

Artificial Intelligence Fueling Smarter Business and Energy Management

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1. State of the Market – Analytics for Energy and Business Efficiency

Today, businesses large and small look to data for decision-making. Executives need to understand the big picture, see a clear return on their investments, and track progress in as close to real time as possible, with one big caveat – they want simpler solutions that do not offer additional technology and layers of complex data. Advancements in information technologies coupled with the convergence of formerly-siloed business processes – made possible by intelligent building solutions - have changed the facility management game.

The intelligent buildings market first came into focus with the introduction of software as a service (SaaS) offerings that gave business decision-makers new insight into how equipment performance directly impacted their energy costs. Today, the market continues to evolve as solutions that tap into ever-growing data streams from connected equipment and devices provide a more comprehensive picture of business costs from site to portfolio levels. Analytics also offer customers better insight into equipment performance related to operational costs, space use, comfort, and other key business metrics, to include energy consumption.

The next stage in the evolving intelligent buildings market will be characterized by greater computing power, analytics, and other advancements from computer science – namely machine learning and artificial intelligence (AI). This pear.ai-sponsored white paper will explore how next-generation software applications can harness the momentum of the intelligent buildings market by leveraging artificial intelligence for the management of energy costs and business operations via the introduction of virtual assistants.

2. Technology That Transforms Energy Management

The intelligent buildings market has introduced a range of solutions that help building owners manage their facilities in new ways. IP-addressable equipment, supplemental data and communications infrastructure, analytics, and services help shift the approach to facilities management from reactive to proactive and even predictive. The tools entering the market today allow users to access their operational data on-demand, in real time, and in many formats. The bottom line is that a software-driven solution can serve as a new kind of business support. Some vendors are exploring how to leverage AI as a new kind of outsourced resource or virtual employee focused solely on meeting customer needs.

Customers can benefit from SaaS tools that automate the process of data analysis and proactively supply detailed site and enterprise-level information in the form of actionable priorities. This kind of 24/7 support shifts the focus of energy managers from reactive facilities management (blocking and tackling equipment

failures, hot and cold calls, etc.) to the strategic streamlining of business processes around utility billing and operational planning. There are a few key differentiators customers can look for when exploring new investment opportunities:

- **Straightforward Implementation** is crucial for customers contemplating an investment in energy management technologies. Customers should look for a partner that can get up and running quickly with minimal business disruption during implementation.
- **Ease of Use** is also critical for an energy management solution for business customers of all sizes. Overtaxed enterprise and site-level energy managers are looking for solutions to their operational challenges. Today's energy management tools help users access information on-demand with the flexibility of delivery via text, email, or web formats.
- **Comprehensive Clarity** aligns closely with ease of use. Customers want a solution that incorporates external factors beyond utility bill data to drive action and ongoing operations improvement.

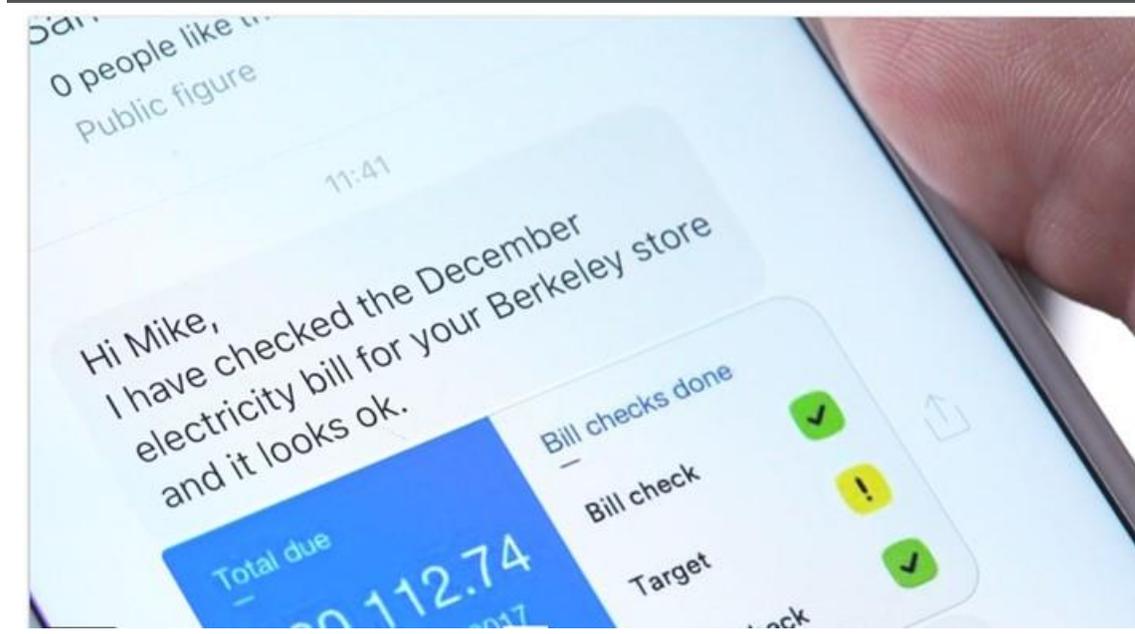
Diverse data streams gleaned from monitoring and control devices, utility billing, and external factors must be automatically communicated to the analytics engine for translation into meaningful business information. Machine learning and AI are fundamental to transforming today's SaaS tools into the next generation of energy management solutions:

- **Machine learning** is the automated process improvement directed by the algorithms inside the intelligent building devices. For example, machine learning enables the continuous change in settings and operations of major energy loads, such as HVAC, without the intervention of human analysis. The orchestration of control and automation across all energy loads within the facility is an important step in creating the intelligent building energy asset. Machine learning provides a pathway for computer-directed operational improvements that enable dynamic, real-time demand management. Providing a new layer of sophistication for the analytics engines that drive operational improvements in commercial buildings, machine learning is the type of AI that gives intelligence to devices for automated continuous improvement. As the device receives more data, the underlying computer program changes the directives. Machine learning first penetrated the intelligent buildings market for HVAC optimization. In these sophisticated applications, the algorithms in the intelligent building solution are programmed to identify faults and direct automated changes to HVAC equipment operations. As a system becomes more energy efficient, for example, the algorithm directs new system changes to sustain efficiency gains over time. Machine learning now extends to customizable interaction between customers and their utility bills.
- **AI** has the potential to revolutionize energy management and the business world. In modern commercial facilities, AI is an extension of the intelligent buildings paradigm, which is characterized by the integration of information and operations technologies. The management of commercial locations has been transformed by the accessibility of new data streams and the tools to analyze and operationalize associated information. In this new paradigm, business insights and actionable priorities are automatically delivered to corporate and site-level energy managers. In addition, customers can ask technical questions 24/7 in their own terms and get understandable answers without laborious software training or data science skills.

2.1 Sam – An Illustration in the Case for the Virtual Assistant

Pear.ai is a San Francisco-based startup that helps customers manage their energy expenditures via a 24/7 artificial intelligence platform. Pear.ai provides comprehensive utility bill management and payment services, and the virtual assistant, Sam, addresses customer-generated questions and issues. Sam evaluates and alerts customers of the many external elements that could impact cost and usage for operating any or all locations based on utility bills weather, conditions of installed technology, regulatory changes, incentives and competitive alternatives to existing energy supply. Customers can interact with Sam on-demand via text inquiries to improve how they manage utility bills, and compare energy usage between sites and enterprise-wide. Customers also receive notifications that alert them to out-of-the-norm energy use and events that should be reviewed to possibly adjust operations to save on energy costs. Sam affords customers the opportunity to experience what it means to have a virtual employee working 24/7 on their behalf. Sam aims to be more efficient and less expensive than a full time employee with push notification and information sharing to stakeholders and supervisors while retaining the bandwidth for inbound requests. Sam is poised to scale its capabilities alongside the rapid development of AI technology.

Figure 1 Sam, Virtual Energy Management Assistant



(Source: Pear.ai)

The value proposition for AI as a customer support tool is centered around convenience, cost savings, and peace of mind. The idea is that AI can learn the optimal engagement model for any specific user—personalized advisory and support at lower cost because it is derived by data and automated with analytics.

Four critical application components illustrate the technology behind the smart analytics that led to the development of this type of virtual assistant:

- **Automated alerts** push the most critical information to corporate and site-level energy managers

to prioritize maintenance and repairs that will create the biggest cost savings and improvement in comfort. This kind of analytical tool can deliver cost savings through both energy and operational efficiency. The alerts can guide improvements in how building systems are run to reduce energy consumption and immediately direct facilities and maintenance staff to the highest cost problems. These tools are valuable because they deliver timely and succinct information through a mobile interface or text messaging.

- **Energy advisory** is a valuable service for businesses of all sizes and types. These services can help energy managers navigate market opportunities for utility savings whether through local utility rebates for energy efficiency products or engagement in programs such as demand response. Energy advisors can be a source of ongoing support by providing ongoing analysis of real-time energy data and monthly utility bills. Energy advisory services can deliver proactive information on energy consumption 24/7 through texts, mobile/web portals, phone centers, and email, as well as information concerning external factors such as weather, rate changes, and legislation.
- **Performance reporting** creates context for site and enterprise-level energy managers as they look to make sense of energy use and costs. Performance reporting can provide a benchmark of building energy consumption over time, or in comparison to like buildings across their portfolio. Customers can use these reports to define accountability for energy efficiency by establishing key performance indicators for specific buildings and assigning responsibility to meet goals for energy efficiency.
- **Predictive maintenance** is a proactive approach to facility operations made possible by data analytics. Site and enterprise-level usage and cost analysis may yield significant data to aid in predictive maintenance. By benchmarking equipment performance over time or against like systems, predictive maintenance direct repairs and maintenance based on energy usage and cost benchmarking as opposed to following a traditional “react and schedule” approach to maintenance.

3. Thinking Beyond Utility Bill Payment

The energy cost savings associated with SaaS analytics is a universal benefit for intelligent building customers because the improvements in energy usage translate to monthly reductions in utility bills – a straight forward proposition. However, the vendors that find the greatest success in the market will understand the key pain points that stress their potential customers resulting in the compilation of a unique priority list for each customer. Navigant Research suggests there are some similarities in priorities when you consider customer needs by sector and role, which can be illustrated as follows:

- Retail, restaurant and grocery facility managers may be most interested in the operational efficiency of SaaS analytics and the push alerts that lead to predictive maintenance practices. These tools can help ensure cost effective, productive deployment of maintenance teams.
- Corporate real estate managers may look for solutions that ensure connectivity, support wayfinding, space use, and sustainability to help drive two big goals – productivity and the corporate brand – key levers in attracting and retaining organizational talent.

- Heads of sustainability for hotel chains may be most interested in performance reporting that helps benchmark the energy performance of one site versus another to drive improvements that will support corporate climate commitments and lower overall usage and costs.
- Energy managers on university campuses may be best engaged by showcasing how a SaaS offering can benchmark their buildings against each other related to fuel energy efficiency savings competitions amongst departments and students to drive costs savings but also make progress toward campus climate commitments.
- Hospital administrators may be most interested in asset tracking. The bottom line for this potential user is ensuring her staff can best meet the needs of their patients, and real-time data on where equipment is being used, where space is available, and the environmental conditions in their workspaces can all change the game for hospital performance.
- Small and medium business owners may be most motivated by the peace of mind a virtual assistant can offer – a third party, expert lens double checking their monthly electricity bill for errors and alerts regarding new rebate program offering, and energy management insights usually reserved for larger corporations with staff dedicated to this function.

The real take-away is that intelligent building software and services can provide support to business executives that allows them the opportunity to focus on their core objectives and company bottom line. The market is growing and software tools are becoming more refined thus enabling customers to address key challenges across units and business segments. Today's business customers have the opportunity to leverage artificial intelligence for the management of energy costs and business operations via the engagement of a virtual assistant.

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