

**MAXIMIZING
THE POTENTIAL
OF AUTOMATED
METERING
INFRASTRUCTURE
WITH A DIGITAL
PLATFORM**

ABSTRACT

The writer Lewis Carroll famously said, “If you don’t know where you are going, any road will take you there.” Well, the road the utility industry is currently on is perhaps the bumpiest and most circuitous one it has ever seen, and knowing where it is going, or needs to go, is paramount.

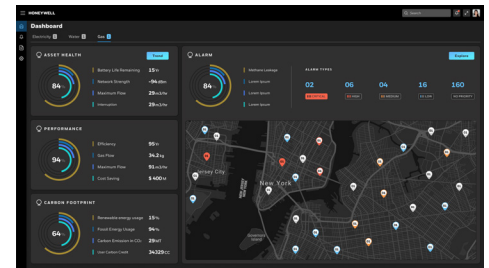
Utilities find themselves in the center of a perfect storm of environmental, technological, regulatory and societal upheaval as it relates to the future of energy. They are on the front lines in trying to manage this disruption by charting a viable course while continuing to serve a demanding customer base with increasingly stretched resources. It is critical they find ways to maximize their operational, technological and physical resources across their enterprise to become more adaptable and profitable. **This means knowing everything that is happening throughout their network in a way that presents actionable information.**

For utilities today, knowledge is indeed powerful and empowering when it comes to running their operations and serving their customers. And one of the most promising solutions for utilities of all kinds operating in this increasingly demanding and rapidly changing environment is the installation and deployment of an advanced metering infrastructure (AMI) in combination with our digital platform, Honeywell Forge Performance+ for Utilities.

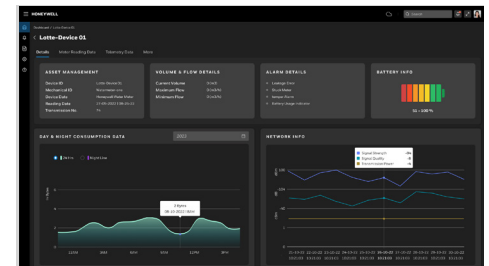
The consideration of Honeywell Forge for Utilities and the specific role of AMI is occurring against a backdrop of grid modernization, decentralization, decarbonization, cybersecurity threats, customer expectations, workforce challenges, regulatory uncertainty and increased financial pressure. Fortunately, both Honeywell Forge for Utilities and AMI have the potential to play a significant role in each of these areas by driving flexibility, resiliency and efficiencies across the value chain, helping utilities do more with less when it comes to their own enterprise assets. As first-generation advanced meter reading (AMR) systems begin to age and become increasingly obsolete, as well as more expensive to maintain and support, utilities are being forced to start making decisions on the direction for next-generation solutions. AMI 2.0 options include improved connectivity, faster processing power, expanded memory, modular communication capabilities and longer-lasting batteries. Next-generation AMI systems offer real-time network visualization, asset performance monitoring, forecasting, predictive analytics, investment optimization and an understanding of operational impact. **The more utilities know, the more they can do to respond, adapt, enhance and maximize their business.** That’s the benefit of AMI as part of a fully realized digital platform.

For the purposes of this report, we’ll first take a close look at the attributes of an AMI. Then we’ll spend some time breaking down the components of Honeywell Forge for Utilities and the advantages it can deliver to gas, water and electric utilities.

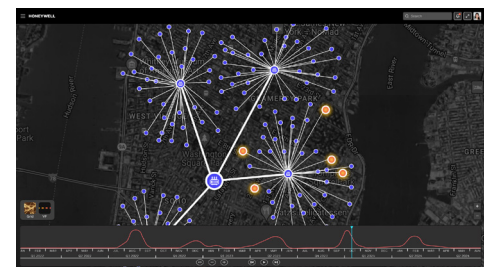
Real-time visualization



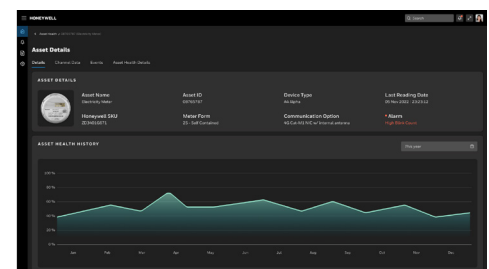
Asset performance monitoring



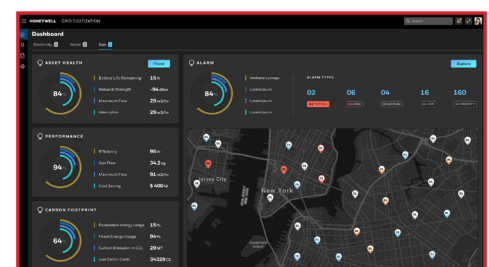
Operational Impact



Forecasting



Investment Optimization



DIGITALIZATION IMPACTS EVERY DEPARTMENT AND FUNCTION

There's a saying, "If you can't measure it, you can't manage it." As the demands on utilities have increased, what needs to be measured and managed has expanded well beyond customer energy usage.

The measurement ecosystem now includes safety, efficiency, sustainability and leveraging connectivity across the enterprise to improve operational performance in all areas of the business. AMI provides actionable information to utilities by connecting assets, processes and people to harness the value of data across a utility's energy and service footprint. AMI offers a highly scalable, holistically manageable communications platform that creates an end-to-end solution that can dramatically enhance operations and bottom-line performance.

So, how does it work? In the simplest terms, Automated Metering Infrastructure technology allows utilities to become digital-first enterprises that can remotely gather network and meter intelligence rather than relying on analog systems and manual meter readings. But an AMI system won't deliver on its full potential without the inclusion of smart meters. Smart meters are the brains behind the business, leveraging connectivity, autonomy and built-in intelligence to provide utilities with real-time data, enabling better decision-making and faster action-taking. You can think of smart meters as edge computing devices that can see and monitor how electricity is being manipulated. Smart meters are integrated into an enterprise-wide communications network, which can be either wired or wireless, and many can operate on both public or private cellular networks.

The data captured delivers actionable insights into things like cumulative kWh usage, peak kW demand, load profiles, tamper notification, outage logs and phase information. In turn, this helps utilities optimize their systems and operations while lowering operational and maintenance costs. With remote monitoring and automatic routing, smart meters eliminate the need for physical, onsite visits by technicians to diagnose problems or manually restore power. Remotely resolving outages reduces truck rolls and helps utilities reach their sustainability goals, all while improving profitability. In addition, smart meters can quickly and remotely detect gas and water leaks, as well as tampering or theft. A smart meter network also provides utilities with the ability to connect or disconnect services remotely and balance energy loads. Remote updates and service upgrades can also be easily made through smart meters.

With societal and regulatory pressure surrounding sustainability through reduced carbon emissions and reduced reliance on fossil fuels, there are both real and perceived mandates that utilities and the energy grid integrate alternative energy sources such as wind and solar. Smart metering can help streamline the integration of renewable energy sources and create the opportunity to serve an even larger customer base. And as delivery unpredictability grows throughout the supply chain due to fluctuating weather patterns, or other natural events, demand-side management is becoming increasingly important. An AMI supported by a smart meter network allows utilities to encourage and incentivize consumers to reduce consumption at peak times, as well as help them create a more reliable, manageable grid to deal with the ebbs and flows of demand.

Features like predictive analytics help with energy management and distribution, as well as improved customer service. Smart meters that can autonomously shut themselves off for improved safety and security add value to utilities and their customers. Real-time monitoring, increased data accuracy and improved customer satisfaction increase revenue through more accurate billing and better outage management.

One area of particular concern where the industry has seen increased vulnerability is in the area of cybersecurity. As utilities become more reliant on digital technologies and connected devices, they are also becoming more vulnerable to cyber threats. Cyber attacks have the potential to cause severe financial, environmental and infrastructure damage. A smart meter-based AMI can help harden networks and improve resiliency against cyber threats.

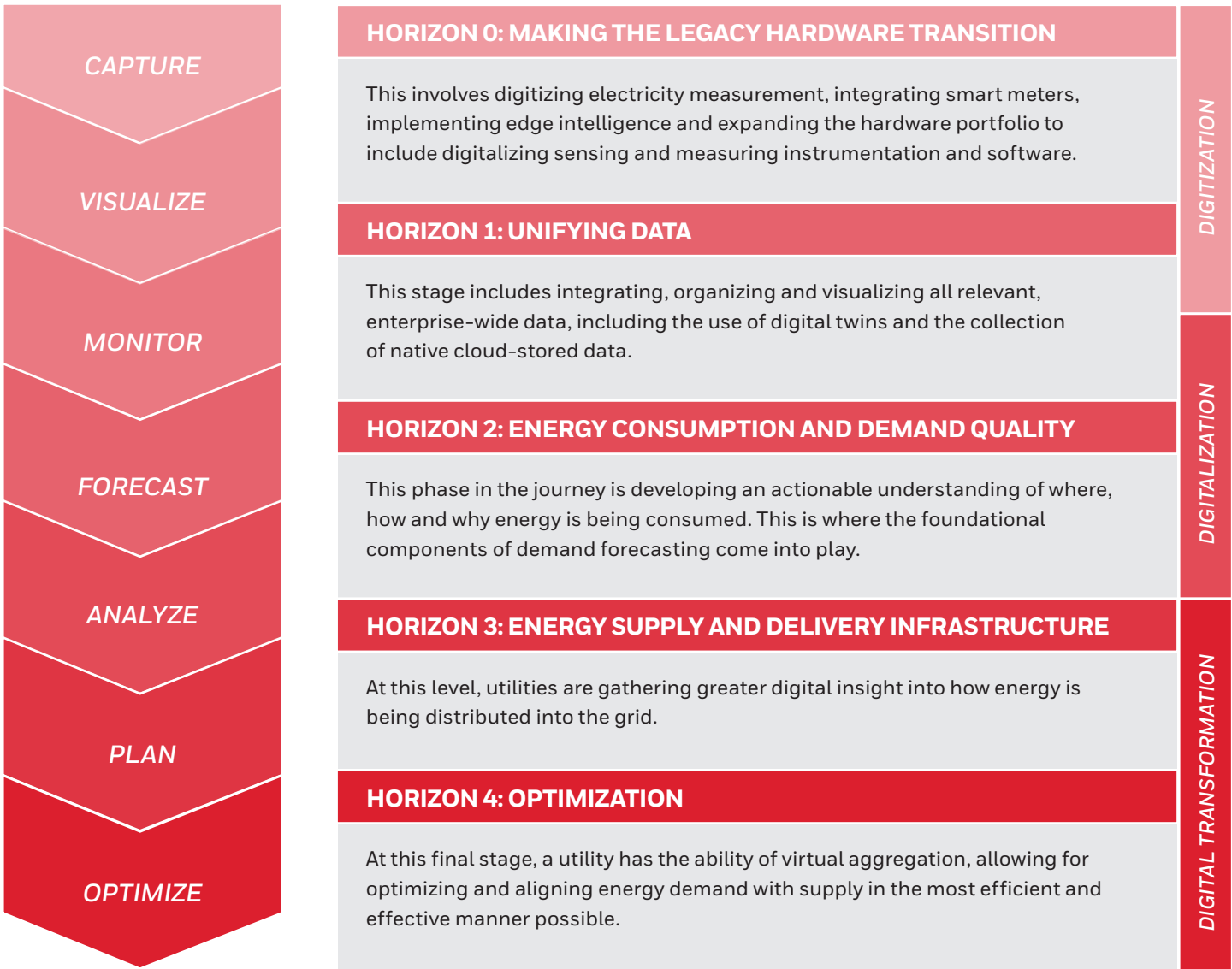
In this environment, utilities have the option to be disrupted by outside forces or to control their own destiny and disrupt themselves so they are better prepared to manage the future. An AMI puts the control in the hands of utilities that embrace this technology. The right system will help them maximize operating income and continuously improve operations, power, process reliability and product quality. It also increases safety and sustainability while ensuring compliance with regulatory demands.

UNIFICATION DELIVERS HOLISTIC VISIBILITY AND MORE ACCURATE INSIGHTS

Now that you have a broader understanding of the benefits of bringing digitalization and AMI into utility management, let's do a deeper dive into what a digitalization journey could look like, including the practical applications, the steps involved in evaluating and implementing a system, a closer look at the technology involved and some real-world examples.

At Honeywell, we see the creation of Honeywell Forge for Utilities as a means to seamlessly unify the collection, curation and validation of disparate pieces of data, which allows for real-time, historical and forward-looking visualization while simplifying self-service reporting and optimizing enterprise management and decision making. Once implemented, this digital platform enables value extraction through a continually growing set of capabilities, from operational reliability and compliance monitoring to capital planning.

The general digitalization journey, or creation of this digital platform as we see it at Honeywell, is a 5-step process:



These same steps apply to gas, water and electricity. The end goal is to build a digital platform, or a “data lake,” to store data from multiple systems and sources to support self-service reporting and analytics.

The end goal of building a fully digitalized and connected enterprise is to give utilities holistic and unified visualization to allow for better decision-making and faster action-taking. Honeywell takes this concept and builds upon it a platform to move well beyond the capabilities of a data lake that is:



**Validated
and curated**



**Builds in holistic
visualization**



**Optimizes AMI
system capabilities**

One particular use case for unification and visualization in which Honeywell Forge for Utilities can help utilities is the transition from AMI 1.0 to AMI 2.0. Such a transition can be simplified by the integration, organization and visualization capabilities of this digital platform. These are typical Horizon 1 activities. The transition benefits maximally from access to enterprise-wide data across old and new systems, and from the use of digital twins and visualization. Also, cycle times can be reduced considerably as Honeywell Forge for Utilities provides an ideal adaptive unification layer with expansive APIs between the legacy AMI 1.0 and newer AMI 2.0 systems and devices. Utilities can keep current systems operating with the same interfaces while new systems get introduced and comply with existing interfaces as well. To enrich data, more sources like telecom network management systems or field services management tools can feed data to the digital platform for a more holistic approach to visualizing the transition from AMI 1.0 to 2.0. Even historical data can migrate to the new digital platform without impacting interfaces, and help improve Horizon 2, 3 and 4 activities with a better demand forecast, more accurate view of the grid (load) or an optimized supply and demand balance in both financial and physical dimensions of the grid operation.

This means moving beyond simply holistic visualization of things like standard business intelligence, self-service reporting, benchmarking and trend analysis to fully managed services, root cause analysis, AMI system optimization, cellular carrier management and more.

MORE DEVICES, MORE CONNECTIVITY, MORE DATA—SIMPLIFIED

These fully integrated capabilities provide actionable information on load awareness, grid awareness, asset awareness, anomaly detection, DER management and, ultimately, grid optimization. The benefits of our approach and capabilities include leveraging the latest AI/ML technology, full integration, no additional IT investment for most applications, the use of a simple SaaS model and the ability to just “turn it on” when you are ready. Honeywell’s platform will regularly introduce new fully integrated capabilities, analytics and applications such as:

- Cloud-native AMI for immediate deployment of new systems with minimal IT effort
- Cloud-native IoT hub for quick 3rd party product support
- Expansive APIs for quick integration into new systems and data sources
- Easy introduction to other Honeywell end-to-end solutions

Earlier, we identified the increased use and value of digital twins as a result of advances in digitalization capabilities and integration. As an example, a digital twin is a very effective way to conduct transformer monitoring and asset management. Most utilities have no idea if their transformers are overloaded until it’s too late, creating a dangerous situation and expensive replacement. Honeywell technology allows utilities to remotely and virtually monitor transformer loads without expensive transformer meters. Through cloud-based engineering analytics and smart meter data, Honeywell can identify the expected asset life due to overloading as well as provide the recommended sizing for the replacement transformer. The result is significant financial

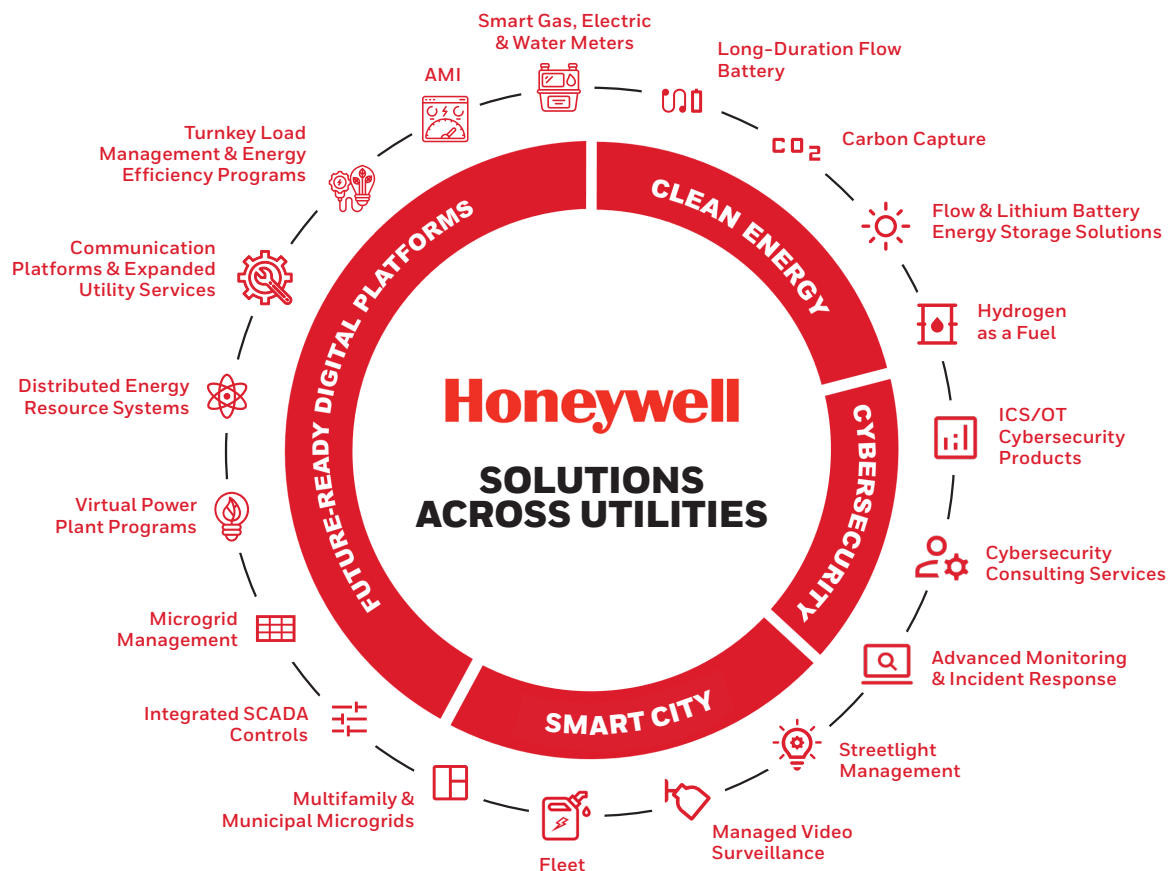
savings from reduced labor, shortened power outages, network damage from under/over voltage conditions, increased safety and improved customer satisfaction. It can amount to up to \$5/customer/year. When applying over an installed customer base, the savings can be substantial, with an impressive return on investment.

Other applications include EV charger identification and load asset management which will become more and more important in the years ahead. Through technologies and services like Honeywell OneRing, we can design, implement and operate comprehensive customer programs that encourage consumers to operate their chargers at times that have the least impact on the distribution grid and assets like transformers. This allows us to help our utility customers optimize grid asset investments while promoting sustainable electrification.

CONCLUSION

In the end, the goal of Honeywell Forge for Utilities is to provide holistic visualization across the energy grid while being system, device, connectivity and information agnostic.

We are also creating solutions that are modular in nature, easy to integrate, enhance existing IT systems and investment instead of replacing, support hybrid deployment and, ultimately, deliver value to our utility customers by helping to reduce operating and capital expenditures across their gas, water and electricity operations. Our objective is to harness advanced technology to better serve our customers so they can better serve their customers. This means the development and implementation of a portfolio of unified, connected, autonomous and intuitive technology and services that turn complexity into simplicity.



When it comes to best-in-class energy management, connectivity creates opportunity. And at Honeywell, that's why we're focused on creating intuitive energy management solutions that allow you to harness holistic, real-time, on-time information to unleash the power of your data and to empower the intellectual energy of your people. Our Smart Energy Solutions are designed to help you optimize your information, assets and resources so you can grow your business and better serve your customers. Let us help you manage your business, from smart to finish.

For more information

pmt.honeywell.com/us/en/businesses/smart-energy

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**THE
FUTURE
IS
WHAT
WE
MAKE IT**

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