STRATEGIC ASSET MANAGEMENT PLAN – 10 YEAR OUTLOOK

For Transmission Services

This Strategic Asset Management Plan documents Transmission's current state and maturity in asset management organization, people, processes and systems. The SAMP recommends asset management improvement actions to be implemented across the full asset lifecycle to better create and deliver value for BPA's ratepayers and stakeholders, while also ensuring long term grid safety and reliability.

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1.0 EXECUTIVE SUMMARY

To ensure that Transmission is poised to adapt to the changing nature of the operating environment and support the Bonneville Power Administration's (BPA) Strategic Goal "Maturing Asset Management" as outlined in the 2024-2028 Strategic Plan, Transmission continues to adapt and improve its asset management strategies. Transmission has dedicated a team, reporting directly to the Transmission Senior Vice President, to Mature Asset Management and strengthen the Asset Management System. Continuing to mature in ISO 55000 will support the need to balance the current asset investments to address the needs of the aging infrastructure and meet the forecasted market and business opportunities.

Transmission plans to focus on the following in the Transmission Strategic Asset Management Plan (SAMP):

- Increase the capabilities of the Transmission Asset Management System to insure people, process, and systems are in place to utilize leading asset management methodologies.
- Increase the Expand Program, to support the Evolving Grid Projects resulting from the 2022 Cluster study and future project work from the 2023 Cluster Study. Transmission will continue to support the results of future subsequent cluster studies.
- Increase the Sustain Program due to our aging infrastructure and to keep pace with technological advancements.
- Increase the availability of human and material resources, directly and through suppliers, to ensure delivery of the increasing Expand, Projects Funded in Advance (PFIA), and Sustain Programs.
- Heightened focus on pacing with asset and system technological changes and improving the configuration management and cybersecurity capabilities that are essential to the operation of Transmission System.

Transmission has two key external dependencies that will affect our ability to attain higher levels of asset management maturity and the related timelines described in these strategies. The two key dependencies are BPA's ability to deliver on the talent acquisition requirements and the technology deployments called out in the body of this document.

2.0 ACKNOWLEDGEMENTS

2.1 Senior ownership

Transmission is proud to deliver on its important mission of reliably and safely operating the grid to serve as an engine of economic development in the Pacific Northwest. From 2023 to 2024, Transmission has dedicated additional resources focused on Asset Management Maturity. dedicated to various aspects of asset management maturity. The teams have completed foundational work, such as building on earlier work performed as part of the Criticality, Health, and Risk effort, to develop and mature the Value Framework. Transmission is also dedicating resources toward maturing its data and systems and will need continued partnership across BPA to accomplish its goals in these areas.

Transmission recognizes that it operates within a dynamic environment, and in partnership with maturing its asset management capabilities, seeks to respond by increasing its capital program to support expansion projects, customer interconnection requests, and aging infrastructure, among other drivers.

To respond to both internal and external drivers, Transmission is working to increase the availability of human and material resources, while also dedicating heightened focus on cybersecurity and physical security needs.

The Transmission Executive Leadership Team, working in concert with the Environment, Fish & Wildlife, Business Management & Development, Safety, Security & Continuity of Operations, Supply Chain, Information Technology, Compliance, Audit, & Risk, Finance, Intergovernmental Affairs, and General Counsel is dedicated to implementing and delivering on the goals and objectives set forth in the Transmission Strategic Asset Management Plan (SAMP) and Asset Plans.

As Senior Vice President, I am committed to periodic updates of the Transmission SAMP, development of Asset Plans, implementation of Asset Management Strategic Goals, and maturation of Transmission's asset management capability. Continued asset management maturity will enable Transmission to plan for and respond to a variety of internal and external drivers, to deliver the highest value to the region for years to come.

Richard Shaheen

Senior Vice President, Transmission

2.2 Strategy Development Approach

2.2.1 Key Contributors

Transmission strategic planning for FY24+ was led by the Transmission Asset Manager and the Transmission Director of Asset Management Strategy. Hundreds of individuals across Transmission contributed directly and indirectly by sharing insights, information, research, current-state assessments, future forecasts, and/or sub-strategies. (BPA Strategic Plan Outcome 4.2.4)

2.2.2 Key Activities

Key activities conducted for SAMP development include:

- Review of existing strategy and sub-strategies
- Analysis of existing business data and information
- Iterative strategy development via strategy sessions with primary subject matter experts and core SAMP Team
- Extensive research and investigations to deliver a comprehensive strategic narrative
- Strength Weakness Opportunities Threats (SWOT) analysis with Asset Management Governance Team
- Asset Management Maturity Assessment by representative sample of Transmission subject matter experts
- Alignment with the Agency Strategic Plan FY24-28 outcomes

3.0 STRATEGIC BUSINESS CONTEXT

3.1 Alignment of SAMP with Agency Strategic Plan

Transmission's alignment to the Agency Strategic Plan is demonstrated in Table 3.1-1.

Table 3.1-1, Alignment between Transmission Goals and BPA Strategic Goals

BPA Strategic Plan	Transmission Business Model	Transmission Asset Management Maturity Goals
Goal: Mature Asset Management Objective: Improve asset management data and system capabilities.	Long-Term Sustainability, Integrated and Efficient Processes	Transmission's asset data is effectively managed, accessible, and structured to enable effective asset management.
	Infrastructure, Value and Risk-Informed Asset Management	Transmission Asset Management systems are appropriately integrated and relied on to automate and manage core processes.
Goal: Mature Asset Management Objective: Enhance risk-based decision-making and portfolio optimization.	Infrastructure, Value and Risk-Informed Asset Management	Transmission uses a standard risk-based decision-making framework to prioritize asset management lifecycle decisions. *"Right asset investments at the right time"*
Goal: Modernize Business Systems and Processes Objective: Develop more cost-effective, well-organized and efficient systems for managing technology and business operations.	Long-Term Sustainability, Integrated and Efficient Processes	Transmission Asset Management processes are documented, consistent, and efficient.
		Transmission's resource management capability is established, documented, and successfully relied on for work delivery. *"Work on the right assets at the right time"*

3.2 Scope

This SAMP covers the Transmission Asset Management System as defined in Section 6.2 and the List of Major Assets, detailed in Section 3.3, which are managed by the Asset Management System. The SAMP includes the Sustain, Expand, and Projects Funded in Advance (PFIA) asset programs but does not include human resources as assets.

3.3 Asset Description and Delivered Services

Transmission manages approximately 313,000 assets organized in an Asset Hierarchy that assigns them into 13 Asset Portfolios, 92 Asset Types, and 220 unique Asset Sub-Type combinations managed in 12 Asset Programs (Table 3.3-1). The depreciated value is approximately $7.1 billion dollars. Annual Operation and Maintenance cost is approximately $280 million dollars.

Table 3.3-1, List of Major Assets

Asset Programs	Description
Alternating Current Substations (AC Subs)	Approximately 300 substations with more than 32,000 assets including transformers, reactors, and circuit breakers
High Voltage DC / Flexible AC Transmission Systems (HVDC/FACTS)	Specialized conversion and control assets located at Celilo Converter Station, Maple Valley, Keeler and Rogue Static VAR Compensation sites, and numerous series capacitor installations on the high voltage alternating current intertie transmission lines
Control Centers	Two redundant and geographically distributed control centers monitoring and controlling the grid and data systems; over 85 automation systems
Power System Control (PSC) & System Telecommunications	732 sites and with approximately 11,000 equipment assets and 3,500 miles of fiber optic cable assets to control and monitor the grid
System Protection and Control (SPC) and Control House	Approximately 28,000 assets of 33 asset types to protect the grid for reliability and safety; 246 Control Houses
Land Rights	Approximately 80,000 tracts of easement plus fee-owned properties
Access Roads	11,860 miles of access roads with bridges, culverts, and gates
Aircraft	1 Fixed Wing Aircraft, 4 Rotary Aircraft, and 1 Unmanned Aerial System
Wood Lines	Approximately 4,800 miles total in 336 separate transmission lines with 73,500 wood poles
Steel Lines	10,300 circuit miles with 43,500 lattice steel and engineered steel pole transmission lines and all associated towers, hardware, and components
Test Equipment Acquisition Process (TEAP)	Tools and test equipment

Transmission assets deliver the following products and services:

Network Transmission (NT)

The NT Service product is intended for, and available only to, load serving entities requesting use of BPA's transmission system for delivery of generation to serve their loads. NT customers provide 10-year load and resource forecasts so that BPA can fulfill its obligation to plan its system to serve NT customer load.

Point-to-Point (PTP)

Point-to-Point transmission is a transmission service that allows a customer to schedule energy from point A to point B. PTP service can be used to market power to third parties as well as to serve load. It can be resold and it can be redirected to other firm or non-firm products. It can also be used for dynamic transfers both on the network and on interties.

Generator Interconnection/Integration (GI)

GI projects are customer requests to interconnect/integrate to the BPA system, resulting in potential network additions and/or interconnection facilities. A key objective of the Transmission Services product management strategy is to interconnect customer projects as efficiently as possible. In doing so, BPA continues to fulfill its commitment to the region to provide an adequate, efficient, economical, and reliable power supply.

Ancillary Services and Control Area Services (AS and CAS)

This product supports the reliable transmission of energy from resource to load, by providing capacity flexibility within BPA's Balancing Authority Area to support customers' generation interconnection, load service, and marketing, and by responding to contingencies and generation/load deviations from schedules. Under the tariff, the transmission provider is required to provide, and transmission customers are required to purchase, certain Ancillary Services. The transmission provider is also required to offer other Ancillary Services that the transmission customer must either purchase or self-supply through a customer's own resources or purchases from a third party.

Dark Fiber communication

BPA leases dark fiber in excess of its current operational needs for commercial and public benefits use on a case-by-case basis. BPA does not provide lit or last mile services and reserves the right to recall fibers for its own operational use when needed. When space and structural capacity allow, BPA will also consider leasing space on its facilities for commercial wireless communications equipment on a case-by-case basis. Revenues from both lease programs offset costs to Transmission ratepayers.

Refer to the Open Access Transmission Tariff (OATT) for additional information pertaining to Transmission products and services.

3.4 Demand Forecast for Services

For Transmission, the Demand Forecast for Services includes a forecast for both Transmission Products and Services. Requests for Products and Services are assessed against our current system capacity and in combination with other new requests. Depending on the assessment, Transmission can:

- Utilize available capacity on the existing infrastructure, upgrade the existing infrastructure, and/or add to the infrastructure.

- Utilize current methods of system operations and management and/or explore evolving market methods of system operations and management that could extend capacity to meet demand. (See Section 10.2.2)

Requests for new Products and Services are received via Generator Interconnection Requests, Line and Load Requests, and the Cluster Study submissions through the Transmission Service Requests (TSR) Study and Expansion Process (TSEP). Transmission is forecasting an increase in these requests over the next 10 years.

3.4.1 Transmission Service Requests

In the past three years, cluster studies of new TSRs have grown in volume and complexity due to the impact of the Renewable Portfolio Standards (RPS). Oregon, Washington, and California have been especially impacted by incentives for the production of renewable resources, storage technologies, electrification, infrastructure bill opportunities, and other factors. In addition to the increased study participation, the impacts to neighboring Balancing Authorities is an additional factor that adds complexity and time. This growth of participation in transmission cluster studies mirrors the exponential growth of our interconnection queues, as seen in these totals from the previous three years:

- The 2021 TSEP Cluster Study included 5,900 MW.
- The 2022 TSEP Cluster Study included more than 11,000 MW.
- The 2023 TSEP Cluster Study grew to more than 17,000 MW.

In August 2023, a decision was made to not run a Cluster Study for 2024 primarily due to the complexity and magnitude of the 2023 TSEP Cluster Study, system rerates, and the reallocation of resources to other transmission study priorities between now and summer 2024. BPA expects to begin the process for the 2025 TSEP Cluster Study in the summer of 2024. Transmission will continue to evaluate requests between now and the next cluster study, and requests that do not require study will continue to be offered service. BPA is committed to being responsive to customer needs and keeping customers informed as BPA and the region move forward.

Growth in requests is an industrywide phenomenon, as acknowledged by FERC in one of their 2023 rulemakings.

3.4.2 Generator Interconnection and Line & Load Requests

Generator Interconnection and Line & Load Requests are increasing in response to the Renewable Portfolio Standards created to help individual states diversify their energy resources, promote domestic energy production, and reduce emissions, as existing generation plants are closing and new generation resources are taking their place. New renewable resources in the generation interconnection queue consist of energy storage, photovoltaic, and wind turbine. Growth in the number of new resources seeking to interconnect to the transmission system and the differing characteristics of those resources have created new challenges for the generator interconnection process. Growth in the number of interconnection requests can be seen in Table 3.4.2-1.

Table 3.4.2-1, Number of Interconnection Requests in 3 Recent Years

Project Type	Project Requests 2020	Project Requests 2021	Project Requests 2022	Project Requests 2023
Large Generator Interconnection	30	49	102	213
Small Generator Interconnection	0	5	9	9
Line & Load Requests	14	23	40	36

3.5 Strategy Duration

Transmission's 2024 SAMP duration is 10 years, with a standard refresh every 2 years. To align with the current IPR Process, the next SAMP update has been extended to 2027 instead of 2026. The SAMP provides a long term (5 year and 10 year) forecasted view that takes into consideration organizational needs, external expectations, current state of existing assets, and the agency's asset management capabilities and goals. It is reviewed annually as part of Asset Plan development work.

Given the current velocity of change in asset management maturity and risk methodology application, Transmission anticipates a pre-cycle update of the SAMP.

4.0 STAKEHOLDERS

4.1 Asset Owner and Operators

BPA provides transmission services and other services for generation and load interconnection to the Federal Columbia River Transmission System. BPA's procedures for offering these services adhere to the requirements of its OATT.

BPA manages and responds to TSRs for long-term firm transmission service on the BPA network through the TSEP. Transmission also operates and manages network assets owned by other entities. Management of those assets is handled through inter-business line budgeting. Customer service agreements with the asset owner(s)/operator(s) are other tools used when work/coordination is required on assets that BPA does not own.

Transmission supports real-time dispatch of the system as well as coordinates with internal groups, western utilities, and other organizations as needed for reliability (including the Reliability Coordinator) and complex outages. In addition, Transmission develops systems for the control centers such as automatic generation control, load shedding, reactive switching, and remedial action schemes. Standards and agreements to support interconnected operations and manage data are generated in real-time.

Transmission coordinates system operation and planning issues with groups such as the Western Electricity Coordinating Council (WECC), Institute of Electrical and Electronics Engineers, Inc. (IEEE), North American Electric Reliability Council (NERC), Electric Power Research Institute (EPRI), NorthernGrid (NG), and Pacific Northwest National Laboratory (PNNL).

Transmission also works closely with the other BPA asset categories: Facilities, Environment, Security, Fleet, Fed Hydro, and IT. For example, the Facilities Asset Management program manages certain

elements of the control house (the building, HVAC systems, etc.), whereas Transmission manages equipment replacement within the control house. The Environment and Security capital programs manage improvements to Transmission assets, such as addressing oil containment concerns or enhancing security fencing. The Fleet program procures vehicles used throughout the Transmission system.

4.2 Stakeholders and Expectations

Externally, BPA's ratepayers and stakeholders expect safe and reliable service at the lowest transmission rates consistent with sound business principles.

Table 4.2-1, Stakeholder Expectations

Stakeholders	Expectations	Current Data Sources	Measures
Customers	Control Costs	Long Term Rates Forecasts, Integrated Program Review (IPR)	Rate Forecast from Long Term Planning / Marketing
	Reliability	Reliability database, SCADA, OARS	System Average Interruption Duration Index (SAIDI), System Average Interruption Frequency Index (SAIFI)
	Transmission Service and Interconnection Availability	Transmission Service Request queue Interconnection queue	Transmission Service Requests granted vs. denied, queue waiting time Request to Energization duration for new interconnections
Government Agencies (USFS, USACE, FAA, Reclamation, USFWS)	Communication	Public Comment Records, Forums including telephone meetings	Customer Satisfaction Surveys
	Compliance with Regulations	Public Comment Records, Agreements, Documented Policies	NEPA Permitting duration
	Joint Funding for Shared Investments	Agreements	Request to Signed Agreement duration for new interconnections.
FERC	Open Access to BPA's Transmission System Proper Asset Accounting	BPA's Open Access Transmission Tariff Plant Accounting Policy and Procedures	Transmission Service Request Mgmt. Interconnection Request Mgmt. Timely Unitization
Environmental Interests	Compliance with Regulations	Industry regulations and standards (NEPA)	NEPA Permitting
	Minimized Impacts	Environmental Assessment Documents	Net Carbon Footprint, Visual Rendering
Fish and Wildlife Advocates	Transmission operations help support fish passage	Outage and Remedial Action Scheme records	Generating Unit forced outage rate, RAS availability
Commercial Energy Market Entrants	Enable distributed generation and energy storage	Interconnection queue	Request to Energization duration for new interconnections and/or metering and telemetering
NERC/WECC	Compliance with Regulations	Resolver	Internal/External Auditing, RSIPP Decision Documentation, Self-Reports
Public	Safety	Public safety management system	Non-conformance records

Stakeholders	Expectations	Current Data Sources	Measures
	Communication	Public Comment Records, Forums including telephone meetings	Tribal Satisfaction Surveys
Cultural Interests	Compliance with Regulations	Public Comment Records, Agreements, Documented Policies	Number of cultural resource disturbances Number of realty actions on Tribal land

5.0 EXTERNAL AND INTERNAL INFLUENCES

Transmission identified several external and internal influences as it continues to deliver its mission. Using the external and internal factors as framework, Transmission also identified strengths, weaknesses, opportunities, and threats in reaching its own Asset Management goals. These factors are detailed in Tables 5.0-1 and 5-1-1, and throughout the Strategic Asset Management Plan.

Table 5.0-1, External and Internal Influences

External Influences	Affects and Actions
Regulatory influences	Routine election cycles and respective changes will impact BPA as a federal agency. This may impact or reprioritize BPA policies, direction, and potential projects.
Regulatory/ Federal Requirements (NERC, FISMA, etc.)	Regulatory changes and federal requirements are calling for increased technology capabilities and internal controls. This increases the number of process improvement projects needed; shortens the technological lifecycle of Operational Technology, which shortens replacement cycles; increases the need for Information technology; increases the need for total system replacements and re-platforming; and moves BPA toward commoditized technology.
Renewable Portfolio Standards (RPS)	Regulatory mandates to increase production of energy from renewable sources such as wind, solar, biomass, and other alternatives to fossil and nuclear electric generation. States created these standards to diversify their energy resources, promote domestic energy production and reduce emissions. This RPS mechanism places an obligation on regulated utilities to acquire a specified fraction of electricity from renewable energy sources. Compliance with these standards are typically measured by the percentage of retail electric sales. (See Section 3.4 and 10.2.2)
Long-term regional resource adequacy, transmission availability, and reliability	BPA engages the region in the public process to implement the Provider of Choice policy, to establish the long-term power sales policy and contracts expiring in 2028. BPA is evaluating potential participation in a Day-Ahead Market.
Changing mix of generation resources & potential load impacts	Changes to the generation mix may require future investments in transmission reinforcements to reliably serve loads. Transmission will continue to perform long-term planning assessments to remain connected to regional developments. Transmission is actively engaged with key members of the industry to assure that the demands are anticipated and that strategies are developed to support the changes.
Timely response to customer interconnection requests for new generation & major load additions	Requests for Transmission's products and services continue to increase. Transmission has implemented improvements to study, plan, and execute these interconnections. (See Sections 3.4 and 10.2.2)
Increased cyber-security attacks	Energy organizations are a prime target of growing and evolving cybersecurity threats given the criticality of their infrastructure. BPA will continue its Cyber Security diligence to protect networks, devices, and data from unauthorized access or criminal use and to ensure confidentiality (limiting data access), integrity (ensuring your data is accurate), and availability (making sure data is accessible to those who need it). Transmission is increasing its cyber security

	focus to protect networks, discover and prevent changes to devices, and protect data from unauthorized access or criminal use.
Increased physical security attacks	Energy organizations are a prime target of increased physical threats due to the criticality of their infrastructure and value of their critical assets. Critical assets need to be fully protected. Replacement parts can be expensive and difficult to obtain given current supply chain issues within the US. BPA has increased priority on its security projects, with help and prioritization by the security organization. More information is provided in the Security SAMP.
Recurring natural events	Impacts of recurring natural events (such as more frequent wildfires or increasing temperatures) to the grid on a long-term basis are unclear. Transmission continues to mature its Wildfire Mitigation and Public Safety Power Shutoff (PSPS) programs to be more proactive and better prepared.
Increasing costs & lead times	Increasing prices for contracts, labor, and materials as well as extended lead times create new and increased challenges for Transmission's ability to meet its goals. Transmission is evaluating processes and inventory levels to mitigate lead times. (See Section 8.2)
Asset Technology Changes	Technological change is more substantial than in previous decades and is occurring at an accelerated pace. Technological obsolescence will require Transmission to replace equipment or entire systems in shorter lifecycles, likely increasing the cost of its communication, protection, and control center systems. Transmission is anticipating these changes and is planning its Sustain program needs to include technological obsolescence as one decision consideration. Due to the rapid pace of technology change, Transmission is evaluating the delivery method for operational technology to improve the agility for delivery.
Internal Influences	**Affects and Actions**
Workforce	The workforce has become frustrated with constant rebalancing of priorities, which impacts resource workload. Transmission is evaluating staffing levels and considering other methods to accomplish the increased workload, including filling vacancies/hiring staff to have enough resources to not over-book them. Talent acquisition and retention remains challenging. Transmission is focused on exploiting the staffing tools we have now and continuing to work with our partners in Human Capital Management (HCM) to expand our ability to remain competitive.
Reliable Transmission Grid	Transmission has demonstrated a long history of safe and reliable grid operations. Transmission has a continuous focus on resiliency and commitment to maintaining system reliability and rapid restoration for unplanned outages.
Asset Management Maturity	BPA's 2024-2028 Strategic Plan includes two goals directly supporting its continued focus on Asset Management. Transmission is also focused on Asset Management Maturity, with five goals aligned to the agency's strategic goals (Table 3.1-1) The goals focus on process documentation gaps, decision support including the Value Framework, demand forecasting & capacity planning, and data & system governance, in addition to a need for clear roles & responsibilities. (See Section 6.2)
Change Management Culture	Even with both BPA & Transmission focusing on Asset Management, there is recognition that our culture will resist change if changes are not well managed. Transmission change management is focused on assuring leadership remains aligned and continues to engage employees to help develop and implement the SAMP and improve the currently varied levels of asset management understanding throughout the organization.
Changing Data & Systems Environment	Developing data and technology governance, coupled with IT challenges, impacts the pace of data integration efforts and system upgrades/replacements. Through its asset management maturity focus, Transmission has identified its specific asset management systems & documented its asset hierarchy. Transmission is developing data governance, identifying opportunities to integrate data through the systems, and minimizing duplicate data entry. (See Section 10.4) Transmission is working with the Information Technology (IT) organization to communicate Transmission's technology needs and related timing needs.

Aging physical assets & capital needs	Transmission's physical assets are aging, including the assets' supporting software, leading to a high need for capital to fund replacements. Transmission is continuing to mature asset management capabilities to focus limited resources on the most critical replacements and is evaluating opportunities to change practices to maximize resources. (See Section 8.3 & 10.2)

5.1 Strengths, Weaknesses, Opportunities, and Threats

Table 5.1-1, Analysis of Strengths, Weaknesses, Opportunities, and Threats

Favorable	Unfavorable
Strengths	**Weaknesses**
Reliable Transmission Grid • Culture of rapid restoration response to unplanned outages and commitment to resiliency Leadership/Management • An agency-wide commitment to a safety culture • BPA's Focus on Asset Management, evidenced by BPA's 2024-2028 Strategic Plan that includes a specific strategic goal with two objectives focused on maturing asset management • Transmission has dedicated teams of resources to mature Asset Management in alignment with the agency goals & objectives	Workforce • Attracting/retaining and continued training of high-quality talent with necessary skillset; especially with the pace of changing information, operational, and asset technology • Significant numbers of employees eligible for retirement Strategy • Varying levels of understanding of asset management roles, and responsibilities • Developing sustainable data governance processes, coupled with IT challenges impacting the pace of data integration efforts and system upgrades/replacements. Leadership/Management • Leadership/Management facing high workload, with too many high priorities to balance them effectively Execution • Execution models lack ability to effectively respond to volume changes
Opportunities	**Threats**
Economic Conditions • Evaluating the potential for participation in a day-ahead market • Changing generation mix, distributed energy resources, and increased congressional funding for transmission system expansion may lead to opportunities to reinforce the Transmission system Decision Making • Improving the support of our automated (vs. manual) integrated tools to make better risk informed decisions Safety • Incorporating safety by design to support the agency safety -centric culture	Climate • Regularly/recurring natural catastrophic events (wildfires, earthquakes, etc.) Cyber security threats • An emerging external influence is the threat of cyber-attacks from outside our organization Economic Conditions • Supply chain's ability to secure contracts has been impacted with increasing costs and lead times Execution • The construction industry is unable to respond to workload variability Regional Impacts • Long-term regional resource adequacy may be affected by weather patterns & other system changes and needs Access to Borrowing Authority • This may become an issue in the future, as Transmission continues to increase its needed Expand spending per the TSEP process and interconnection requests.

6.0 ASSET MANAGEMENT CAPABILITIES AND SYSTEM

6.1 Current Maturity level

Transmission strives to understand the current state of maturity to help evaluate the effectiveness of the methods used and modify them appropriately. BPA applied the Asset Management Maturity Assessment tool for the data presented in 6.1. This data, as well as other interviews, studies, and internal process evaluations, guide the efforts described in Sections 6.2 and 6.3.

The Asset Management Maturity Assessment was most recently refreshed in November 2023 (listed as 2024 in Table 6.1-1). Twenty-seven people participated and gave feedback on the maturity level for all 39 Institute of Asset Management (IAM) Subjects and identified strengths and weaknesses for the requirements they are familiar with.

The results of the most recent Asset Management Maturity Assessment show a slight increase across many of the categories of the assessment between 2018 and 2024 (Table 6.1-1). Transmission is aware of and acknowledges it has shortcomings that need to be addressed under each of the IAM Groups. Top priorities and dependencies have been identified and sequencing is occurring to ensure coordinated plans for making improvements to the most important and foundational areas. Table 6.1-2 provides assessment results in the unique categories for each of the IAM Groups, along with discussion of related strengths and weaknesses.

Table 6.1-1, Asset management maturity assessment results

Group	2024	2022	2020	2018
Strategy and Planning	**1.4**	1.3	1.7	1.8
Decision Making	**1.4**	1.2	1.3	1.3
Life Cycle Delivery	**1.7**	1.5	1.8	1.5
Asset Information	**1.4**	1.3	1.5	1.0
Organization and People	**1.4**	1.2	1.2	1.2
Risk and Review	**1.5**	1.3	1.5	1.3
Average	**1.5**	**1.3**	**1.5**	**1.4**

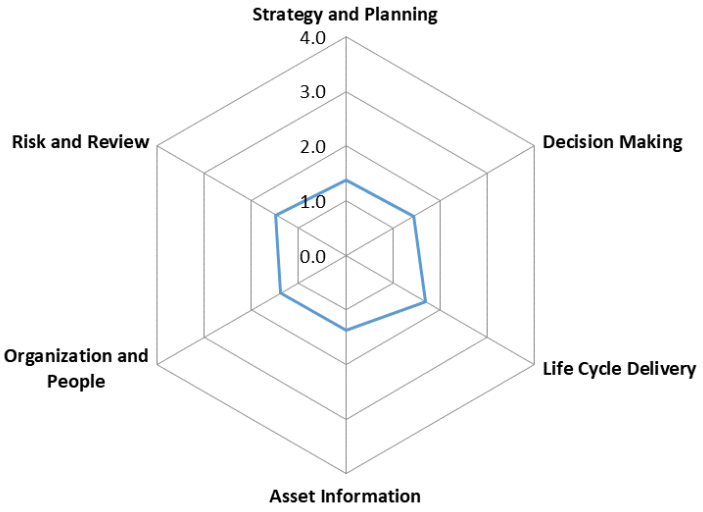
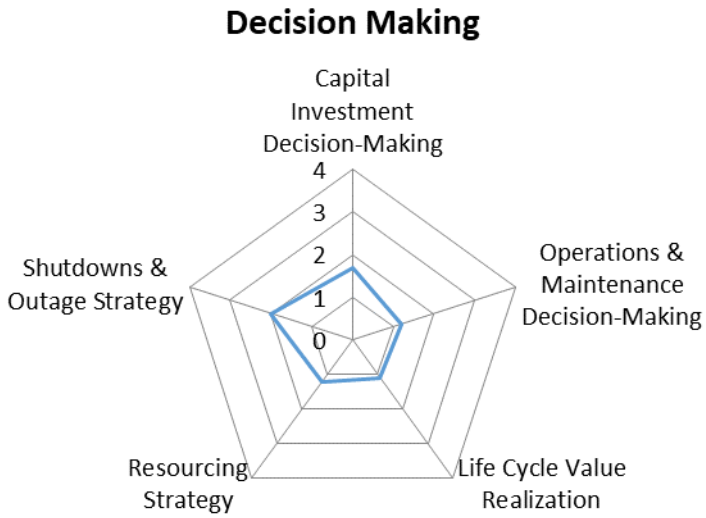
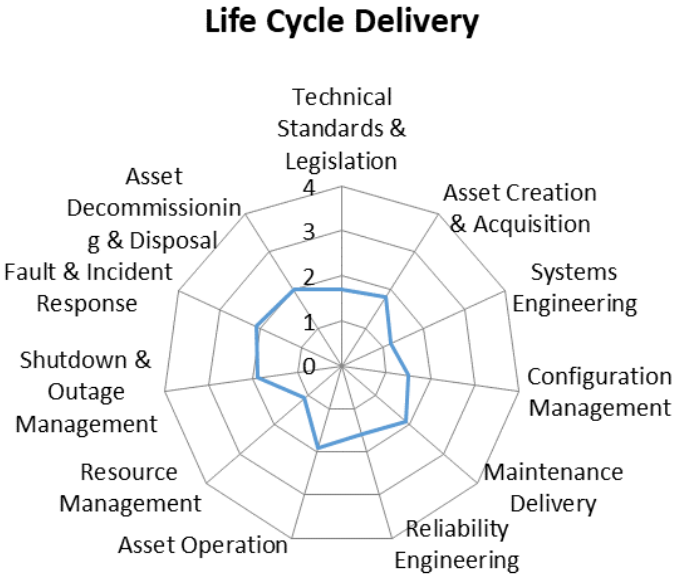
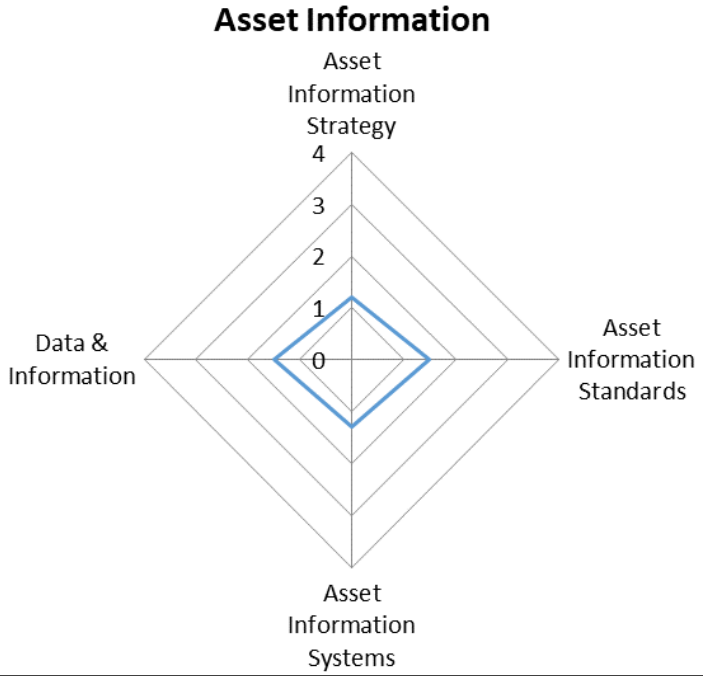


Figure 6.1-1, 2024 Maturity Assessment Results

Table 6.1-2, Asset management maturity assessment results

IAM Groups	Maturity Level
Strategy & Planning	**Strategy & Planning Strengths** There is an increase in the area of Strategic Planning as a whole. BPA launched a new Strategic Plan (FY24-FY28) which aligns with Transmission's Asset Management Maturity (AMM). **Strategy & Planning Weaknesses** Since the Transmission AMM Program is in its developmental stage, there is a need to continue to mature and improve processes, in order to execute the SAMP and Asset Plans more effectively. Several stakeholders reported that Transmission remains "siloed" and has work to do on policies, processes, and communication throughout Transmission. Many people are aware there is work being done in these areas, but the area of emphasis is that communication throughout and across the organizations needs improvement. 

IAM Groups	Maturity Level
Decision Making	**Decision Making Strengths** Capital Investment Decision Making, Resourcing Strategy, Shut Down and Outage Strategy have improved from continued development. **Decision Making Weakness** Overall, processes are in place for the capital approval process, but there is a lack of consistent data and knowledge concerning integral life cycle value realization which can negatively impact the work being done. There is cautious optimism surrounding resourcing and its impact for continued improvement. 
Life Cycle Delivery	**Life Cycle Delivery Strengths** There have been increases across the board, and in particular for Outage Management and Fault & Incident Response. This may be due to the progress and work being done in this area. **Life Cycle Delivery Weakness** Despite the amount of data systems in place, they are fragmented and lack data tracking for consistency across Transmission. There is general awareness that work is being done in this area. 

IAM Groups	Maturity Level
Asset Information	**Asset Information Strengths** The organization has a slight improvement for Asset Information Standards and Data Information. **Asset Information Weakness** Struggle with silos and inconsistency across Transmission for this focus area. There is general awareness that work is being done in this area as part of the AMM Data and Technology Governance focus area. 
Organization & People	**Organization and People Strengths** The organization saw increases across the board in all categories, especially in Asset Management Leadership. This may be a result of recognition of progress in this area with the current AMM Team. **Organization and People Weakness** There may be a lack of understanding of Asset Management and Roles and Responsibilities as a whole. Overall, there is a mixed review on level of maturity. There is general awareness that work is being done in this area as part of the AMM Process, Policy and Governance focus area. 

IAM Groups	Maturity Level
Risk & Review	**Risk and Review Strengths:** Increases in most areas, particularly in Contingency Planning and Resilience Development as well as Sustainable Development. This may be from continued development in Value Framework. There is currently a high awareness of steps needing to be taken to move forward. **Risk and Review Weakness:** Improvement is needed overall on Risk Assessment, Change Management, and Data System integration; some of which are currently being addressed with work underway within AMM focus areas. 

6.2 Long Term Objectives

Transmission's long-term objective is to develop and mature Transmission's Asset Management System as defined by ISO 55000.

> *"Set of interrelated or interacting elements of a group of people that has its own functions with responsibilities, authorities, and relationships to achieve its results to be achieved, to establish:*
>
> - *a set of intentions and direction as formally expressed by its top management (Policies),*
> - *results to be achieved (Objectives), and*
> - *a set of interrelated or interacting activities which transform inputs into outputs (Processes) to achieve those objectives, for the coordinated activity of realizing value from an item, thing or entity that has potential or actual value."*

Transmission is focused on maturing the Asset Management System in alignment with the Agency Strategic Goal "Mature Asset Management," as well as internal Transmission drivers. These drivers include the Transmission Business Model focus on "Long-Term Sustainability, Integrated and Efficient Processes," and the Sustain Program internal maturity assessment. Maturing the Asset Management System is intended to improve and accelerate Asset Management value delivery by optimizing our current state functional and organizational structures and asset management capabilities. Improvements to the system are expected to alter current processes and capabilities.

Over the next ten years, Transmission intends to develop a comprehensive set of strategies to establish the required Asset Management System capabilities based on the conceptual model (6 Groups and 39 Subjects) from the Institute of Asset Management Anatomy and the ISO 55000 series of standards for asset management. Each strategy is time bound and will develop and implement the objectives, management system, performance measures, and policies for that function. To date, Transmission has identified the need for these essential strategies:

- Risk Assessment and Management
- Operations
- Maintenance
- Spares and Inventory
- Portfolio Planning & Delivery
- Market Responsiveness
- Asset Performance Assessment and Monitoring
- Resource Management
- Asset Information Systems and Data

The sequencing and individual plans for the development of these essential Asset Management System strategies will be included in the next Transmission SAMP.

1. While the Asset Management System is under development, Transmission has created Asset Management Maturity (AMM) Focus Areas. Focus Area teams are accountable to accomplish the five AMM Goals, which are aligned with the BPA Strategic Plan and the Transmission Business Model for FY24-FY28. (See Section 3.1) The AMM goals, and the AMM Focus Area associated with each goal, are listed in the table below.

	Transmission AMM Goals	AMM Focus Areas
1	Transmission's asset data is effectively managed, accessible, and structured to enable effective asset management.	Data and Systems Governance
2	Transmission Asset Management systems are appropriately integrated and relied on to automate and manage core processes.	Data and Systems Governance
3	Transmission Asset Management processes are documented, consistent, and efficient.	Asset Management System (Process, Policy, and Governance)
4	Transmission uses a standard risk-based decision-making framework to prioritize asset management lifecycle decisions. *"Right asset investments at the right time"*	Decision Support
5	Transmission's resource management capability is established, documented, and successfully relied on for work delivery. *"Work on the right assets at the right time"*	Demand Forecasting and Capacity Planning

Accomplishing these goals in the mid-term allows Transmission to improve on foundational elements of Asset Management, while planning for and developing a comprehensive Asset Management System.

6.3 Current Strategies and Initiatives

To deliver on the five Asset Management Maturity Goals, the Transmission Asset Management Maturity Focus Area teams identified needed efforts to improve these Asset Management Capabilities that are paramount in an Asset Management System:

AMM Focus Areas	Efforts

Data and Systems Governance	○ Phase 1 - Core Asset Register and Reporting ○ Phase 2 - Asset Hierarchy system mapping ○ Asset Management Data Governance capability
Decision Support	○ Risk-based decision-making (Value Framework) • Phase 1 – Value Framework methodology established, leveraging Criticality, Health and Risk data • Phase 2 - Manual Asset Risk Assessment Tool (MARAT) is developed at the asset level, the Common Economic Scale is developed at the project level, IT Priority request for Transmission Prioritization Optimization Tool (TPOT) is submitted ▪ Phase 3 – Technology solution for TPOT is established
Asset Management System (Process, Policy, and Governance)	○ Phase 1 – Processes are documented ○ Phase 2 - Data usage is identified in processes ○ Phase 3 - Process controls and governance are identified
Demand Forecasting and Capacity Planning	○ Phase 1 – Complete demand scheduling, reporting, and update frequency requirements for the Transmission Work Portfolio ○ Phase 2 – Evaluate and utilize existing technology to consolidate systems and to improve Portfolio Management capability ○ Phase 3 – Expand execution model

Implementation of these efforts in FY24 and FY25 will allow Transmission to close identified gaps, overcome known weaknesses and threats, and work towards meeting the desired Outcomes defined in the BPA Strategic Plan for 2024-2028.

6.4 Resource Requirements

In January of 2023, Transmission created a new position, Director, Asset Management Strategy, reporting directly to the Senior VP of Transmission. This role, in coordination with Agency Asset Management, Enterprise Architecture, and IT established a structure and plan for Enterprise Asset Management Maturity (EAMM). This structure mobilized dedicated full-time, part-time, and contracted resources to ensure focus on fulfilling established goals and desired outcomes.

This dedication of Transmission resources for the EAMM program will continue in perpetuity as the Asset Management System is planned, developed, and managed and becomes a standard part of the business. It is anticipated that the number and types of resources will evolve over time as Transmission matures in its asset management capabilities. Transmission's asset management maturity is also reliant on resources from Operations Performance (MO), Business Transformation (MT), and Information Technology (J) for success.

7.0 ASSET CRITICALITY

7.1 Criteria

Transmission is evolving in its approach and application of the concept of criticality. Transmission acknowledges criticality and critical assets may be related but are not equivalent. Currently, Transmission has aligned on a standard definition for critical assets, to apply toward use within Asset Management. Critical assets are facilities, systems, and equipment, which if destroyed, degraded, or otherwise rendered unavailable, would affect the reliability or operability of the bulk electric system.

This would include assets in the AC Substation, DC Substation, Power System Control, System Protection Control, Wood Line, Steel Line, System Telecommunications, and Control Centers Asset Programs. Assets included in the Land, Tools, and Aircraft Asset Programs are not identified as critical assets.

The current definition of critical assets is based on the reliability criteria of being part of the Bulk Electric System. Transmission's Asset Management Maturity efforts are discussed in Section 6.3. As part of the effort to mature risk-based decision-making, Transmission will continue to evaluate and expand its ability to define Asset Criticality from differing impact perspectives with scoring that will allow ranking by asset and/or project. Work connected to this effort is also described in Section 9.

7.2 Usage of Criticality Model

In the 2022 SAMP, Transmission was pursuing an application of criticality made possible through logic sheets created according to standard risk dimensions (safety, reliability, financial, environment, compliance). The intent was to develop logic sheets and score assets based on where they fell on a standard matrix for BPA's specific needs. Transmission leveraged that work and is using it to continue its development on the Value Framework that is described in Section 9.

In the current state, Transmission does not have a portfolio-wide criticality framework. Program Managers manually apply the concepts of criticality to evaluate assets on a project-by-project basis. Some examples of factors they apply include considering impacts on compliance, reliability, safety, and public relations, as well as other factors. These factors, among others, are included in Transmission's Value Framework effort. Fiscal year 2024 is a crucial year in Transmission's maturity in risk-based decision making. We plan to establish a risk-based decision-making Value Framework at the asset level and at the project level. The project level Value Framework will allow Transmission to have a common economic value to compare its Sustain, Expand, and PFIA projects to each other. In addition, we plan to mature our asset health data, and prepare the business requirements for a Transmission Portfolio Optimization Tool (TPOT) that will provide automated risk-based decision functionality, which Transmission intends to put into place in the 2027 timeframe, assuming funding and resources are approved. This effort is currently underway and discussed in detail in section 9.

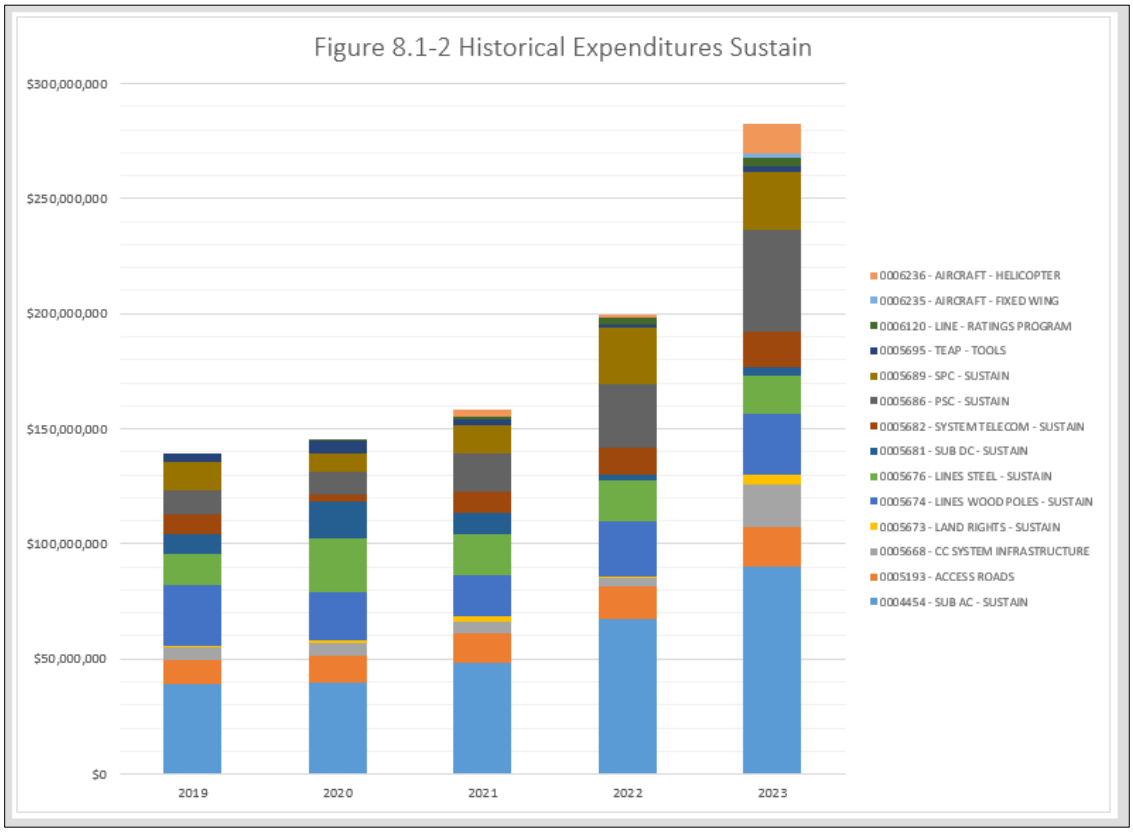
8.0 CURRENT STATE

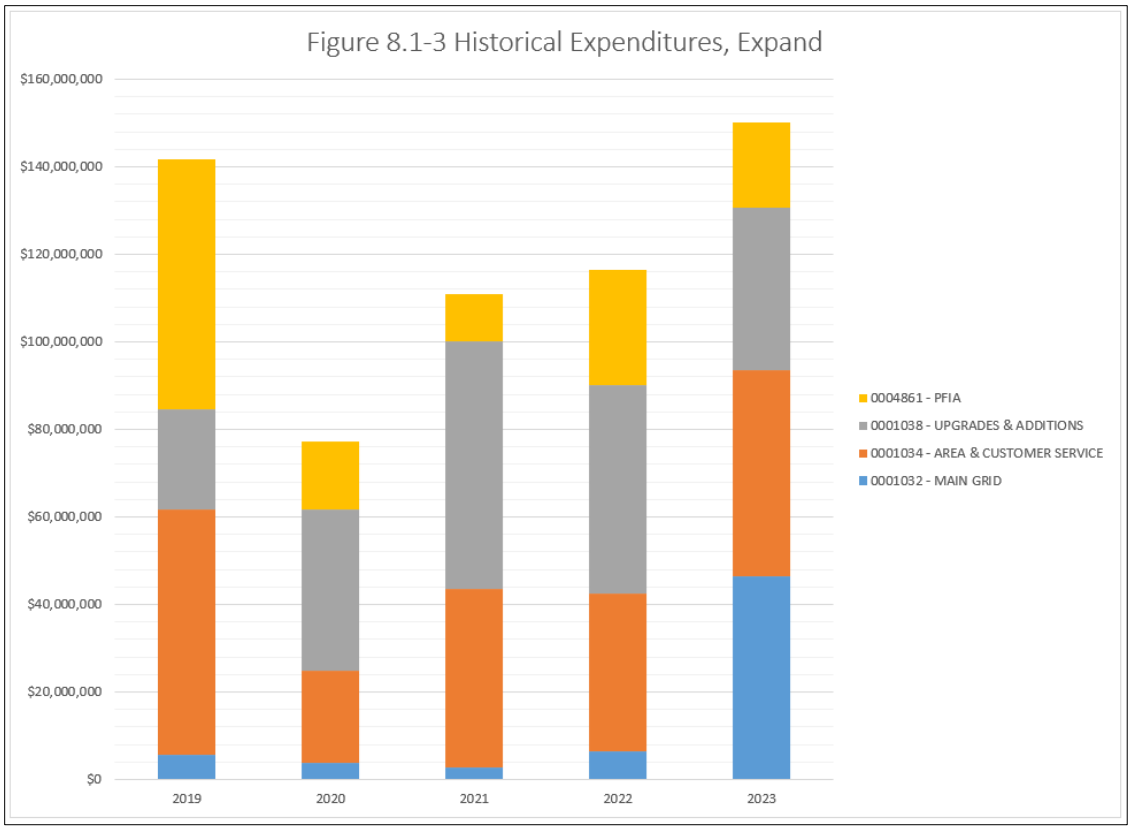
8.1 Historical Costs

Transmission's historical costs along with the current approved rate case costs are depicted in this section. Table 8.1-1 and Figures 8.1-2 through 8.1-4 provide historical-spend variations by program, between the years of 2019 and 2023. They also include FY24 start of year (SOY) budgets and FY25 rate case projections. Capital expenditures were lower in FY20, primarily due to pandemic impacts, and increased again in FY21. Projections for FY25 are included here for prospective future spend in the next year.

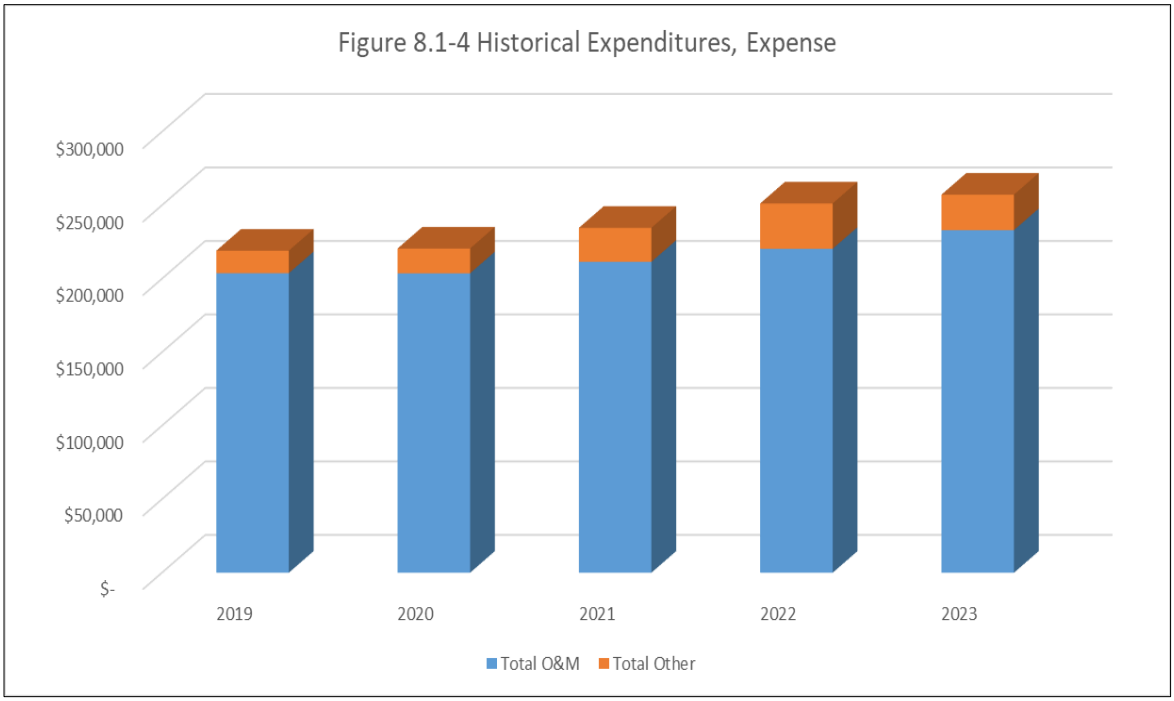
Table 8.1-1 Historical Spend

SAMP 8.1-1 Rollup									
Program	Historical Spend (in thousands) With Current Rate Case								
Capital	2019	2020	2021	2022	2023	2024		2025	
						SOY	OPTIMAL	EXPECTED	OPTIMAL
Expand	$ 84,600	$ 61,700	$ 100,100	$ 90,300	$ 130,600	$ 105,450	$ 135,450	$ 352,000	$ 352,000
Sustain	$ 139,500	$ 145,000	$ 158,600	$ 199,300	$ 282,800	$ 290,100	$ 290,100	$ 313,308	$ 492,880
PFIA	$ 57,200	$ 15,600	$ 10,900	$ 26,200	$ 19,500	$ 42,000	$ 42,000	$ 30,000	$ 30,000
Total Capital	**$ 281,300**	**$ 222,300**	**$ 269,600**	**$ 315,800**	**$ 432,900**	**$ 437,550**	**$ 467,550**	**$ 695,308**	**$ 874,880**
Expense									
Total O&M	$ 203,755	$ 207,720	$ 211,515	$ 220,384	$ 233,097	$ 264,528	$ 264,529	$ 250,562	$ 272,389
Total Other	$ 15,338	$ 16,844	$ 23,105	$ 30,851	$ 24,110	$ 28,286	$ 28,286	$ 35,941	$ 40,986
Total Expense	**$ 219,093**	**$ 220,564**	**$ 234,620**	**$ 251,235**	**$ 257,207**	**$ 292,814**	**$ 292,815**	**$ 286,503**	**$ 313,375**
Total Transmission	**$ 500,393**	**$ 442,864**	**$ 504,220**	**$ 567,035**	**$ 690,107**	**$ 730,364**	**$ 760,365**	**$ 981,811**	**$ 1,188,255**





The graph below showcases the Total O&M and Total Other Expense asset sub-categories, which covers the support provided to facilitate the output of capital and maintenance programs under the Transmission asset management asset category. This includes aircraft services, logistics services, NERC/WECC compliance, environmental planning, enterprise services and other non-capitalizable business support functions. The Transmission Other Expense asset sub-category does not include non-transmission asset categories that are in other SAMPs such as Fleet, and Security.



8.2 Historical Asset Sustain Trends vs Forecast

Overall, Transmission Sustain Program spend has increased since 2012, after adjusting for an average National Inflation Rate of 2.6%. Supply Chain analysis of 2020 through 2023 validated BPA is experiencing a 33.7% average construction material increase that ranges from 16.6% to 76.3% depending on the specific material/equipment. In addition to the increased prices for construction materials and substation and line materials, lead times for said materials experienced an increase from 104% to 1028%.

Transmission is anticipating that material prices will stabilize in alignment with the national economy, but that overall costs for materials are not likely to decline. Currently, material costs are about 46% of total project cost. Material lead times will likely decrease over time as supply chains stabilize, but restoring inventory levels and fulfilling backlog for most manufacturing companies takes considerable time. As such, Transmission will focus on the volume of needed replacements, evaluating inventory levels, and continuing to represent the funding required to deliver the appropriate volume via the Integrated Program Review process.

For the Sustain Program, Transmission is forecasting:

- Material costs will continue to increase steadily for several more years.
- Portions of asset populations will require bulk replacement due to technological obsolesces or end of life, as the Transmission system was built out in waves over time.
- The current forecast for the Expand Program will increase asset populations and perpetuate the "wave build-out" effect.
- Increased replacements will be necessary in the near-term to mitigate backlog.

8.3 Asset Condition and Trends

Transmission's asset health is calculated based on the type of asset and the ability to measure degradation of the asset. For example, a relay is a self-contained device that provides little if any indication of its likelihood to fail. In contrast, a disconnect switch is a mechanically actuated device exposed to the environment and may fail to operate at different intervals given usage and weather, and in many cases there are indications of its likelihood to fail to operate. In some cases the health of the asset is a function of age. However, in other cases, a primary replacement driver could be technological obsolescence or lack of manufacturer support.

In general, Transmission establishes the health of its assets using asset-age, with some asset types using condition information (health modifiers) and expert assessment to further modify asset health to account for the variability of the physical and operating environments. As one aspect of the Value Framework effort discussed in Section 9, Transmission will be maturing health scores for prioritized asset types within the Asset Hierarchy.

Figure 8.3-1 demonstrates Asset age, shown by program. The graph showcases the assets organized into four separate categories: Power System Control (PSC), System Protection Control (SPC), Substation (Sub) and Transmission Line Maintenance (TLM). The figure below represents 80% of our total assets based on accessible data from Cascade and illustrates some upcoming waves of aging assets. The graph showcases the need to increase the volume of execution in the Sustain program moving forward.

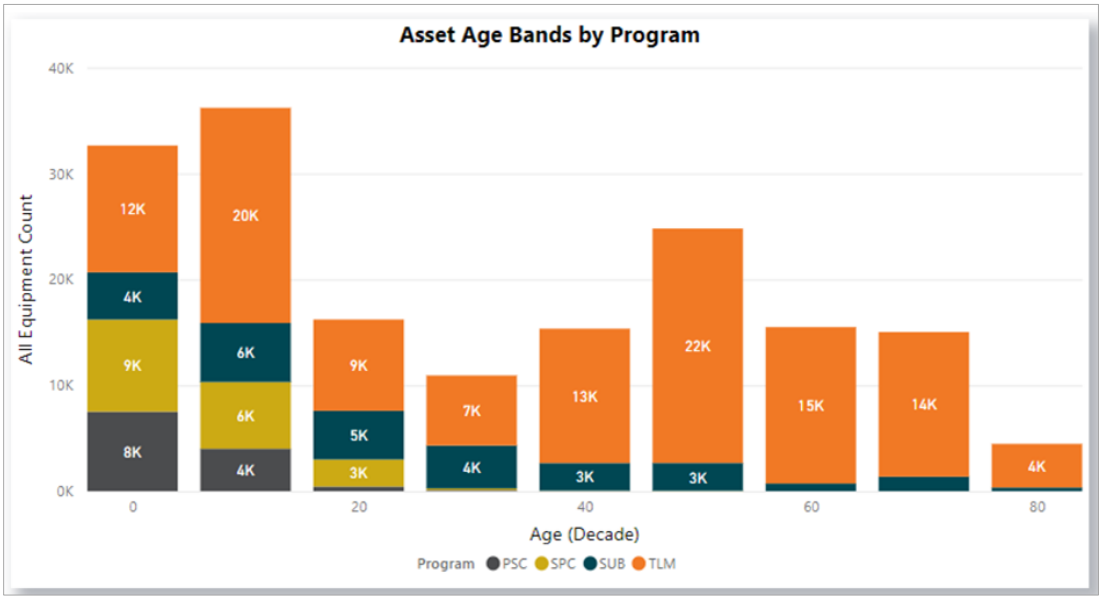


Figure 8.3-1, Asset Age Bands

Asset health and age are foundational data points in the decision criteria for asset replacement plans and maintenance interventions. (See Section 9) Transmission applies asset-specific interventions where warranted. For example, recognizing the high price and long lead time of transformers, Transmission is currently developing a spare transformer program to address the specific strategic implications of the supply chain challenges for this asset type.

Transmission also evaluates System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI), a lagging indicator, to assess reliability over time, with trends shown in Figure 8.3-2. As Transmission Asset Management matures, additional asset performance metrics will be developed and described in future SAMPs.

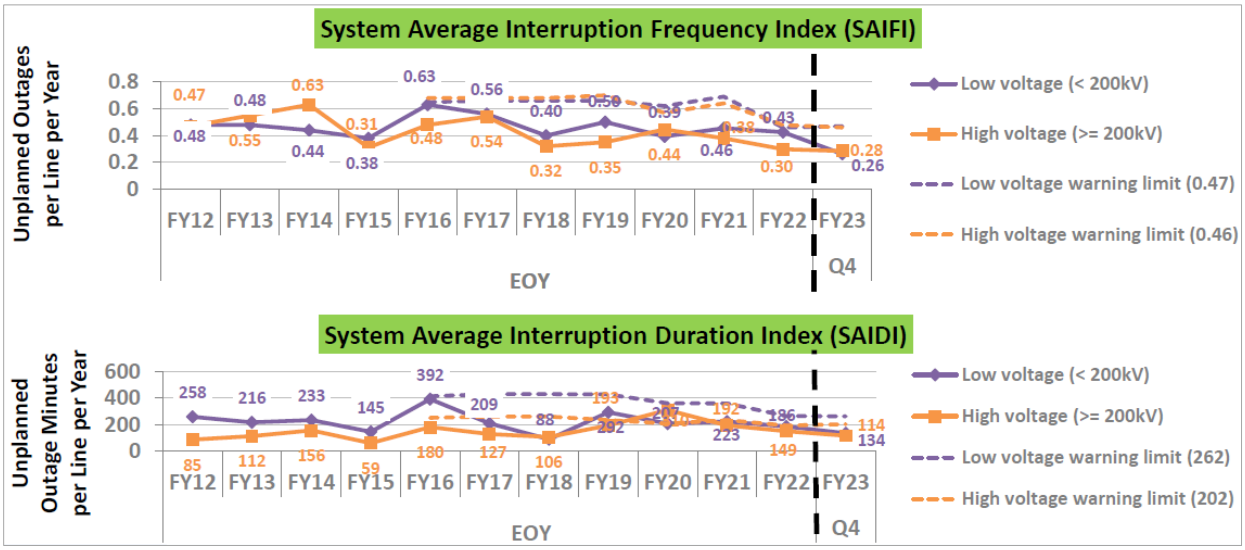


Figure 8.3-2, 2024 Maturity Assessment Results

8.3.1 Asset Age

As noted in section 3.3, Transmission manages over 313,000 assets with over 220 asset sub-types that have a useful life span from a few to many decades. Therefore, averaging asset age across asset sub-types does not produce indicative information related to asset health, asset performance, and/or asset replacement needs. Through development of the risk-based decision-making Value Framework, asset age, as a factor of asset health, will be standardized and applied across the asset base. In addition, we will be maturing health scores for prioritized asset types within the asset hierarchy by defining appropriate methodologies; mapping data models to the methodologies; working closely with BPA's Data and Governance AMM focus team; and designing specification models per asset type.

8.3.2 Asset Condition

Maintenance Services are established for each Asset Type and/or Asset Sub-Types. The maintenance service defines the task, task type, and task frequency, which are grouped into services that are scheduled through the Maintenance Management System for the asset. The service structure can support routine, population-based maintenance, and tasks that are unique for model type, age, and condition variables. Most of the maintenance Transmission currently performs is population-based.

Asset Condition is impacted by the efficiency, timeliness, and minimization of maintenance-induced errors of the Maintenance Services. Transmission rigorously monitors maintenance service performance and backlog tracking for most Critical Assets in the Cascade maintenance management system and Figure 8.3-3 shows 40% of our total assets and their health condition information per the asset category. The y-axis represents the health condition of the asset; a health score of one means the asset condition is good or like new vs. a health score of 10 means the asset is in poor condition and has a

higher likelihood of failure. The x-axis represents the total number of assets represented per the asset category identified. The asset categories showcased below are Power System Control (PSC) assets, System Protection and Control (SPC) assets, Substation (SUB) assets and Transmission Line Maintenance (TLM) assets. This asset health data is kept up to date in the Cascade system per asset type and maintenance inspection schedule.

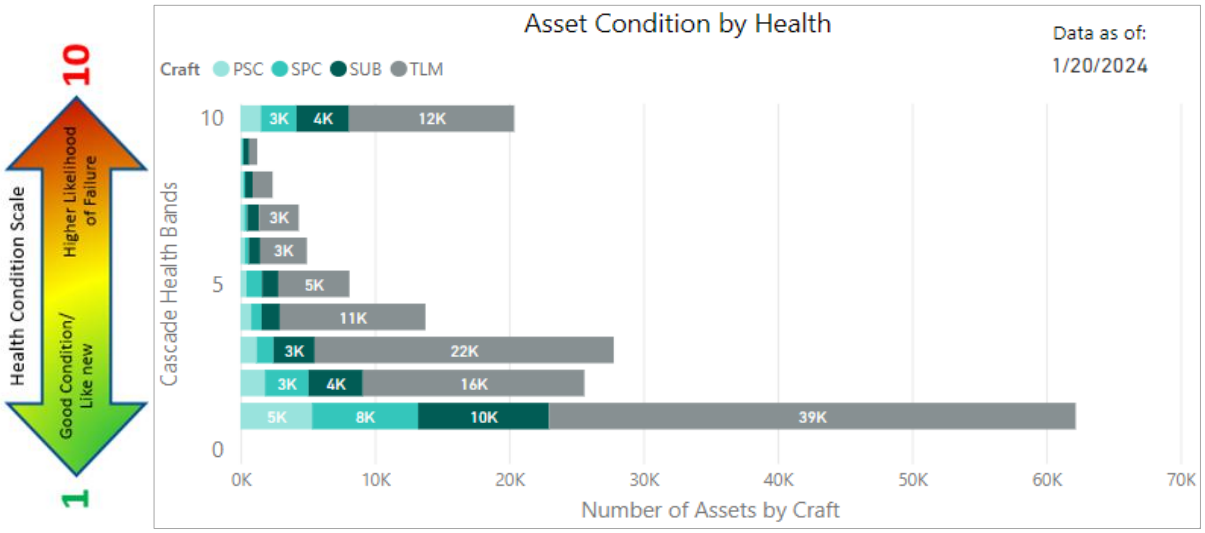


Figure 8.3-3, Asset Condition

8.4 Asset Performance

Currently Asset Performance is managed and measured at the System level by tracking the:

- System Average Interruption Frequency Index (SAIFI)
- System Average Interruption Duration Index (SAIDI)

For the last seven years Transmission has reduced the SAIDI and SAIFI targets (less interruption frequency and duration) and system performance has kept pace with those decreases.

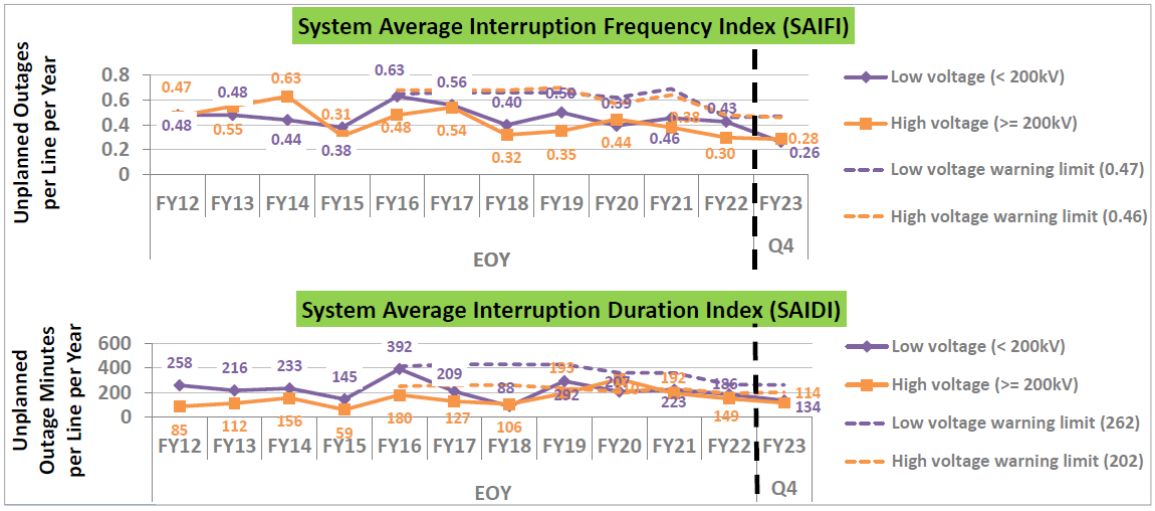


Table 8.4-1 below demonstrates Transmission's financial execution performance, as a percentage of SOY budget. In 2023, across all programs, Transmission exceeded its SOY budget, spending 114.82% of that budget. This, when viewed over time, represents an increase in execution volume when compared to prior years (for example 2018 and 2019, when 71% and 76% of the budget was spent, respectively).

Table 8.4-1, Financial Execution Performance

		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Expand		77.87%	116.92%	99.92%	65.16%	67.66%	103.80%	82.48%	93.64%	110.18%	98.59%
Sustain		106.90%	104.01%	80.54%	96.56%	75.60%	67.83%	108.82%	100.26%	110.61%	133.37%
PFIA		48.38%	6.57%	15.36%	23.09%	60.29%	70.78%	93.57%	62.96%	174.35%	60.02%
Transmission Overall		88.20%	108.82%	87.03%	81.66%	71.09%	76.44%	98.92%	95.46%	113.93%	114.82%

8.5 Performance and Practices Benchmarking

Transmission participates with a variety of peer utilities and organizations to share knowledge, data, and process development information. In the Asset Management space, benchmarking is informal and flexible based on the specific issue. For example, Transmission might meet with a group of partner utilities and ask them about their processes or tools, to support addressing specific gaps or investment decisions. Transmission is a member of several organizations that support information sharing, including:

- Electric Power Research Institute (EPRI)
- Centre for Energy Advancement through Technological Innovation (CEATI)
- North American Transmission Forum (NATF)
- International Wildfire Risk Mitigation Consortium (IWRMC)
- Institute of Electrical and Electronics Engineers, Inc. (IEEE)
- Pacific Northwest National Laboratory (PNNL)

Transmission has participated in member surveys on topics ranging from estimating to asset management systems, to questions more specific to particular equipment. Results are confidential with controlled distribution, and not available to be included in the SAMP.

9.0 RISK ASSESSMENT

Transmission subject matter experts currently assess asset and project risk to communicate the importance and urgency of risk-mitigating investments. Consequence/Impact elements such as Safety, Reliability, Financial, Environmental, and Compliance, in combination with asset age and condition, are discussed and identified by subject matter experts.

Transmission is aware of the need for formal, standardized, and documented inputs as one key component of data-informed risk-based decision-making, as reflected in the internal Sustain Program maturity assessment. In the current state, maturity varies among asset programs. Transmission's Portfolio Management Team (PfMT) has begun to apply the 'Methodology for Sustain Project Prioritization and Selection,' which is owned by the Strategy, Asset and Program (TPO) organization and provides a common definition of criteria and methodology for assigning priority to a Transmission sustain program project, as well as the selection of the next Sustain project to be performed.

Transmission continues to apply the Total Economic Cost (TEC) models as one input to allocate funding between asset programs, and to set optimal Sustain budget scenarios. In parallel, Transmission is developing a risk-based decision-making Value Framework that is being led and owned by the TPO organization and captures the Transmission organization's key value measures, financial parameters, and risks and is aligned with the overall organizational goals. The Value Framework, which is part of the Decision Support AMM focus area, when implemented systematically, will be used to evaluate and prioritize potential investments on a common scaling capability to enable the comparison of projects across Sustain, Expand and PFIA programs. Until it is automated, it will be manually run by the TPO organization and used to support subject matter assessments and discussion in a more standardized fashion.

The Value Framework is system-agnostic and manual, it will specify the risk mitigation and benefit values associated with asset interventions. In FY23, phase 1 work included Value Framework model definitions and specifications, data models and reference architectures, and roadmaps for further development. In FY24, phase 2 work is including the foundational Value Framework at the asset level and project level definitions, methodology, and documentation are scheduled to be completed by the end of FY24. Beyond FY25, phase 3 work will include the Value Framework continuing to be a work-in-progress. The Value Framework maturation project phase 2 will produce calibrated models, full documentation, and a roadmap for further maturation, establishing a solid foundation for further maturity.

Transmission is currently working to define requirements and processes for an automated tool that Transmission refers to as the Transmission Portfolio Optimization Tool (TPOT), which requires making an IT request. The TPOT system, which is targeted for full system usage in roughly 2027, will enable automated risk-based decision functionality. In addition, it will allow Transmission to stop applying its Value Framework manually, enabling the ability for dynamic optimization of the Portfolio, and demonstrating the impact and consequences associated with this optimization, all in an automated tool. Without this automated application, maturity will not advance past phase 2, given the number of assets, the number of asset types, and the complexity of the calibrated models Transmission manages.

The Value Framework that is currently under development is an evolution from what was detailed in previous Transmission SAMPs. This evolution retains many of the elements of the original CHR approach, but also includes the following:

- Maturing the asset-level Value Framework
- Establishing the project-level Value Framework
- Developing business process documents
- Instituting a Value Framework governance structure to systematize change

For this SAMP, Transmission is opting to exclude heat maps.

- In prior SAMPs Transmission manually created heat maps for some asset types that were based, in part, on the asset health and an approach on "criticality" that has since been modified to conform better to industry best practices.

- Transmission has partnered with a leading industry expert and the Agency's Enterprise Risk Management Office to develop an improved methodology to help assure that resulting heat maps represent an accepted approach and help depict a more accurate risk picture.
- Today the risk-based decision-making methodology, within a Value Framework, is under development and addresses data, source system, and methodology alignment issues identified in previous years. These advancements will give Transmission the data and structure needed to complete heat maps in the future with enough accuracy to represent the risk related to the transmission system assets.

A visual depiction of the manual work underway in FY24 is shown in Figure 9-1. Additional content will be available for inclusion in Transmission's next SAMP update, though full development of a heat mapping capability and Value Framework will not be deployed without an automated tool like TPOT to process data for the significant number of assets and projects Transmission manages.

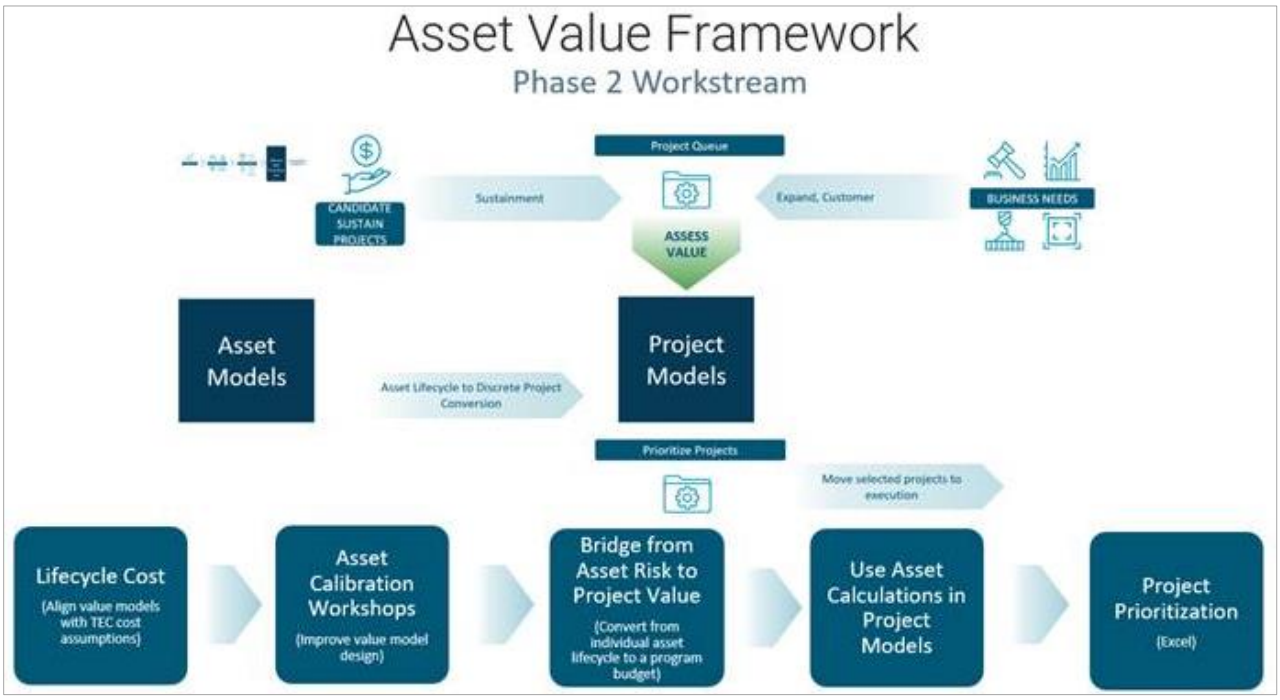


Figure 9-1, 2024 Maturity Assessment Results

10.0 STRATEGY AND FUTURE STATE

Transmission Asset Management is not a linear system of inputs to outputs. Transmission owns a highly variable population of assets. For example:

- the average lifespan of an asset varies from several years to over 80 years
- the average cost of an asset varies from $1,800 to over $18M
- the average cost of a project varies from $25,000 to over $250M
- the duration of project ranges from 2 to 12 years

As such:

- an increase in the amount of capital spending may or may not increase the number of assets added or replaced and vice versa;
- quantifying health by average asset age across the system is not indicative of current and future asset performance;
- benchmarking average age by asset type is problematic because of operational, environmental, and maintenance practice variability;
- Transmission has been designed to track and manage capital spending as an indicator of success. However, the addition of asset count tracking in 2016 add more context and demonstrates some of the nonlinear complexities in asset replacement.

Transmission knows that:

- the number of assets being replaced is declining and that is driving up the average age of the assets on the Transmission system;
- the cost of labor and materials is increasing;
- the availability of skilled labor and of materials is challenging;
- the utility industry is saturated with developing technologies;
- the system operating environment is more volatile than before, introducing emerging issues related to operations, maintenance, and design considerations related to temperature, precipitation, fire, population growth and shift, urban development, and natural disasters.

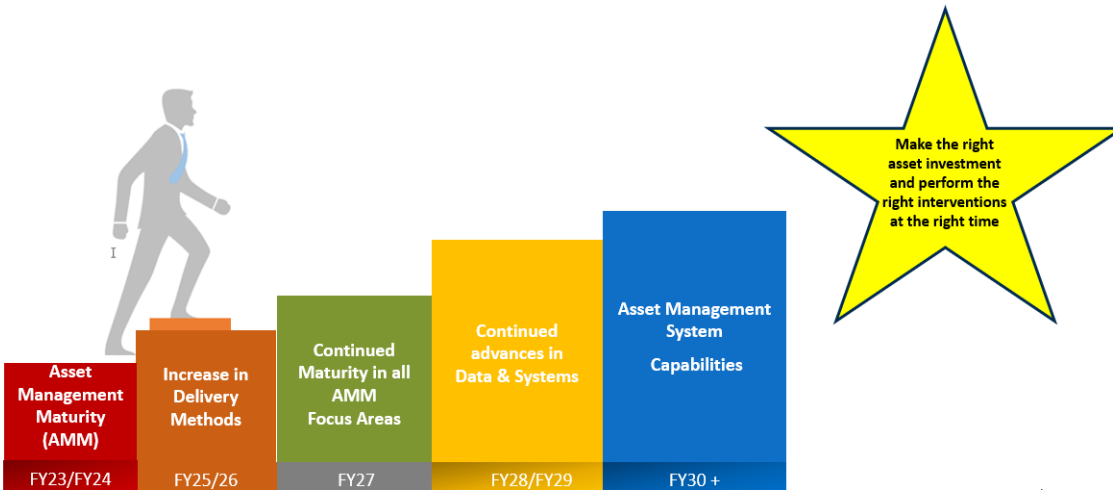
The overall strategy is to target growth over the next four years, to meet the planned needs of the Sustain Program and the anticipated needs of the customer led Expand Program. The Transmission Expand Program may warrant higher growth requirements, and Transmission will adjust as appropriate.

10.1 Future State Asset Performance

The Operations Strategy, as part of the Asset Management System, will detail the addition of asset performance management and measurement at the asset level in addition to the system level. This is intended to mature establishing asset metrics and will help identify diminished individual asset performance as well as inform modifications to maintenance practices. (See Section 6.2)

10.2 Strategy

As discussed previously in the SAMP, Transmission has identified the need for capability enhancements to support its long-term program strategies. A visual depiction of Transmission's overall asset management strategy is represented in the graphic below, and additional details are included below.



In FY23/FY24: Transmission begins the advancement of their AM program overall, by assigning a new Director of Asset Management (AM).

Four new Asset Management Maturity (AMM) Focus areas are established with the following goals:

Decision Support:

- **Risk based decision making** Value Framework in place:
  - At the asset level
  - At the project level, with a common economic value for all asset programs: Sustain, Expand and PFIA.
  - Prepare business requirements for a potential Transmission Portfolio Optimization Tool (TPOT)

Asset Management System (Process, Policy, and Governance (PPG)):

- Establish the new Sustain program business case template
- Establish roles and responsibilities for the sustain program
- Document processes, policies, procedures, and governance around the Sustain capital program

Data & Systems Governance:

- Asset Definition and Hierarchy Mapping
- Asset Register
- Risk-Based Decision Data Set Identification, Collection, and Storage (ongoing)
- Additional capability development and function mapping

Demand Forecasting & Capacity Planning:

- Standard Project Types with Resource Estimates (Stage gate 0 – Stage Gate 4)
- Fully Adopt Microsoft Project (MSP) Business Rules
- Evaluate Dedicated Delivery Methods

In FY25 & FY26: Transmission continues to respond and prepare for the large influx of requests for Products and Services, with one planned set of projects known as Evolving Grid Projects 1.0, and another tentatively planned set known as Evolving Grid 2.0. The Evolving Grid Projects are explained in Section 10.2.2 as part of the Expand strategy.

- **Demand Forecasting & Capacity Planning:**
    - Resource management capability is established, documented, and successfully relied on for work delivery strategies
    - Increasing existing delivery methods:
        - Establish and put into place a second Owners Consultant (OC) and Progressive Design Builder (PDB) combination to outsource additional work that is similar to the type of work routed to the current OC/PDB.
        - Put into place additional contracts to outsource small project work that is currently delivered by the Primary Capacity Model (PCM).
    - Business requirements for TPOT are submitted to IT through the IT System Life Cycle (SLC) process and prioritized, resourced, and funded by the APSC for FY25
    - Asset Management metrics are developed
- Decisions on the future replacement or upgrade of Transmission's current maintenance tool, Cascade, will be decided, funded, and approved. If an Enterprise Asset Management system is selected to replace multiple systems, integration would be required between Cascade and that new system. The Cascade upgrade effort is being led within Transmission.
- Decisions on the future replacement or upgrade of the Agency's Asset Suite program, will be decided, funded, and approved. As noted above, if an Enterprise Asset Management System is selected to replace multiple systems, integration would be required between Asset Suite and that new system. This effort is led outside of Transmission, by Corporate Modernization.
- Continued updates to the Total Economic Cost (TEC) models, with updated data, project information and execution levels.

By FY27: Work will continue in all AMM focus areas, Transmission anticipates realizing the following benefits:

- Process, Policy and Governance:
    - AM processes continue to be matured, documented, consistent, and efficient
- Data & Systems Governance:
    - Asset data continues to be efficiently managed, accessible, and structured to enable effective AM
    - AM systems are appropriately integrated and relied on to automate and manage core processes
- The TPOT system, which is targeted for full system usage in Transmission by roughly 2027, will enable automated risk-based decision functionality and Portfolio optimization capabilities.
    - TPOT is planned to absorb the capabilities of several tools, some of which are no longer supported by IT:
        - **i.** TEC models
        - **ii.** TAPM
        - **iii.** Business Case library
        - **iv.** EaSI/Chess (i.e., estimating)

v. Manual Asset Risk Analysis Tool (MARAT)
vi. Net Economic Benefit Ratio (NEBR) models

By FY28 & FY29: Continued advances in Data & Systems across Transmission and BPA

- Continued maturity of TPOT
  - Data validation
  - Data and System integration
  - Continued implementation and optimization
  - Predictive Analytics
- Targeted continuous improvement in data and systems
  - Retire Cascade once Cascade data has been integrated into the replacement system
    - Data and system integration with TPOT continues
  - Retire Asset Suite once Asset Suite data has been integrated into the replacement system
    - Data and system integration with TPOT continues

FY30 and beyond

As discussed in earlier sections, Transmission intends to develop comprehensive strategies to establish the required Asset Management System capabilities based on the conceptual model (6 Groups, and 39 Subjects) from the Institute of Asset Management Anatomy and the ISO 55000 series of standards for asset management. Each strategy will develop and implement the objectives, management system, performance measures, and policies for that function and are time bound. To date, Transmission has identified the need for these essential strategies:

- Risk Assessment and Management
- Operations
- Maintenance
- Spares and Inventory
- Portfolio Planning & Delivery
- Market Responsiveness
- Asset Performance Assessment and Monitoring
- Resource Management
- Asset Information Systems and Data

In addition, Transmission will continue to progress and mature in the following:

- Commitment to technology, equipment, and system design modernization
- Application of Integrated Work Planning (addition, replacement, and maintenance) for optimization opportunities to include geography, system, outage/outage-less, co-termination of asset life, etc.
- Commitment to data quality, creation, management, and utilization
- Commitment to documentation quality, change management improvement, and roles and responsibilities clarification

The asset programs are making significant advances in their capabilities with advances in the AMM focus areas, Risk-informed Value Framework maturing, a maintenance program maturing and advancing, and with a potential TPOT tool in place.

10.2.1 Sustainment Strategy

By FY34, Transmission's goal is to continuously initiate and complete the optimal replacement targets as defined by total cost modeling within +/-10-% based on the Value Framework created in FY24.

- In direct relation to the risk-based decision-making Value Framework methodology, Transmission will update the current total cost model calculation methodology and asset data inputs during FY24 and FY25 to determine optimal replacement targets.
- With each Start of Year (SOY), Transmission has increased the Sustain Program Budget since FY20, from approximately $130M to $290M. Acknowledging that the rate of asset replacements needs to increase, Transmission will plan to ramp up the Sustain budget 20% plus an inflation consideration from FY24 – 27 and 5% annually thereafter in order meet the FY34 goal set by the updated total cost model calculation.

Asset Programs

Across all Asset Programs:

- Mature and standardize risk-based decision-making (Value Framework) for prioritization at the asset level for replacements and at the project level for investment approval and sequencing (See Section 9.0).
- Continuous improvement commitment to technology, equipment, and system design modernization.
- Continuous improvement in the application of Integrated Work Planning (addition, replacement, and maintenance) for optimization opportunities that includes geography, system, outage/outage-less, co-termination of asset life, etc.
- Mature asset replacement programs and asset maintenance programs into whole-life asset management programs (FY25+).
- Continuous improvement commitment to data quality, creation, management, and utilization.

Across multiple Asset Programs:

Transmission continues to apply the Total Economic Cost (TEC) models as one input to allocate funding between asset programs, and to set optimal Sustain budget scenarios.

In FY 24, Transmission will formalize a structured Critical Spare/Spare program that will include assets in the following Asset Programs: AC Substation, DC Substation, Power System Control, System Protection Control, Wood Line, Steel Line, System Telecommunications, and Control Center. The design and build of the Critical Spare/Spare program began in FY24, with implementation in FY25.

In addition, in FY24, Transmission will work to restructure the asset strategies and plans for the Control Center and Power System Control (PSC) Programs. With the rapidly changing regulatory and federal requirements, the new strategy and plan will need to address the need for new

business and system capabilities, new and/or different process and system controls, increased asset and total system replacements, and new information technologies.

By FY26, Transmission will formalize remaining guidance that drives the Maintenance Backlog management for Substation and Linear assets.

10.2.2 Growth (Expand) Strategy

The BPA Transmission Plan (Open Access Transmission Tariff Attachment K) is developed by the Transmission Planning organization. The annual planning process recommends a ten-year plan of service to support the needs identified from the annual reliability system assessment, transmission service requests, new generation interconnection requests, and line & load interconnection requests. Acknowledging the many uncertainties that exist in the evolving energy industry, the Transmission Plan is a robust yet flexible forecast of Transmission needs. (See Section 3.4)

- The Transmission Plan assesses and describes investments needed to support existing obligations and forecast requests for Products and Services, which complements the asset replacement programs.
- Transmission system expansion will be dominated by compliance and customer-driven requests to serve continuing growth in renewable generation and large load additions, specifically data centers. Energy storage projects are on the horizon, and these may also require system reinforcement. Any required reinforcement needs to be in place ahead of time. BPA and the region are increasingly looking to commercial and technical alternatives to meet dynamic system demands.

As a result of the Transmission Plan published in January 2023 and the 2022 TSEP Cluster Study assessments, Transmission proposed 10 projects in FY23 to enable future growth by adding to and/or upgrading the Transmission System. These projects, collectively called Evolving Grid Projects (EGP) 1.0, started in FY23 and are forecasted to continue through FY32 and will replace approximately 200 miles of line, add approximately 50 miles of line, add one transformer, add two new substations, and rebuild an existing substation.

Transmission is forecasting another large group of projects in response to the 2023 cluster study results. Transmission has identified 14 new projects totaling a potential estimated $3.9B in direct costs. The projects are needed in many future scenarios for reliability, expanded load service, and as renewable resources seek delivery to load. The 2023 Transmission Service Requests (TSR) Study and Expansion Process (TSEP) projects are not just stand-alone projects, many build upon the previously identified projects from prior cluster studies. Transmission identified and will be pursuing system enhancements expected to take through 2038 to complete. Transmission will have additional information about this grouping of potential projects, collectively called EGP 2.0, in greater detail by the first quarter of FY25.

Forecasted requests for Transmission Services are expected to continue increasing for at least the next 17 years, so the Expansion Program is expecting the volume of projects resulting from the Transmission Plan, Customer Requests, and Cluster Studies to continue on pace with that increase. The Expand Program anticipates that the volume of required projects will spike in years closer to the state targets renewable portfolio standards. In the Pacific Northwest, that is 100% by 2040 for Oregon and by 2045 for Washington and California.

Given the state of market and system conditions, Transmission is again embarking on efforts to increase Portfolio Delivery capacity, as noted above (under Demand Forecasting & Capacity Planning), including these two initial strategies and solutions that would involve significant increases in the capacity of the Secondary Capacity Model (SCM):

- Establish a second Owners Consultant (OC) and Progressive Design Builder (PDB) combination to outsource additional work that is similar to the type of work routed to the current OC/PDB.
- Put into place additional contracts to outsource small project work that is currently delivered by the Primary Capacity Model (PCM).

The additional capacity would increase Transmission's flexibility to expand or downsize its capacity as dictated by system and market needs. Transmission will continually evaluate Portfolio Delivery capacity as visibility into future work becomes realistic and the certainty of the future Evolving Grid Projects 2.0, per the results of the 2023 TSEP cluster study, are agreed to and approved by FY25.

In addition to growing capacity, Transmission Portfolio Delivery is working to define how best to build projects and bundle work to optimize resource utilization and process management. Portfolio Delivery has recognized inefficiencies and is focusing on processes that were originally intended to create standardization but may have also compromised execution agility and may now need to be more lean.

Also, the Expand Program includes projects, proposed by District Management staff, that would:

- improve system operations
- improve system maintenance
- bring the system up to current standards
- operate the system more safely
- reduce the duration and frequency of outages

Finally, Transmission works with neighboring systems and entities to ensure ownership and maintenance of a comprehensive system is optimal. These opportunities expand or reduce the Transmission System through the acquisition and/or sale of assets. Currently, negotiations are in the final stages for the asset transfer of the 500, 230, and 115 kV switchyards at Grand Coulee from the US Bureau of Reclamation to BPA. This will better align the core missions of the two federal agencies and save significant dollars in annual operations and maintenance costs and overheads applied to capital and expense work performed there.

10.2.3 Strategy for Managing Technological Change and Resiliency

In 2022 Transmission contributed to the Agency Vulnerability Assessment and Reliance Plan (VARP) that identified current, planned, and potential practices for climate resiliency. Seventeen vulnerabilities were identified in the landslide, heavy rainfall, wildfire, flooding, and heatwave hazard categories. Plan measures are reviewed annually and the 2023 update indicates that Transmission has 17 current practices and four planned practices under evaluation to improve resiliency measures:

- Design and construct transmission assets to reduce ignition sources.
- Replace wood poles with steel poles in areas vulnerable to wildfires.
- Upgrade older buildings with fire-resistive materials in areas vulnerable to wildfires.
- Under evaluation: Install weather stations in transmission rights-of-way to collect information on ambient temperatures and adjust power when necessary to keep the line operating within capacity limits.

To support the VARP findings, Transmission continues to mature its Wildfire Mitigation program and its Public Safety Power Shutoff (PSPS) programs, including supporting processes, tools, and expertise. Transmission continues to mature its capabilities through acquisition of modeling tool(s), continued benchmarking with other utilities, and becoming more efficient in its processes on developing the PSPS list for Transmission as early as January of each year. This resiliency work directly supports the capital projects planned as well as potential responses to and preparation for fire season.

In 2021 BPA began the approval process for the replacement of the existing Dittmer Control Center with the new Vancouver Control Center (VCC) facility, intended to be completed by end of fiscal year 2031. The new VCC represents major technological changes for the agency by enhancing Power and Transmission system operations, improving Continuity of Operations (COOP), consolidating data centers, fortifying fiber loops and enabling future mission capabilities. The VCC will also reduce risks by having a seismic risk category 4 design, being compliant with BPA code policy and promoting safety by design components, and conforming to Uptime Institute tier standards for control centers. Transmission equipment and technology related to the VCC is included in the SAMP, whereas the buildings (and other Facilities components) are included in the Facilities SAMP.

The Boardman to Hemingway project (B2H) is not included in the SAMP. BPA did engage in public processes to discuss B2H with customers in 2022/2023.

10.3 Planned Future Investments/Spend Levels

Table 10.3-1 lists the expected spend levels for fiscal years 2026 through 2035 for both capital and expense.

Table 10.3-1, Planned Investments

Program										
Capital	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Expand	$ 477,000	$ 602,000	$ 552,000	$ 371,000	$ 353,125	$ 337,250	$ 93,000	$ 100,000	$ 100,000	$ 100,000
Sustain	$ 415,073	$ 433,892	$ 510,078	$ 439,918	$ 444,314	$ 489,375	$ 444,213	$ 457,540	$ 471,266	$ 485,404
PFIA	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000
Total Capital	**$ 922,073**	**$ 1,065,892**	**$ 1,092,078**	**$ 840,918**	**$ 827,439**	**$ 856,625**	**$ 567,213**	**$ 587,540**	**$ 601,266**	**$ 615,404**
Expense^										
O&M	$ 273,713	$ 286,816	$ 301,137	$ 280,634	$ 288,663	$ 296,631	$ 304,556	$ 312,420	$ 320,490	$ 328,770
Other	$ 29,021	$ 30,547	$ 32,495	$ 22,957	$ 23,691	$ 24,420	$ 25,148	$ 25,869	$ 29,927	$ 30,560
Total Expense	**$ 302,734**	**$ 317,363**	**$ 333,632**	**$ 303,591**	**$ 312,355**	**$ 321,051**	**$ 329,704**	**$ 338,289**	**$ 350,417**	**$ 359,330**
Total Transmission	**$ 1,224,807**	**$ 1,383,256**	**$ 1,425,709**	**$ 1,144,509**	**$ 1,139,793**	**$ 1,177,676**	**$ 896,917**	**$ 925,828**	**$ 951,683**	**$ 974,734**

*** EGP 1 only - EGP 2 is not included**

^ IPR_BP26_A (5-3-24); FY29-FY35 subject to pending FAF update.

The expected future spend forecast for capital includes:

- Expand program budget includes the Evolving Grid Projects (EGP) 1.0 from FY2023 through FY2031
- Sustain program budget has a 5% increase plus 3% for inflation in each FY25, FY26, FY27 and FY28, with a 3% inflation for the remaining seven years.
    - Includes Vancouver Control Center (VCC) through 2031.

The expected future spend forecast for expense includes increases for/to:

- materials and labor for maintenance backlog mitigation
- expense-related-capital to support growth in the Expand Programs
- support the Lines Ratings and Facilities Ratings mitigation programs
- support the district addition required for the Grand Coulee asset transfer
- support the forecasted resource additions

Table 10.3-2 lists levels of investment that would be optimal for fiscal years 2026 through 2035 for both capital and expense.

Table 10.3-2, Optimal Investments

SAMP 10.3-2 Optimal Rollup										
Program										
Capital	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Expand	$ 509,000	$ 630,000	$ 579,000	$ 575,750	$ 600,500	$ 595,500	$ 588,500	$ 590,500	$ 590,500	$ 590,500
Sustain	$ 492,880	$ 484,630	$ 531,580	$ 449,580	$ 441,780	$ 474,280	$ 403,680	$ 403,680	$ 403,680	$ 403,680
PFIA	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000
Total Capital	$ 1,051,880	$ 1,164,630	$ 1,160,580	$ 1,075,330	$ 1,092,280	$ 1,119,780	$ 1,042,180	$ 1,044,180	$ 1,044,180	$ 1,044,180
Expense										
O&M	$ 302,154	$ 326,327	$ 342,643	$ 359,775	$ 377,764	$ 396,652	$ 416,485	$ 437,309	$ 459,174	$ 482,133
Other	$ 36,317	$ 39,340	$ 41,392	$ 43,462	$ 45,635	$ 47,917	$ 43,886	$ 46,081	$ 48,385	$ 50,804
Total Expense	$ 338,471	$ 365,667	$ 384,035	$ 403,237	$ 423,399	$ 444,569	$ 460,371	$ 483,390	$ 507,559	$ 532,937
Total Transmission	$ 1,390,351	$ 1,530,297	$ 1,544,615	$ 1,478,567	$ 1,515,679	$ 1,564,349	$ 1,502,551	$ 1,527,570	$ 1,551,739	$ 1,577,117

***EGP 1 and 2 are included**

The optimal future spend forecast for capital includes:

- Expand program optimal budget includes:
    - The approved forecast for the Evolving Grid Projects (EGP) 1.0 from FY2023 through FY2031

    - The forecasted EGP 2.0 projects, with forecasted spend in FY28 through FY38
- Sustain program optimal budget was determined by Transmission applying the Total Economic Cost (TEC) models as one input to allocate funding between asset programs; in addition, Vancouver Control Center (VCC) has been included through 2031

The optimal future spend forecast for expense includes increases for/to:

- materials and labor for maintenance backlog mitigation
- expense-related-capital to support growth in the Sustain and Expand Programs
- support the Lines Ratings and Facilities Ratings mitigation programs
- support the district addition required for the Grand Coulee asset transfer
- support the forecasted resources additions

10.4 Implementation Risks

A significant Portfolio execution risk is Transmission's maturity in work forecasting, capacity planning, and setting budgets. Adding to that are complexities such as:

- long project execution timelines
- dependencies on other business units/organizations for project resources
- short lead times for project identification and authorization
- high volumes of identified customer projects and low volumes of project authorizations
- long required project execution timelines, with short requested timelines

As the Portfolio of work continues to grow, Transmission will begin to face Portfolio Delivery complexities and limitations with respect to system limitations related to geographical saturation, outages, and system capabilities.

Transmission budgets and estimates lag behind current economic conditions related to material supply chains, financial inflation, and unemployment/employment. As such, increases and/or decreases to spending levels and work volumes may not fully deliver expected results in the expected timeframe. In many instances these conditions are fluid and mitigation plans are ineffective.

Volatility and unpredictability of demand creates complex resourcing challenges. It is a real-time, present-day reality for Transmission to determine the proper:

- amount of continuous workload,
- inventory levels,
- sparing strategies,
- budget variability and potential limitations on borrowing authority,
- purchasing plan based on market availability of equipment,
- controls to avoid reducing Sustain Program resourcing to counterbalance market demand, and
- definition of discretionary and non-discretionary work.

Transmission is dependent on resources from the following internal organizations.

- To deliver on the Transmission Portfolio of work: Environment, Fish & Wildlife; Safety; Security & Continuity of Operations; Supply Chain; Information Technology; Compliance, Audit, & Risk; Finance; Intergovernmental Affairs; and General Counsel.

- To attract and secure the human resources needed to deliver on the Transmission Portfolio of work and to mature asset management: Workforce and Strategy Office, Human Resource Services, Supply Chain, and Finance.

As Transmission targets aggressive growth over the next four years, additional resourcing from these partner organizations will be required.

Transmission's aggressive efforts to mature asset management as a business model, ramp up its system investments to record highs, and operate resiliently in a rapid changing technological environment are limited by its Information Technology (IT) systems and applications. For example, Transmission:

- Has used the Asset Suite procurement system as a partial asset register and it is due to be retired (sunset) within five years without a planned replacement to date.
- Has used the Cascade maintenance management system as a partial asset register and it is due to be retired (sunset) within five years without a planned replacement to date.
- Uses the same Cascade maintenance management systems for all corrective and preventative maintenance tracking and reporting.
- Has limited system integration across the 9 major asset management applications and the 100+ unstructured applications/tools used today.

This IT environment is the major contributor to the current and future business development for Transmission. Progression past a 2.0 maturity level score for the majority of the IAM Assessment Groups is unachievable without IT support.

10.5 Asset Conditions and Trends

Transmission's current state capability in evaluation of asset conditions and trends is discussed in section 8.3. As indicated in previous sections, Transmission manages over 313,000 assets with over 220 asset sub-types that have a useful life span from a few to many decades. So averaging asset age across asset sub-types does not produce indicative information related to asset health, asset performance, and/or asset replacement needs.

In the current state with current tooling, Transmission does not have the ability to display an overview of expected changes to the age of the assets, at the portfolio level, due to the variability and number of assets managed within Transmission.

10.6 Performance and Risk Impact

Transmission has elected not to provide heat maps in this SAMP, due to reasons listed previously in the document. As a result, Transmission is not able to provide content for section 10.6, which requires updated heat maps to those provided in section 9.

11.0 ADDRESSING BARRIERS TO ACHIEVING OPTIMAL PERFORMANCE

Transmission faces barriers to achieving optimal performance and has plans in place to mitigate the impacts of the most significant risks. Transmission operates in a complex internal and external environment, as presented in detail in the SWOT analysis in section 5. Primary risks include challenges in attracting and retaining staff, an aging system, supply chain constraints, increasing costs, increasing physical and cyber security attacks, increasing volumes of customer requests, and a changing generation mix with potential load impacts. The mitigation plans are summarized in the below table.

SIGNIFICANT RISKS	MITIGATION PLAN
Complex environment of aging assets	• Ramp up sustain spending for the next 5 to 10 years • Continue to mature AM capabilities to focus limited resources on most critical replacements • Continue to evaluate opportunities to change practices to maximize resources
Global supply chain issues with materials and resources	• Maintaining more equipment in stock • Developing, standing up and maturing our sparing strategy • Changed existing contracts and added new language into new contracts to allow earlier material procurement efforts for long-lead time items
Talent acquisition/retention	• Hiring additional resources and maximizing available HCM tools to remain competitive
Increase in costs for labor and materials	• Requesting additional borrowing authority • Evaluating processes and inventory levels to mitigate for lead times
Increased physical and cyber security attacks	• Increasing cyber security focus to protect networks, discover and prevent changes to devices and protect data from unauthorized access or criminal use • BPA has increased its priority on its security project

In addition to the known significant risks, Transmission faces some additional barriers to optimal performance, though the extent that these risks will materialize remains unknown at this time. The regional and global environment remains complex, and Transmission works to build resiliency into system and programming decisions, to mitigate the impact that this complexity will have on the Transmission system. Transmission also remains well connected to regional and national policy discussions, so that responses can be coordinated and collaborative when a Transmission response is needed. Wildfire risk is another unknown risk, but Transmission has dedicated significant resources to its wildfire mitigation program. Transmission has modeled a range of potential scenarios and is always working to increase program maturity to mitigate future regional wildfire impacts. Transmission's collaborative approach with other utilities across our service territory serves to mitigate wildfire risk, as Transmission strives to remain coordinated in all activities, from preparation, to mitigation, to, when necessary, response.

EXTERNAL RISKS	MITIGATION PLAN
Regional and Global Impacts	• Build resiliency into system and programming decisions • Respond in a coordinated and collaborative way
Wildfire Risk	• Continue to mature the wildfire mitigation program, including supporting processes, tools and expertise • Continue to work with the cities, states and regionally on wildfire mitigation and preparation

12.0 DEFINITIONS

Financial Terms:

Indirect Costs: Any costs incurred for common objectives that cannot be directly charged to any single point of cost application. Indirect costs as a class have the character of `joint' or `common' costs and, as a group, are usually referred to as `burden' or as `overhead'. Indirect costs are often allocated to various categories of work in proportion to the benefit to each category.

Direct Costs: A direct cost is a price that can be directly tied to the production of specific goods or services. A direct cost can be traced to the cost object, which can be a service, product, or department.

Investment Classifications:

Compliance: Must be an executive order/directive requiring the specific investment must be made and that the project as proposed includes only the minimum required to comply with the directive. For example, Cyber Security, Highway Relocations, and biological opinions (BiOps).

Replacements: In kind replacement of equipment and components to maintain the same capacity or capability. For example, wood poles, transformers, batteries, existing buildings, breakers, reactors, and conductors.

Upgrades/Additions: Replacement of existing assets that provide added capacity and/or capability. Examples include breakers, transformers, lines, etc. that, after replacement, have higher ratings to transfer power. Replacement of applications that provide new capability.

Expansion: Adding new assets to the system that did not exist before, providing new capability. Examples include new IT applications, new buildings, new units at existing power generation sites, and new line and substations.

ISO 55000

Asset: An asset is an item, thing, or entity that has potential or actual value to an organization. The value will vary between different organizations and their stakeholders, and can be tangible or intangible, financial or non-financial.

Asset Management System: Management system for asset management whose function is to establish the asset management policy and asset management objectives.

- The asset management system is a subset of asset management.

Asset Management Plan: Documented information that specifies the activities, resources, and timescales required for an individual asset or a grouping of assets, to achieve the organization’s asset management objectives.

- The grouping of assets may be by asset type, asset class, asset system, or asset portfolio.
- An asset management plan is derived from the strategic asset management plan.
- An asset management plan may be contained in, or may be a subsidiary plan of, the strategic asset management plan.

Management System: Set of interrelated or interacting elements of an organization to establish policies and objectives and processes to achieve those objectives.

- A management system can address a single discipline or several disciplines.
- The system elements include the organization's structure, roles and responsibilities, planning, operation, etc.
- The scope of a management system may include the whole of the organization, specific and identified functions of the organization, specific and identified sections of the organization, or one or more functions across a group of organizations.

General

Hierarchy: A structure or grouping intended to represent how assets are managed and talked about, not how they are configured in any one system.

Portfolio: Group of asset types with similar attributes that are within the scope of the asset management system.

Program: A group of related assets managed in a coordinated manner to obtain benefits not available from managing them individually.

Sustain: Investments with the primary purpose of replacing existing assets.

Expand: Investments with the primary purpose of upgrading and adding assets and expanding a transmission system.

PFIA: Project(s) Funded in Advance by BPA customers. The projects can be funded or financed in advance by customers, in return for transmission credits.