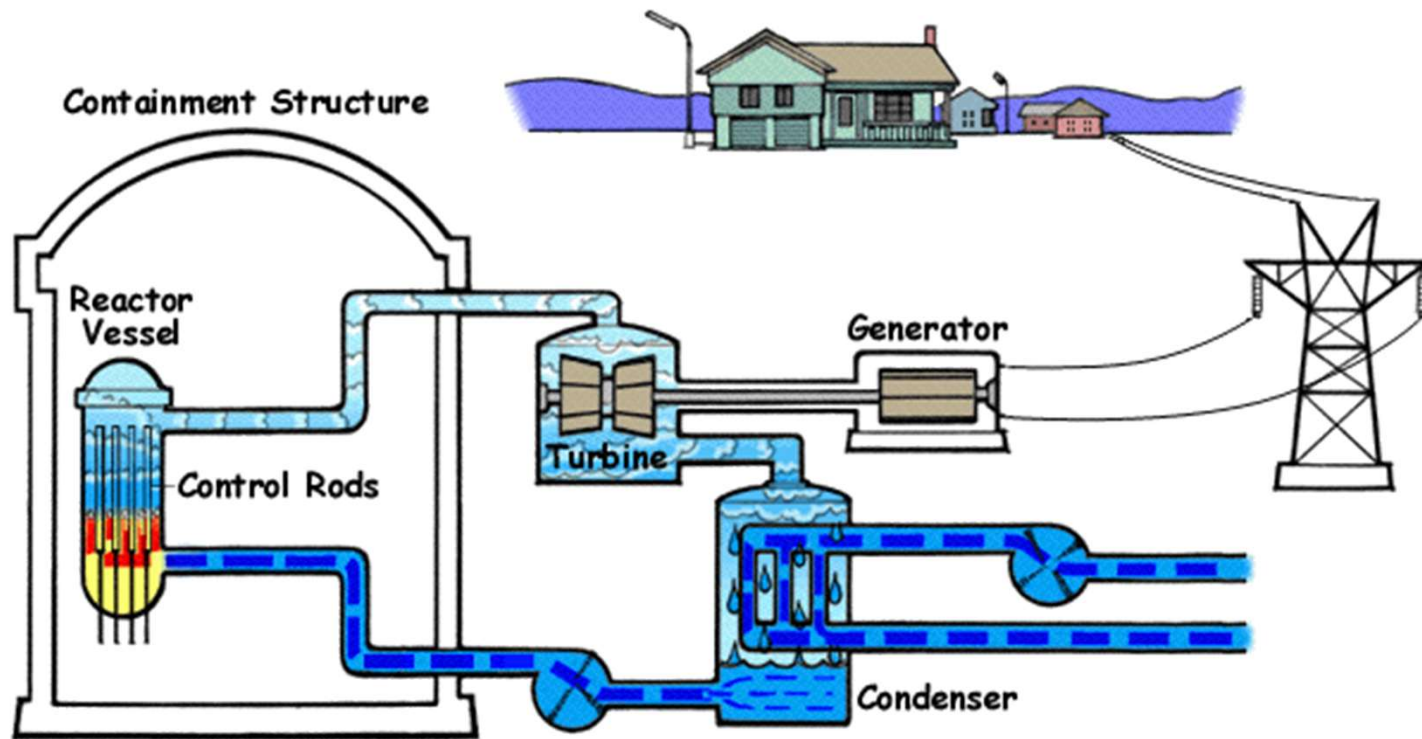
Who are we?

- Columbia Generating Station is a General Electric (GE) Boiling Water Reactor near Richland, Washington
- It is owned and operated by Energy Northwest, a Washington state Joint Operating Agency
- Columbia received its initial 40-year operating license from the U.S. Nuclear Regulatory Commission (NRC) in December 1983
- Energy Northwest has enhanced the station's value by increasing the licensed thermal power and extending the operating license, specifically:
 - Power generation uprates in 1994 and in 2017 to 3,544 MWt or approximately 1,207 megawatts electric
 - 20-year license extension to operate through December 2043
 - Subsequent license renewell

Boiling Water Reactor Steam Cycle

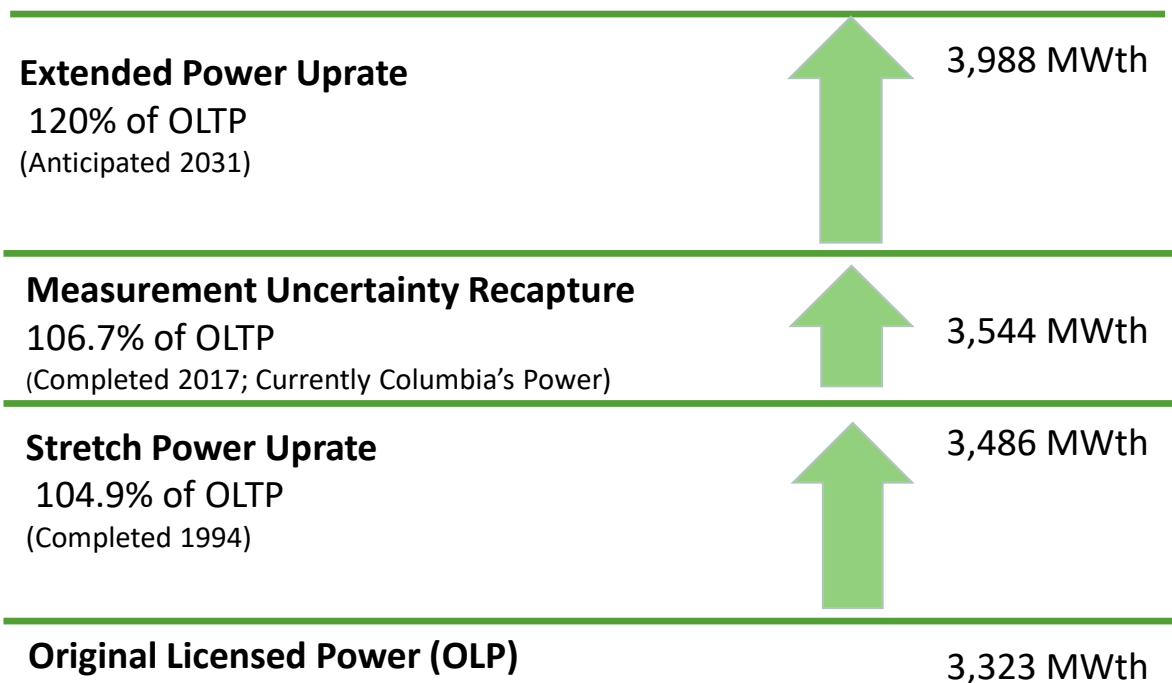
Thermal
Plants heat
water, to
make steam
and spin a
turbine and
generator

Thermal
Plants
deliver
power on
demand

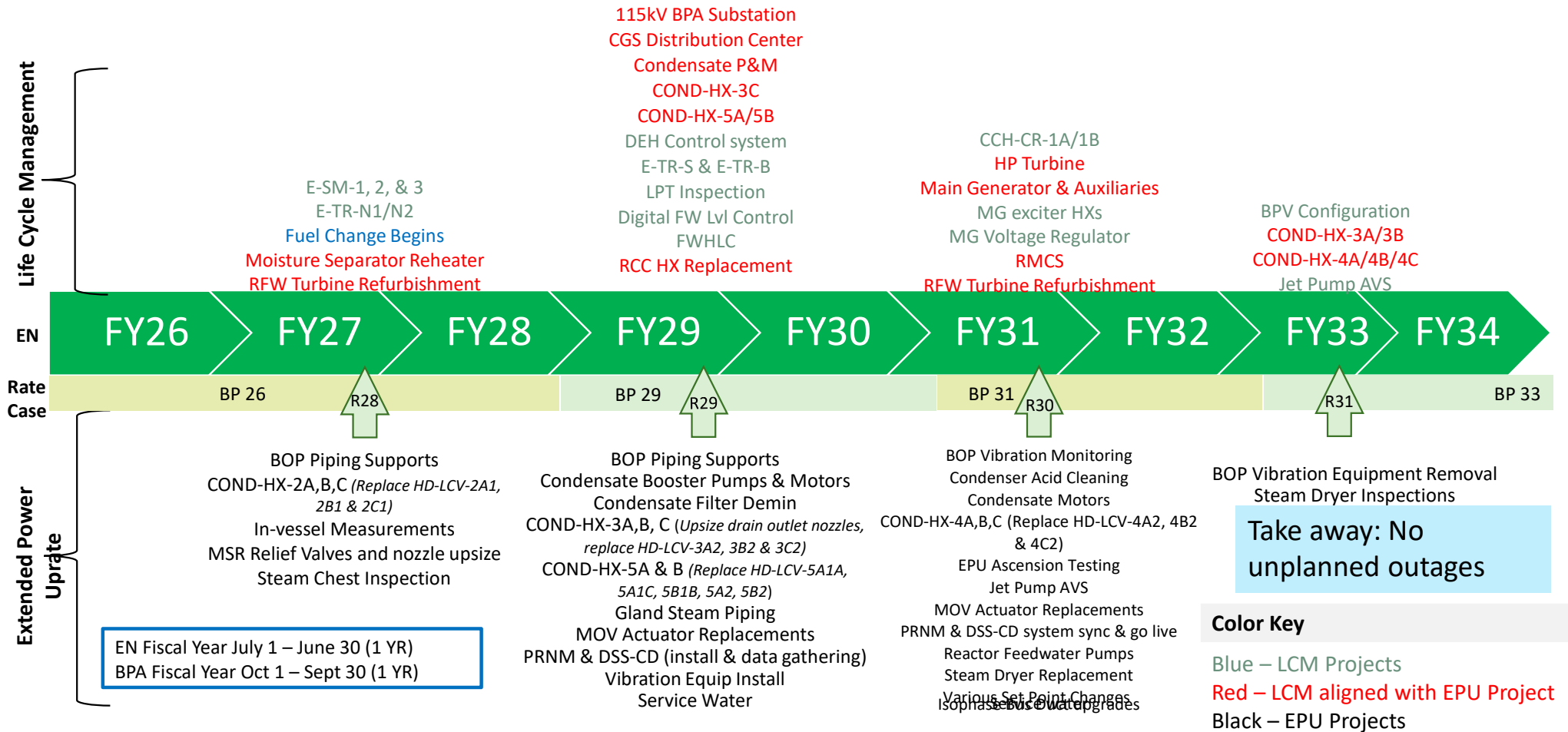


Columbia's Power Uprates

- Columbia's current Gross Generating Capacity Following the *Measurement Uncertainty Recapture* in 2017 is 1,207 MWe
- With the implementation of the *Extended Power Uprate and efficiency improvements*, Columbia is anticipated to have an output of ~1,393 MWe post 2031 outage



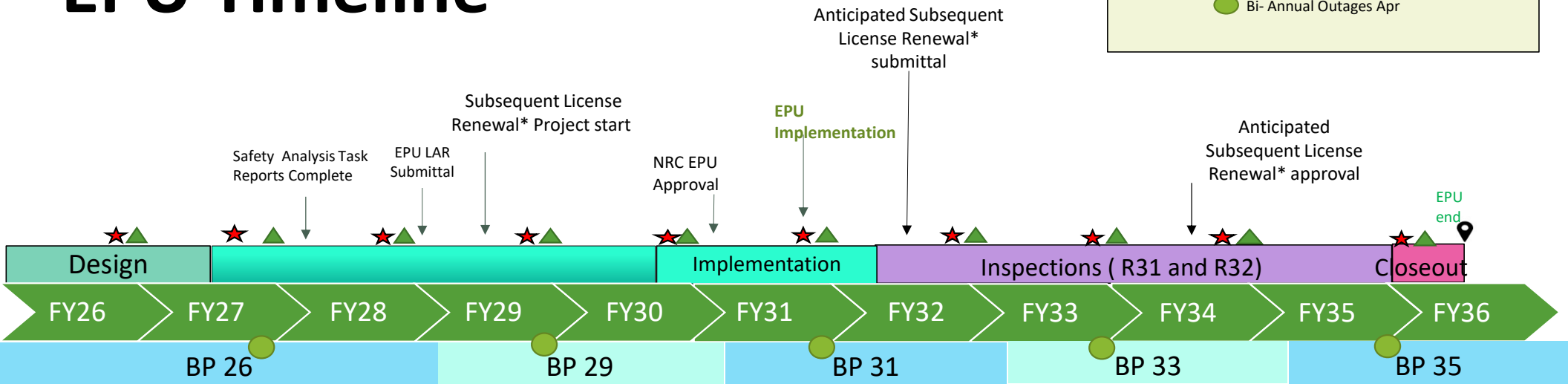
Life Cycle Management LRP Overview / EPU Integration



EPU Timeline

Legend

- ★ EN deadline for next BP FY budget submission- Mar
- ▲ BPA FY Non-Disapproval- approval of FY projects -May
- Bi- Annual Outages Apr



Major Extended Power Uprate Projects will occur during the Refueling and Maintenance Outages in calendar years 2027, 2029 and 2031.

These efforts are scheduled to be executed within the existing Refueling Outage schedule and are not expected to extend the durations.

*Represents anticipated timeframe for Subsequent License Renewal extension request and approval. EPU is not dependent upon this decision.

Thermal Efficiency Upgrades

Improve power output without increasing reactor thermal power

- Examples:
- Higher-efficiency turbines and/or blades
- Upgraded condensers and cooling systems
- Improved feedwater heaters
- Valve upgrades - reduced leakage and better insulation

Goal is to Reduce energy losses in the steam cycle

Key Takeaways

- Upgrades extend power uprate from existing reactors
- Range from minor instrumentation improvements to major equipment upgrades
- Extend the value of current BWR assets

Thank you!
