Northwest **Power** and **Conservation** Council

June 7, 2022

MEMORANDUM

TO: **Council Members**

FROM: **Jennifer Light, Interim Power Planning Division Director**

SUBJECT: **2022 Northwest Regional Forecast**

BACKGROUND:

Presenter: Shauna McReynolds, PNUCC Executive Director

Summary: The Pacific Northwest Utilities Conference Committee (PNUCC) released its annual update to the Northwest Regional Forecast (NRF). This report is a summation of the region's loads and resources over the next ten years from the utilities' perspective. Shauna will present the key findings from the 2022 NRF and highlight where those findings do and do not relate to the resource strategy recommendations in the Council's 2021 Power Plan.

Shauna will also use this opportunity to introduce the Council to PNUCC's new staff: Crystal Ball, Deputy Director and Aliza Seelig, Analytics and Policy Director.

Relevance: The NRF provides a forecast of loads and resource supply to identify potential needs in the near future. This is similar to the Council's annual resource adequacy assessment which will be completed later this year, but the NRF differs in that it is essentially the sum of each utilities' load forecast and current/expected resources, providing an expected projection of future needs.

More Info: https://www.pnucc.org/system-planning/northwest-regional-forecast/

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2022 Northwest Regional Forecast

Executive Summary

This year's PNUCC N*orthwest Regional Forecast (Forecast)* marks seventy years of Pacific Northwest electric utilities updating and aggregating their individual long-term forecasts of loads and expected generation to show how the region's electric power needs are being met.

By examining utility-reported information in a consistent manner, the *Forecast* has served as a barometer for the region from the utilities' perspective, highlighting trends in an evolving power system, changes in power generation and developments in technology for meeting future electricity demand.

An Industry in Transition

A significant transition from thermal generation to clean energy resources is well underway here in the Northwest and in the rest of the Western Interconnection. With company, local, state, and federal goals to reduce carbon emissions in play, the region is seeing retirements of large thermal units and significant amounts of new renewable generation making their way into utilities' supply portfolios.

Innovative solutions, such as battery storage mixed with renewables, are being investigated and acquired to adequately accommodate this transition. And a variety of distributed generation and demand side resource options are also being explored, tested, and added to the power picture.

Just over 2,100 MW of coal have already retired in the Northwest, with more to come. And this year we've captured that two coal plants (almost 1,100 MW) will be converted to natural gas-fired generation by 2025, substantially reducing their carbon intensity.

Resource Adequacy Being Addressed Across the West

The move to a more variable clean power supply has utilities focused on anticipated peak capacity shortfalls and resource adequacy. Individual utilities have unique circumstances and needs, yet there is universal recognition that the power industry must work together to ensure an adequate, reliable power supply as the industry's transition to a carbon-free future unfolds.

This *Forecast* is the only long-term regional utility perspective of loads, resources, and future power supply. The information in this report gives the fundamental starting point for identifying regional power issues and providing facts about the state of the Northwest power system.

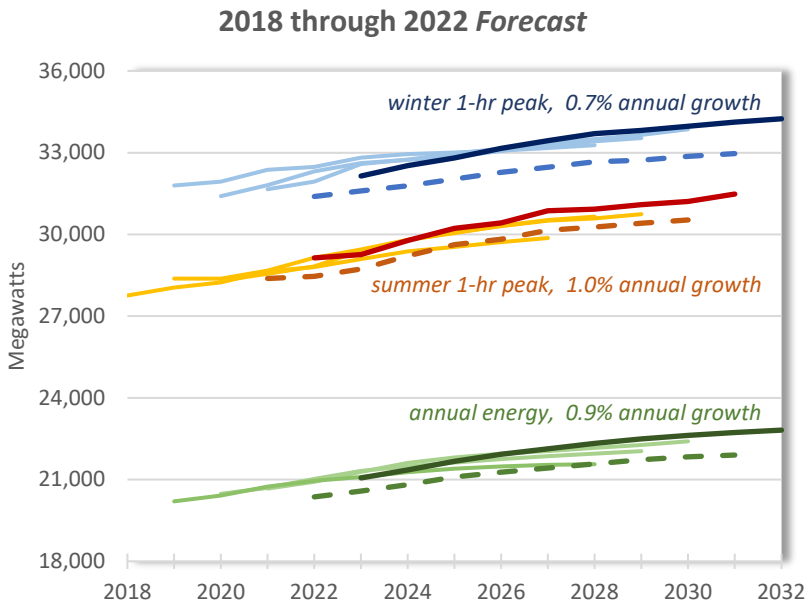
The Northwest Power & Conservation Council indicates in the just completed *2021 Power Plan* that depending on the expected future and other planning assumptions, the Pacific Northwest's need for power could range from zero to 6,000 aMW in the next seven years.

More broadly, concerned utilities across the West have joined together in a variety of forums and with state and regional entities to analyze and address their peak capacity needs. Under the umbrella of the recently renamed Western Power Pool, utilities are working together to design and implement the Western Resource Adequacy Program (WRAP) which is in its first stage of program implementation and testing. This program is intended to address near-term needs of utilities and expected to be fully functional by 2024. And the recently released *2020-2021 Regional Transmission Plan* developed by NorthernGrid highlights the transmission requirements needed to support regional reliability.

Load Forecasts Pick Up

The regional demand for electricity is influenced by an array of factors, including the economy, advancements in technology, and people moving to and around the region. Today a variety of policies, such as Oregon's Climate Change Executive Order 20-40 and the Washington Climate Commitment Act, are promoting electrification to reduce emissions and address influences of climate change, are adding to forecasters' challenges of estimating the demand for electricity.

Figure 1. **Load Forecasts Comparison**

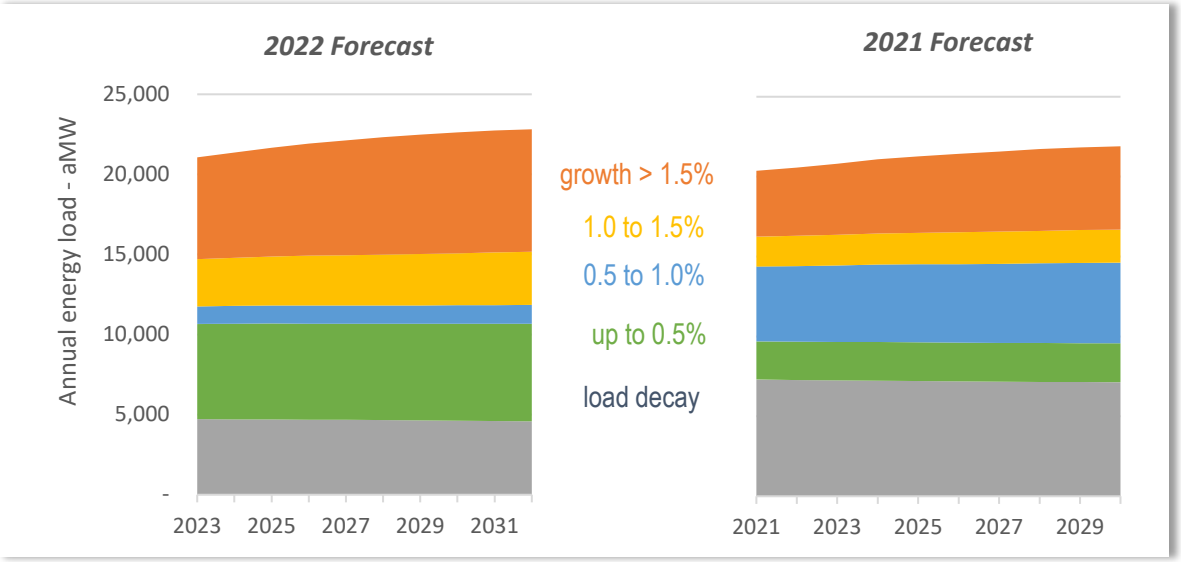


This year's load forecasts shown in the solid dark lines of Figure 1 indicate that loads are up compared to the *2021 Forecast* (shown by the dashed lines) and that load growth rates ticked up slightly for all three forecasts – annual energy and winter and summer peak. In addition to new industrial loads that include server farms, the growing population in the region, especially into eastern Washington, Idaho, and western Montana, is contributing to the growth utilities are reporting as we rebound from the impacts of the pandemic.

Utilities' load growth varies, ticking up for several

The regional annual load growth is forecasted to be 0.9% over the next 10 years based on annual energy. This is a slight uptick as compared to 2021. The more interesting story is the shift in the outlook for individual entities. Individual utilities' expected load growth varies, ranging from negative 0.9% to positive 2.9%. Figure 2 is utility loads sorted into load growth bins. Most reporting utilities are predicting similar if not increased load growth for their service area compared to last year. A greater portion of the load falls into the bin growing at more than 1.5% per year. With the share of load expecting load decay decreasing substantially.

Figure 2. **Utility Annual Load Growth Rates**

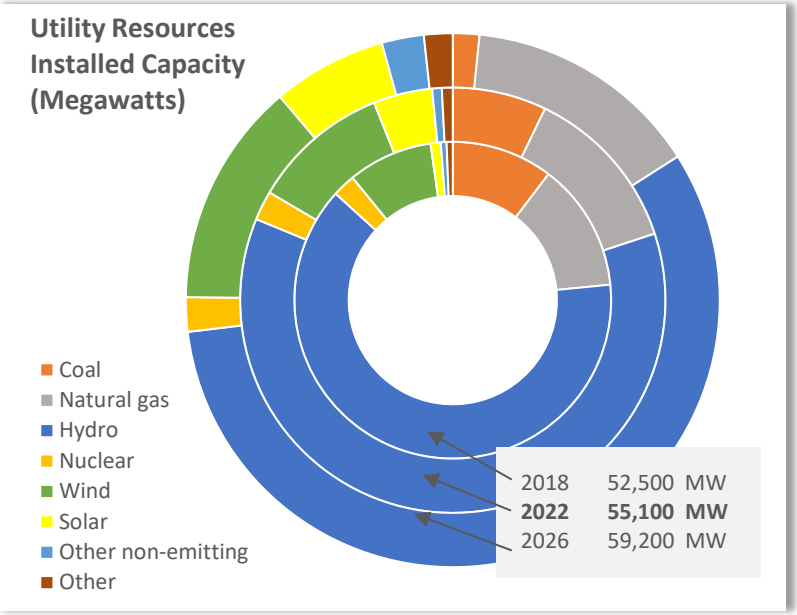


While utilities are examining the implications of electrification and climate change in their load forecasts, these factors are only beginning to influence utility load projections at this point. In this year's request for data, utilities representing just over 25% of the load indicated they are factoring in climate change and utilities making up 30% of regional load are directly accounting for some electrification. This year increases in population and growing industrial load are bigger factors for the fastest growing utilities.

Majority of Northwest Generation is Carbon-Free

With hydropower as the foundation of the region's power supply, the share of non-emitting resources meeting the region's needs is steadily growing. Measured by project size, Figure 3 shows that the share of carbon-free resources in the Northwest grew from 76% in 2018 to 79% in 2022 and is expected to be at or above 83% by 2026.

Figure 3. **Northwest Generating Resources 2018, 2022, 2026**



Because of the annual variability of water supply, the shares of the actual carbon-free generation produced in the region significantly varies year to year. In good water supply years, hydro generation can make up more than 80% of total generation. And on the flip side, low water conditions can limit the amount of generation provided by hydropower.

In addition to hydro, the 1,200 MW Columbia Generating Station, 5,800 MW of wind, and 2,470 MW of solar make up the regional utility-owned and contracted carbon-free resources today.

Variable resources replacing baseload

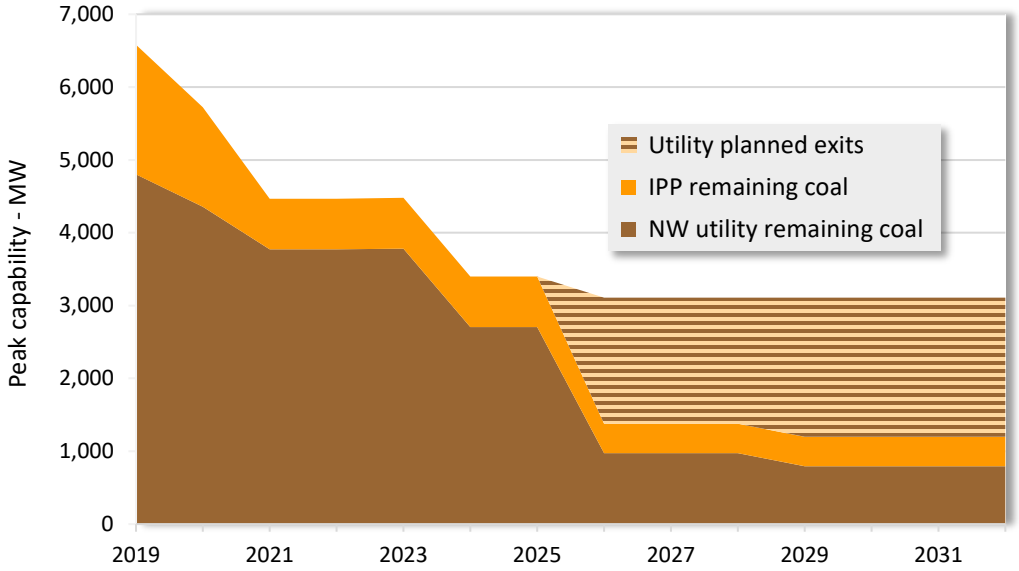
The transition from coal-fired generation to clean power technologies is progressing. By the end of the study horizon only a few utilities are reporting a fraction of existing coal plants in their resource portfolios.

New generating resources in the past five years have been largely solar and wind, with batteries and some hybrid combinations coming into the system. In addition, new contracts, including some that firmed up regional hydropower, have recently been added to the power supply picture.

Plans for Exiting Coal Progressing

Utilities across the West are phasing out coal-fired generation from their resource portfolios. In the Northwest, the exact timing is coming into focus. Figure 4 shows since 2019 the Northwest has retired 2,100 MW of coal peak capacity (half of that amount utility-owned). And looking ahead, Northwest utilities will be exiting positions of another 2,800 MW by 2026.

Figure 4. **Coal Plant Availability**



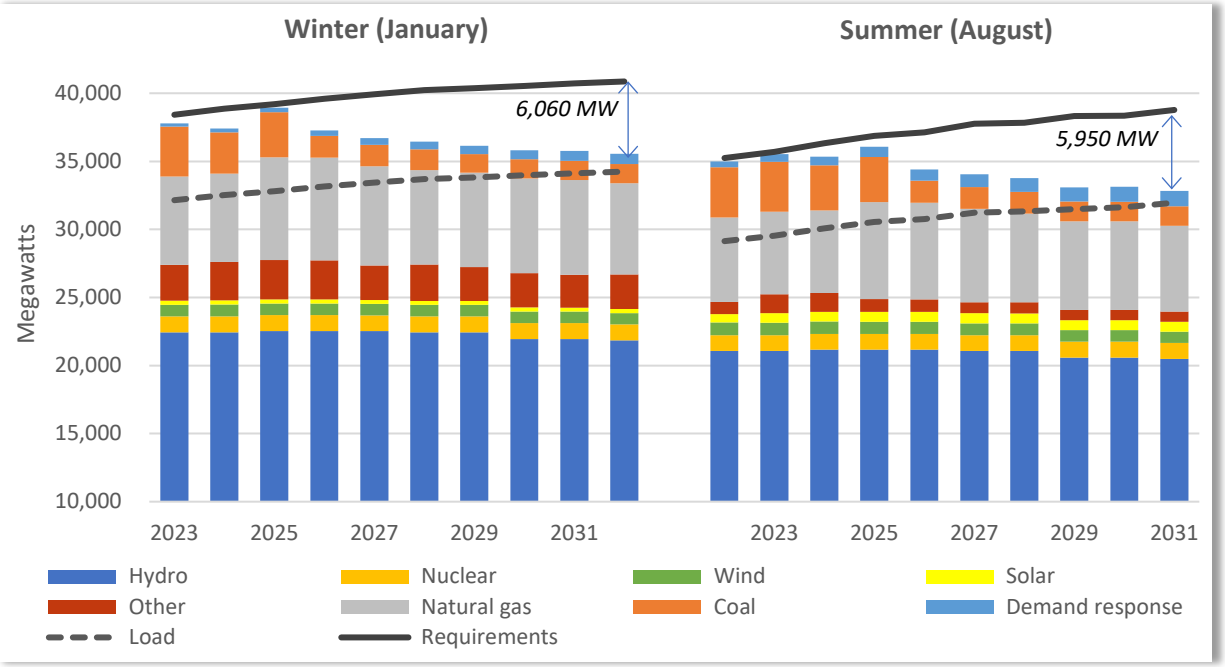
Two coal units are being converted from coal to natural gas-fired generation. What is yet to be seen is, if the generation from coal units (shown in the striped area) will be available for others to use. New carbon reducing technologies are being considered for the remaining utility-owned units and are currently expected to continue operating.

Summer Peak Gap Grows to Size of Winter

A comparison of Northwest utilities' peak loads to the expected peaking capabilities of their resources shows a growing difference between supply and demand over the next decade due to coal plant retirements and forecasted load growth. Figure 5 below shows how utilities' peak loads and resources stack up for winter (January) and summer (August).

The winter peak deficit, much like last year, grows from 900 MW to 6,060 MW over the 10-year horizon. The summer gap is also widening to nearly match the expected winter gap. And as indicated in Figure 5, by the end of the study period, the summer gap grows from 300 MW to 5,950 MW.

Figure 5. **Peak Capacity Load/Resource Picture**



It is also worth noting that the annual energy picture reveals a regional resource deficit by next year, which is three years earlier than last year's estimate. Table 1, page 14, of the full report shows the annual energy picture. The region is at energy load/resource balance at the beginning of the study and grows to a need of over 3,900 aMW by year 10.

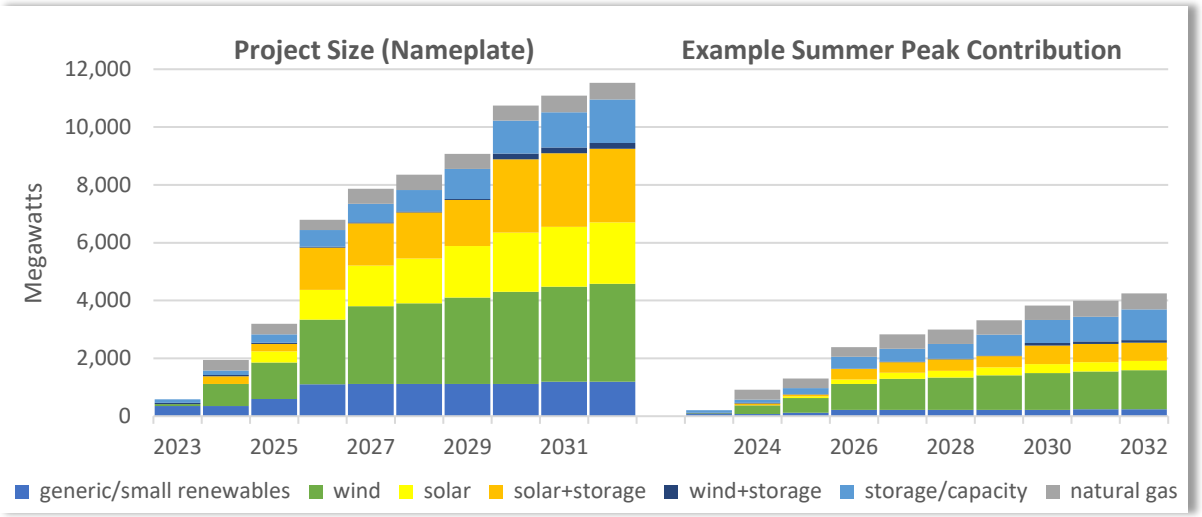
These resulting load/resource balances are not a precise resource need. The need estimates are based on a fixed set of assumptions. The peak capacity pictures in Figure 5 include normal weather loads, a 16% planning reserve margin, low hydro generation (8th percentile), the expected 1-hour peaking capability for generating resources, and zero short-term market purchases. Yet, it is an indication that without new resources many utilities see a growing resource need, especially those that provide capacity.

Innovative Combinations of Resources on the Drawing Board

Over the next 10 years, utilities have identified more than 11,000 MW of nameplate capacity made up of generic renewables and other unnamed solar, wind and storage projects in their integrated resource plans' preferred portfolios to meet their growing need. Innovative combinations of wind with storage, solar with storage, or a mix of all three are showing promise and being planned for several utilities.

Wind power and solar generation make up the largest portion of potential new resources in this year's report shown in Figure 6. To help meet peak capacity needs more batteries and storage projects are finding their way into the mix. Other resources and technologies such as small modular reactors are in utilities' plans beyond the horizon of this study.

Figure 6. **Planned/Preferred Resource Portfolio Future Resources**



Peak contributions dependent on several factors

The potential future projects add up to over 11,000 MW project size/nameplate. Planners anticipate each type of resource will contribute differently to meeting customers' demand. The available energy and peak capacity contribution of these resources are dependent on several factors and are expected to be significantly less than the project size (nameplate capacity). The ability for a resource to provide power during a peak load event depends on the time of year, type of generating resource, its geographic location, access to fuel, access to transmission, and other factors that impact the capability to generate and deliver power at any given time.

For illustration purposes, Figure 6 shows the stack of planned future resources based on project size compared to the chart on the right which is a rough estimate of generation available from those resources to meet summer peak loads. Given the generic nature of utilities' preferred resource portfolios this illustration will vary considerably. For both the winter and summer peak, the capacity contribution of potential new resources, at most, will hold the line on generating resources through the study horizon.

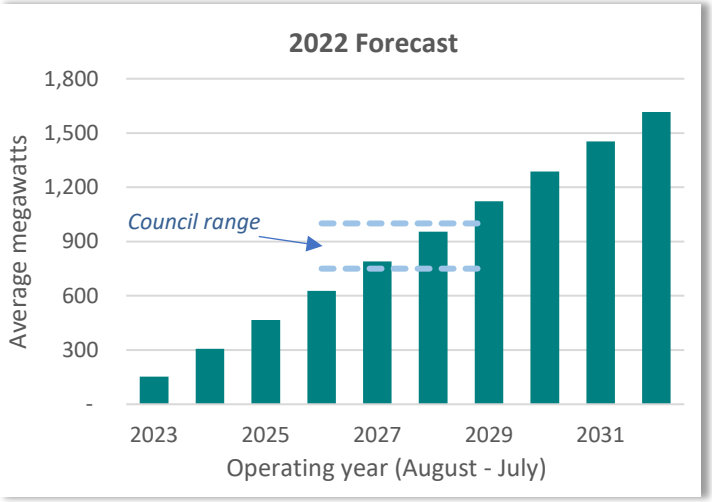
Counting on Much More than Generation

In addition to generating resources, utilities are counting on energy efficiency program savings and demand-side opportunities. Utilities are also calling for additional transmission system upgrades and additions to maximize the benefits of new resource builds.

Substantial investments in energy efficiency

Energy efficiency and other demand side resources are key components of utilities' long-term planning. In some recent utility integrated resource plans, more energy efficiency is showing up. Figure 7 is a snapshot of the cumulative energy savings from utilities' energy efficiency programs. These savings total 1,620 aMW over the next decade; just shy of last year's 10-year estimate of 1,690 aMW.

Figure 7. **Cumulative Energy Efficiency Savings**



The region can also expect additional savings from market transformation efforts, state codes, federal standards, and market momentum savings.

It is timely to note that utilities' total planned program savings fall within the range of 750 to 1,000 aMW by the end of 2027 as was recommended in the Northwest Power and Conservation Council's just completed *2021 Power Plan*.

Demand-side innovations being championed

In addition to what is on the books now, utilities are proving out demand response technological advancements that will ultimately provide grid-scale capabilities. The number of customers participating in new utility programs is becoming a substantial opportunity as programs are being expanded and/or established. This year's report contains a notable increase in projected demand response over time. Table 7 on page 20 of the full report shows that over the 10-year study horizon, summer demand response jumps more than two-fold to over 1,250 MW, while winter demand response grows to over 750 MW by 2032. The contribution of demand response in meeting peak hour needs also shows up in the peak capacity load/resource picture, Figure 5 above.

Transmission upgrades and additions planned

With the addition of over 9,400 MW of renewable energy over the 10-year study horizon, the continued transition to clean energy will rely on sufficient transmission to get new generation to load. Utilities have included upgrades and additions to transmission in their preferred portfolios. They are counting on these changes to the regional infrastructure to ensure an adequate reliable power supply.

In summary, the shifts in this year's *Northwest Regional Forecast* are capturing the clean energy transition the industry is making. The *Forecast* demonstrates how the power system is evolving to meet society's goals to address climate change with load forecasts picking up, variable energy resources replacing thermal generation and new innovative technologies and programs on the horizon.