



Business challenge

To prevent contamination, reduce energy consumption and cut costs, food and beverage companies must ensure their air compression systems run at optimal efficiency and are regularly inspected and maintained.

Transformation

Compressed air systems that run inefficiently waste up to 50 percent of the energy they consume, costing business billions. Using the IBM® Watson™ IoT Platform and IBM Cloud™ Functions, two services of IBM Cloud technology, EcoPlant built an AI-powered monitoring and control system designed to optimize machine maintenance, helping reduce energy waste and costs.



Yaron Harel
Chief Technology Officer and
Co-founder, EcoPlant

Results

**Saved global food provider
USD 170,000 annually**
and reduced CO2 emissions by 700 tons
by cutting energy consumption 25%

**Saved plastics manufacturer
USD 70,000 annually**
and cut CO2 emissions by 380 tons
by reducing consumption by 30%

Starts delivering ROI on day 1
by optimizing the efficiency
of compressed air systems

EcoPlant

Cutting energy waste by up to 50 percent

Founded in 2016, EcoPlant develops and markets an AI-powered, cloud-based monitoring and control system designed to reduce energy waste and optimize the maintenance of air compressors in industrial plants. Recently, the company was chosen to participate in the prestigious 2019 [Techstars Farm to Fork Accelerator](#), a program co-funded by Cargill, Inc. and Ecolab that mentors entrepreneurs developing innovative technical and digital solutions for the food and agriculture sector. In addition to its Israel-based headquarters, EcoPlant operates additional offices in Minnesota in the US.

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—Yaron Harel, Chief Technology Officer and Co-founder, EcoPlant

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The high costs of inefficiency

If you eat and drink, then air compression systems are part of your everyday life. How so?

Many food processing plants fill bags of potato chips and other food items with compressed air, and use compressed air to create a vacuum during the packaging process. Beverage and dairy producers apply the technology for bottling, capping bottles and filling cartons. And modern production facilities use compressed air to cut and shape food products and clean machinery.

In the food and beverage sector, air compression systems serve critical roles throughout the manufacturing, processing and packaging operations, making them essential pieces of equipment. But as onsite generated utilities, they are also among the most expensive to operate because of the energy they require. According to the US Department of Energy (DOE), air compression systems can account for 10–20 percent—and sometimes as much as 30 percent—of the electricity a plant consumes.

Worse, compressors that run inefficiently or are poorly maintained waste as much as 50 percent of that energy, costing companies as much as USD 2 billion. In the end, businesses and the environment alike pay the price: a facility with a 1,000-kilowatt (kW) system not only

loses USD 300,000 in total cost of ownership (TCO) annually but also emits 2,765 tons of carbon dioxide (CO₂) into the atmosphere.

Aviran Yaacov, Chief Executive Officer and Co-founder of EcoPlant, explains why: “Inefficiencies are the result of leaks, blockages, breaks in pipes, bad system design, poor maintenance, delayed service calls, etc. But inefficiency also affects the production floors and increases the risk of downtime for the factory. So a breakdown can cost millions of dollars.”

But cost isn’t the only issue: inefficiencies in compressed air systems can put food safety at risk. A single leak can introduce a host of contaminants into food containers, including microorganisms, particulates, liquid oil, oil aerosols and oil vapor. For health and safety reasons, air compressors used in food and beverage manufacturing environments must be held to the highest standards.

The only way to prevent contamination, reduce energy consumption and cut costs is to regularly inspect and maintain the machines and ensure they run at optimal efficiency.

Continuous monitoring, control and optimization

That’s where EcoPlant technology comes in.

EcoPlant is a software as a service (SaaS) solution that continually monitors and optimizes compressed air systems in real time to help companies significantly reduce energy waste, optimize maintenance and save money. In addition to predicting equipment malfunctions before they escalate into real problems, the platform can also dynamically control the equipment, further boosting machine efficiency and minimizing downtime.

The founders of EcoPlant took their platform to the enterprise-ready level by participating in the IBM Alpha Zone accelerator, a prestigious 20-week program that helps startups develop solutions for the enterprise market. There, participants have access to mentorships, technical training and support, and IBM infrastructure.

“IBM’s Alpha Zone accelerator was a great experience,” says Yaron Harel, Chief Technology Officer and Co-founder of EcoPlant. “We worked with very smart and experienced software architects that helped us build the platform in the right way.”

For instance, the company built EcoPlant’s advanced analytics engine on IBM Cloud Functions technology, a functions as a service (FaaS) programming platform. This helped it develop the proactive engine logic and benefit from the platform’s built-in capabilities, such as events and periodic execution.

Today, the technology also takes advantage of the Watson IoT Platform, a service of IBM Cloud technology, designed for availability and scaling, to securely connect and process equipment data.

The EcoPlant platform works like this: through the use of strategically-placed sensors and smart devices called EcoBoxes, the platform collects a wealth of system, operations and environmental data, such as flow velocity, oil and water temperatures, kilowatt and ampere readings, machine working hours, ambient air temperature and more. The EcoBoxes, which are connected to each compressor’s internal programmable logic controllers (PLCs) and external sensors on the power lines, send the data to the Watson IoT platform.

There, the data is analyzed using a set of business rules and the predictive, AI-powered algorithms of EcoPlant’s cloud-based proactive advanced analytics engine. If an Internet connection is unavailable, or for customers who require the system to run on-premises, the EcoBox can run the algorithm locally.

When the solution identifies a problem, such as a blockage in a filter that requires the attention of an operations manager, it proactively sends alerts via text or email. It also provides recommendations to resolve the issue based on key performance indicators (KPIs) and sends those plans back to the EcoBox to run.

But the EcoPlant platform doesn't stop there—it's also smart. It takes optimization and maintenance one step further by dynamically controlling each compressor.

Mr. Yaacov explains: "There are many startups that offer predictive maintenance solutions. What's unique about EcoPlant is that it also controls these machines... it can close a valve or a compressor it has identified as problematic. We can actually show the customer what happens when we optimize the system using a good control strategy."

Soon after installation, while still in manual mode, the platform starts learning about the compressors themselves: demand from production, off and on patterns, energy efficiency levels and so on. After a few weeks, customers can activate the automatic engine that controls the equipment and accept, or not, the platform's recommendations to improve efficiency.

Mr. Harel elaborates: "During this semi-automatic phase, we start generating some control suggestions like, 'The EcoPlant system wants to change the pressure settings for this compressor. Do you approve or decline?' Usually, after a few days, plant managers have confidence in the system and allow it to go fully automatic. From that point onward, the algorithm keeps learning and improving and making more data-driven decisions on the control side."

Today, EcoPlant serves customers throughout Europe and is rapidly expanding into the US market from its Minnesota-based office.

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—Aviran Yaacov, Chief Executive Officer and Co-founder, EcoPlant

Savings for businesses and the planet alike

EcoPlant's success is easy to understand: wonderful things happen when air compression systems are optimized and running efficiently.

Take the case of a global food and beverages provider. By using EcoPlant technology to improve the efficiency of its compressors, the company cut its energy consumption by roughly 25 percent, saving a total of USD 85,000 in less than five months, and USD 170,000 annually. The plant also reduced its annual CO2 emissions by nearly 700 tons.

A leading plastics manufacturer based in Israel realized similar results. In less than four months, by monitoring, controlling and optimizing its compressed air system, the company saved nearly USD 40,000, and USD 70,000 annually. The facility also reduced its energy consumption by roughly 30 percent and CO2 emissions by 380 tons.

On average, industrial plants can realize up to 50 percent in energy savings. Hospitals and commercial buildings can also reduce costs and energy consumption by applying the technology to critical equipment such as pumps and chillers.

No matter the type of facility, there's no waiting for an ROI: within minutes of installing the technology, customers gain visibility into the efficiency of their compressed air systems using EcoPlant's dashboards.

"When it comes to energy efficiency, the customer gets his ROI immediately—he can see the savings from day one," adds Mr. Yaacov. "When you combine energy efficiency with predictive maintenance, you can quantify the value very fast."

The solution's predictive analytics also helps companies avoid costs associated with maintenance, parts replacement and production down time. Mr. Yaacov recalls a recent event where the platform saved a customer's compressor from breaking down. "The platform

detected a problem, so it sent an alert to the customer. All the customer had to do was replace a 50-dollar filter. But if he hadn't, the whole air unit could have broken down, costing thousands. So by optimizing your maintenance, you can avoid these costs."

By continuously collecting and aggregating data, the solution also uncovers trends, such a rising oil temperatures, that could lead serious issues—issues that might otherwise be overlooked by a service technician or lead to equipment failure.

"Our analyses might indicate that a machine's oil temperature has increased three degrees a week for the last four weeks," explain Mr. Harel. "This could be related to ambient temperature or to an issue in the compressor. So we send an alert to the plant manager that explains our analysis and states that, based on our experience, the machine will fail within the next two months if they don't address the issue."

Moving forward, the company is developing a hybrid model of its analytics engine. "Right now we have a pre-trained model of the engine that was trained in the cloud," concludes Mr. Harel. "In the next 12 months we want to have a hybrid model to download to the EcoBox, so if there's no Internet connection, the trained model will run locally.

"We'll also continue to leverage our relationship with IBM to make more progress."

Solution components

- IBM® Alpha Zone accelerator
- IBM Cloud™
- IBM Cloud Functions
- IBM Watson IoT™ Platform

Take the next step

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