

NAVIGATING AN AIRPORT'S FUTURE UTILITY NEEDS

In the years ahead, airport utilities across the country will be affected by changes in passenger amenities, environmental factors and technological advances. To stay ahead of the curve, Portland International Airport needed a utility master plan to guide upgrade projects, enhance utility system reliability, increase energy efficiency, and develop sound investment and economic performance.



PLANNING FOR GROWTH

A comprehensive utilities master plan charts a path forward by considering system growth, available technologies and overall life cycle performance through identification of system limitations.

PROJECT STATS

CLIENT

Port of Portland

LOCATION

Portland International Airport, Portland, Oregon

9

UTILITIES EVALUATED

42%

GROWTH IN
UTILITY DEMAND

50%

PROJECTED GROWTH IN
BUILDING SQUARE FOOTAGE

250+

OPTIONS EVALUATED FOR
SERVING FUTURE DEMAND

Portland International Airport is experiencing tremendous growth — growth that isn't expected to slow in the near future. As a response, the airport plans to add a large amount of square footage to its facilities over the next five years as part of its PDXNext capital improvement program to enhance passenger experience.

The impact this expansion will have on the airport's utility needs — twice its current usage — made Port of Portland (Port) management realize they needed a utility master plan (UMP). A process of analysis and planning would be required to create a recommended list of capital improvement projects that would address current demands and see that the airport utilities would work efficiently to serve both new and existing spaces.

FACING INCREASED LOAD

The existing utility master plan, performed in 1993 by our team, was nearing the end of its lifespan, requiring that the Port develop a new master plan that would define its current and future utility requirements. The new plan would identify and screen many potential technologies, providing technical and economic analysis of various strategies to find the most effective solution to the airport's needs over the next 20 years and beyond.

Our team was retained to perform a rigorous assessment of Portland International Airport's major utilities including chilled water, steam, hot water, domestic water, normal and emergency power, natural gas, fire water, sanitary sewer, and telecommunications. The goal of the resulting UMP was to evaluate the available capacity of the distribution systems, estimate the remaining life of those existing utilities and establish projected replacement dates while considering issues such as reliability, carbon neutrality and future energy resilience.

FINDING IMPROVEMENTS

In addition to analyzing future capacity needs and options for serving the load, the UMP studied miles of distribution systems to identify potential points of failure and aging segments that could impact airport operations. Armed with this knowledge, the team constructed a set of comprehensive project recommendations that addresses future utility needs, protect airport operations and increase system reliability.

The most significant recommendation calls for converting the airport's aging centralized steam boiler system to a low-temperature hot water system. Concern was expressed over the initial high cost of the changeover



exceeding the allotted system budget. Even more concerning was maintaining daily operations during the changeover, requiring that the team develop a phased approach to replacing the aging system. Through a full life cycle and financial analysis, our team confirmed that a low-temperature hot water system would not only provide better energy performance and maintainability, but also a lower total installed cost versus renewing the existing steam system. The team also worked with the Port to develop a step-by-step plan to transition from steam to hot water that avoids long-term heating outages to the airport. This system should provide an immediate payback and long-term advantages for years to come.

The report also addressed substantial telecommunications growth expected through 2021. Fixed internet protocol (IP) is expected to grow 20 percent each year, while mobile IP traffic is expected to grow 40 percent annually. By adding capacity and redundant pathways for IT, the airport can continue to meet its customers' growing needs.

The UMP not only provides recommendations for a comprehensive utility strategy, but also lays out an implementation plan for each option that coordinates with the overall capital improvement plan. This plan aims to prepare Port leadership for future repair or replacement projects and identifies possible funding mechanisms to aid in their capital planning and requests.

STAYING SMART FOR INCREASED DEMAND

By taking a proactive approach to its utility needs, the Port now has a greater understanding about what systems will need to be replaced, repaired or upgraded and how best to phase those upgrades within the airport's continuous operation and future capital improvement projects, ultimately keeping its utility infrastructure at least one step ahead of the demand.

Preparing now for the future will allow Portland International Airport to greet growth and expansion with open arms and implement a strategy that doesn't just address immediate needs, but lays the groundwork for successful operations for decades to come.

OPTIONS ANALYZED

- Boiler flue gas economizer
- Combined heat and power
- Emergency power expansion
- Free-cooling economizer
- Heat pump chillers
- Microgrid conceptualization
- Solar PV/domestic hot water
- Steam-to-hot water conversion
- Thermal energy storage
- Variable primary CHW conversion



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