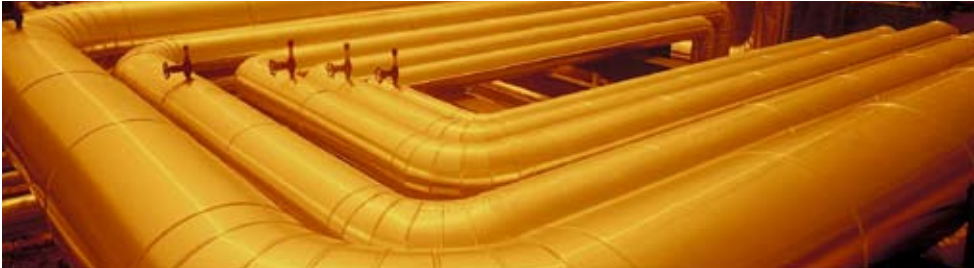


# Rockwell Automation Manufacturing Perspectives White Paper Series

Perspectives on Sustainable Production:  
Delivering Economic Value and Serving the Greater Good



LISTEN.  
THINK.  
SOLVE.™

Reduce dependence on fossil fuels  
Boost energy savings  
Build your competitive advantage

Reduce emissions and waste  
Measure and report results  
Improve financial performance  
Minimize raw material waste

Protect workers  
Protect your products and customers  
Preserve the integrity of your brand

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# Delivering Economic Value and Serving the Greater Good

*Global manufacturers face economically challenging times with a complex and crowded agenda. Today's market pressures require manufacturers to balance multiple priorities: productivity, globalization, innovation and, sustainability.*

Rising prices and shortages of resources, whether of talent, dollars, energy, or materials, have re-written the economics of manufacturing. The unexpected downfall of some of the world's once-most powerful financial institutions highlights the new sense of urgency for companies to build trust, operate transparently, and reduce risk. Sustainability is no longer just the right thing to do; it's a business imperative.

Rockwell Automation believes manufacturers who adopt sustainable production practices turn marketplace challenges into advantages. We define sustainable production as cleaner, safer and more energy efficient operations. Production is cleaner when it reduces waste, eliminates emissions, and consumes fewer natural resources. Production is safer when it protects workers, processes and equipment, and product integrity and quality. Sustainable production is more energy efficient when companies produce more goods with less energy.

Sustainable production practices deliver economic value and serve the greater good. They provide a long-term solution to volatile energy, scarce raw materials, costly workers compensation, lost worker productivity, and product liability costs. While regulatory compliance may have been the motivator in the past, today's resource shortages and economic demands require safer, cleaner and more energy efficient manufacturing.

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## Perspectives from Industry Leaders

We invited Rockwell Automation customers, industry leaders who have successfully adopted sustainable production practices, to offer their insights. These executives come from world-class brands, including The Boeing Company, Coca-Cola, and General Mills, as well as an executive from our own company. We asked them to address sustainability's evolution, the importance of information and metrics to create change, and the need to deliver business results. Our customer panel also discusses why safety and water are important facets of their sustainability agendas.

*The increase in media attention on sustainability the past few years implies it's a relatively new issue, a trend. How has your company addressed sustainability and how has it evolved?*



**Coca-Cola, Mark Lee, Director, Commercial Products Supply Engineering/ELSP:** It's a bit surprising this appears new because from a manufacturing perspective, sustainability is just good business. Energy efficiency, improvement in recycling, and eliminating waste are things we've been doing since the 1990s. Now these efforts are part of our manufacturing excellence program, our lean initiative. We've bundled lean and green together to further reduce our manufacturing costs through improved productivity, energy reduction, waste elimination, and reduced water consumption. While these efforts are now part of a more formalized program, it's work that has been going on for years within the manufacturing sector of our company.

The change for us is a move from strictly an internal focus toward a more outwardly focused effort, including our supply chain. We've shared some of the good work we've done with our customers, consumers, and suppliers and we're assessing what they need from us to help them become more sustainable in their business practices.



**General Mills, Jim Schulz, Director, Controls and Information Systems:** Sustainability is something we've always done. Like Mark said, it's been part of our business all along because saving energy and water makes good business sense.

What I think maybe shifted for our company is we now view it as an ingredient in almost every formula we make. So, for example, along with sugar, water and flour, sustainability, quality and safety are also ingredients in our products. Sustainability is more than an initiative, which always seems like it's an optional activity.



**Rockwell Automation, Bob Ruff, Senior Vice President, Control Products and Solutions:** What I've noticed that has changed over the years is that sustainability was once driven around regulatory requirements, but now it's an imperative because of the shortages of power, resources, and clean water. These demands have shifted priorities across industries. Now we're seeing people take their capital budgets and prioritize with a sustainable number in them that we hadn't seen in the past.

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*As Bob indicated, while priorities have shifted, it also appears the priority list has grown. What are the sustainability priorities for your company?*



**Boeing, James W. Fonda, Advanced Technologist, Networked Systems:** We have goals to reduce energy consumption, greenhouse gases and hazardous waste, and increase recycling by 2012. We're looking at how we order our materials to make sure we have less waste and to make it easier for us to finish parts in house while reducing the overall time and complexity. Then we want to make sure that the waste material we generate in our finishing process goes back to a supplier who can then recycle it back into the supply chain. With our fleet of aircraft, we try to reduce fuel demand for every new generation of aircraft we build.

My role specifically is to look at how we can provide more visibility into energy consumption and optimization. Then, how to use that information to get workers more involved so they can give feedback on how they think we can make our processes more energy efficient.

**Coke, Lee:** From a purely manufacturing perspective energy, water, and safety are priorities. It just makes good business sense. Obviously water is a big component of our product so we have to steward that appropriately and energy savings go to the bottom line. From a supply chain perspective, the focus is on sustainable packaging, eliminating waste, and improving recycling. Food safety and quality are core components of our system and that's also part of any sustainable business model and corporation.

*Make sure there is a business reason to improve and post gains against sustainability metrics*

We've made a 20 percent net gain in water efficiency since 2002. We have another goal of 20 percent improvement by 2012. We have also made substantial gains on energy reduction. We look at both energy in terms of mega joules per kilogram of product produced and CO<sub>2</sub> emissions. As part of our work with the World Wildlife Fund we have a slogan, "grow the business not the carbon." So even though we intend to grow the business in places like China and India where greenhouse gas factors are extremely high, we want to keep those emissions flat or reduce them in both absolute and production terms.

**General Mills, Schulz:** Water usage, energy usage, greenhouse gas emissions, and the solid waste stream. Which is most important really depends on the business justifications for improvement, and that will vary by region and country. Where water is in shorter supply it's going to be much more of a business benefit to improve the water usage or where energy costs or distribution costs are higher, we're going to work on energy. We try not to have the metrics drive the wrong behavior but more the right behavior and the way we do that is to make sure there is a business reason to improve and post gains against those metrics.

We have publicly announced reduction goals for water and energy usage, greenhouse gas, and solid waste. But it's important to understand that in our business, our food business particularly, we make hundreds of products and the greenhouse gas, energy profile, and water use profiles for each of those products is different. For example, our refrigerator and frozen channels are highly energy intensive versus our dry ingredients channel where we make bakery flour and things like that. If sales go up in yogurt or ice cream (energy intensive channels), or sales go down in dry food channels, we still want to hit our goals but it becomes significantly more difficult when sales of highly intensive energy products are up.

What we wrestle with internally is how do you make sure you've set goals that are the right goals? I'm confident our company will find ways to make yogurt and ice cream with less energy, gas emissions, and water usage. But if net across the portfolio our business spikes in high energy usage areas, we may use slightly more energy in absolute measures. If that should happen we will make sure to track if we make ice cream for fewer BTUs per pound the next year or the year after? Did we make yogurt more efficiently? The reason I'm so confident we will is because we always have and it's good business sense. It's how you maintain your margins and improve your business.



*When sustainability is typically discussed, many think of it as just an environmental issue but for all of us as manufacturers it's much more than that. Sustainability includes safety too because we have to increase productivity and quickly adapt to rapidly changing manufacturing demands while we protect employees, equipment, and ultimately products.*

**Coke, Lee:** Obviously you can't have a sustainable operation if you don't protect your people. We must have systems that are designed so our people can be productive as well as safe.

**Boeing, Fonda:** One thing that is definitely on our mind is worker safety. We use a lot of different materials and processes to build very complex aircraft. Therefore we need to insure worker safety by using greener methods and safer ingredients in our processes.

**Rockwell Automation, Ruff:** For a long time the purpose of safety was so we didn't hurt somebody or damage machinery. The problem was in the past when safety was approached with that narrow but important focus, it didn't provide a lot of efficiencies. Today it's part of the sustainability process because we've developed safe and flexible working processes and embedded those processes into the overall project. Now you're not just protecting workplace safety, the machinery, or the product itself. Instead with today's systems, which have so much power, capability, and flexibility, you actually provide a manufacturing environment that's both safe and efficient.

**Coke, Lee:** Safety has been part of the sustainability agenda at Coke for a number of years. Following what Bob said, you try to help people be more flexible and cross functional, and you need them to know the systems and the equipment you install. In the past, employees ran the same machine for 20 years and knew exactly what they needed to do to be safe. But if they run this machine today, a different machine tomorrow, and another process the next day, safety has to be embedded into your engineering, capital deployment, and supplier partnerships to make sure you have the ability to be more flexible inside your manufacturing environment.

For us safety in the manufacturing workplace has been around since we started. As part of our sustainability program, we attempt to drive safety through our entire supply chain, distribution network, and bottling partners because we truly believe our business is only as sustainable as the communities where we operate.

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*All of you have mentioned sustainable production has to support and help meet business objectives. That means you need information and metrics. But data and measurement can go beyond demonstrating results. With visibility, easy-to-share information, and predictive modeling organizations can identify opportunities and create change.*

**General Mills, Schulz:** Delivering business results is the fuel that makes the engine run. The business has got to believe that doing this helps improve business margins and quality, as well as keeps our people safe. Showing the benefits is clearly the single most critical success factor.

Now the difficult part of that is, sometimes those benefits are hard to see. That's where information and their systems are so critical. If we weren't so connected, if our information architecture was not as good as it is, it would be very hard in some places to measure the result or at least feel comfortable that we could measure the result. When we put a project together it goes through a lot of scrutiny to make sure there's some likely rate of return and tighter quality parameters. We're an organization that likes accountability, so you better be able to show the numbers. You can only show the numbers if you have the ability to collect those numbers. It's that business driver underpinned with enough information to prove that you actually delivered the results.

**Rockwell Automation, Ruff:** Manufacturers need an integrated control and network system that puts at their finger tips the capability to get the data they need. If you can't measure it, you can't control it. It's just that simple. The flexibility and the capability that manufacturers have today allow them to get their arms around what information they need. I think it takes sustainable production up another notch. Access to information not only improves efficiencies, but also provides bottom line productivity improvements.

*If you can't measure it, you can't control it. It's just that simple.*

*We need data visibility so we prove that we can make a difference in our factories.*

**Boeing, Fonda:** Our networked-enabled manufacturing program brings visibility to our processes, facilities, and the various pieces of equipment that are spread throughout the country. We're modeling our processes to try to improve them. That's one way we can look at how we can reduce waste and change processes before we make investments in those changes. In some cases, we look for big consumers like compressor systems or large electrical loads. We know if we make a two percent or three percent reduction on those types of equipment, we can make a big difference in our power consumption.

When measuring the data, if we can't record it then we can't react to it and we can't do anything about it. We need that kind of visibility so we can record and prove that we can make a difference in our factories.

**General Mills, Schulz:** If you don't measure it you can't manage it. One of the things I want to add is that you can have the right idea and you can have the right information, but you still have to have people who can actually do something with that information. We work very hard to get good information but you still have to be able to present it to somebody who can understand it and execute something about it.

**Rockwell Automation, Ruff:** Current software packages allow you to do that much better. Information and systems existed for many years but getting data in a useable form that somebody could use to make a good decision has come to the point now where some of the decision making is engineered in from a predictability standpoint. Where managers before had to monitor carefully and make a decision when they wanted to do something, now they can set those parameters ahead of time and do the predictable things that save costs, and do it in a way that keeps the efficiency moving along.

**Coke, Lee:** We've done a pretty sound job of driving energy improvements and efficiencies. Now we are looking at that next cut. How do you get to that next level where opportunities are harder to find and harder to justify? That next cut of granularity requires better data. That's one of the areas where we are partnering with Rockwell Automation to deploy energy monitoring solutions, enabling us to find those hidden opportunities. For example, in a plant that's 30, 40, or 50 years old where you don't have sophisticated electrical distribution gear, it's not easy to determine which work center is consuming the most energy. You have an idea but when you get that next cut of data you can pinpoint the improvement and more quickly justify a project.



*Many experts now warn that escalating demand for fresh water and inadequate supply are as urgent as efforts to manage energy and tackle climate change. How does your company treat water as a sustainability priority?*

**Coke, Lee:** Water is the single biggest ingredient in any product we make so water availability is critical. We treat every drop that comes through the door with our own treatment systems. From a manufacturing perspective we're not a big water user, but as our products themselves contain water, it's a priority for us to make sure we use it responsibly and to assist the communities where we operate to have better access. We are more outwardly focused than ever before and are transparent with our water consumption. We measure water efficiency and have significant reduction goals.

We also believe water conservation alone is not enough. We use a term in our organization known as "water neutrality" with the goal of being water neutral. Every drop we use that goes into a package is obviously made available to the consumer for consumption. We treat every drop we use for sanitation and cleaning beyond local regulations so it can be productively returned to the environment. From rain water harvesting to deep water injection there are many things we work on that go far beyond water efficiency improvements.

We see this as a never ending journey as we've all seen how the droughts within the southeast US, Australia, and other parts of the world significantly impact how people live and perceive water.

**General Mills, Schulz:** Water is important to us and this is where I said we have to think locally and regionally. For example, in Covington, Georgia we have a waste treatment facility in one of our breakfast cereal plants. We started to design it in 2004 about two years before the drought actually hit the Atlanta area. What struck me about this was Toyota, for example, started to design the Prius in 1990-91 long before anyone realized it would be as successful as it is. You do these things because they match your strategy and make good business sense.

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In our case in Georgia, we felt the high water usage we were sustaining was going to drive the city to have to build an additional waste treatment facility. We realized we could do it in house and to do so made great business sense. In the end we actually saved ourselves about \$840,000 a year, which is a nice payback. Literally it went on line in August of 2006. The summer of 2006 was the drought in Atlanta.

We process the water so that it's actually cleaner than the water we get from the city but we don't put that water back into the product stream at all. Even though it's cleaner, it's a mental barrier that we can't get past at this point. So we reuse the water in our air wet scrubbers and through our non-food contact chillers. It's a great example of how sustainability is built into your way of thinking. It's just an ingredient in what you do. We searched for an idea like that a few years before the drought hit. It just so happened at the time we ended up saving around 5.3 million gallons a month and that's enough to supply about a thousand houses in the Covington, Georgia area. I might point out too that the entire system is run with Rockwell Automation control technologies.



***With the economic challenges companies face today, every program, every initiative, gets a second look. Will sustainability survive during economic downturns?***

**Rockwell Automation, Ruff:** When it first started out sustainability was regulatory driven. But now infrastructures around the world can't keep up with the demand that's put on them. There are not enough power plants, water is an issue, and when it comes to putting waste back into the stream we only have limited space. I think this will put pressure on the business community where sustainability will be with us for a long time to come. Last but not least, the pressures that businesses are under today from a profitability standpoint will not lighten up. Sustainable production will help drive the bottom line.

**Fonda, Boeing:** Most of all I think in times of economic trouble sustainable companies become survivable companies as well because they've driven inefficiencies out of their system. Even if sustainability fades in the press, any responsible company will eventually continue to try to drive their bottom line home so they become survivable in times when oil becomes more expensive and other economic problems bubble to the surface and cause havoc.

**General Mills, Schulz:** If you look back at our company 30 years ago sustainability, safety, and those types of issues tended to be managed into the process, meaning you did it because you thought someone was watching you. The shift I've seen – as we've moved to see safety, environment, and other sustainability issues as ingredients in our formulas – is that this has become a part of how all our people think. They do it naturally now rather than make it a check box initiative. That's what will allow us to sustain long term because when the pressure eases, whether market, financial, or regulatory, things typically stick around if it's something you want to do naturally. We still have more than enough sustainability initiatives that meet our ROI hurdles. There's plenty of work to do.

**Lee, Coke:** We've been working on these efficiency drivers for the last ten years. We will work on them for the next ten years whether it's in the press or not. It's part of a continuous improvement culture and the relentless pursuit of waste elimination whether it's labor, inventory, energy, or water. I think it's a part of what you have to do to be a successful manufacturing entity. Sustainability may lose some press but I don't think it will lose focus in manufacturing.

## Perspectives on Future Sustainable Innovations

Sustainable production has evolved from regulatory mandate and social good to business imperative. In the next five to ten years our Rockwell Automation Advanced Technology Group specialists expect sustainability will be designed into products which will change how they're manufactured and perform. We're currently developing and demonstrating intelligent, autonomous systems that have proven to be exceptionally robust and resilient as they self-adapt to changes, even unanticipated changes. They use energy efficiently, protect critical processes from failure, provide minimal downtime, and improve product quality and throughput.

Today, Rockwell Automation partners with customers, academic institutions, government agencies, and other experts worldwide to research and develop sustainability innovations. These include advancing technologies that will efficiently convert food and animal waste to energy that can be used to heat boilers or drive electrical generators. We're exploring how to use waste streams and carbon dioxide to foster algae growth and then efficiently extract lipids to serve as an alternative source for high-quality oil. We've demonstrated a prototype adaptive wireless sensor node that is powered by extracted energy from machine vibration. These self-powered sensors can be used to continuously monitor machine performance and safety, or the environment, without any wires or batteries. Additionally, we're testing new sensors for detecting bacteria in process fluids, such as food products and beverages, for optimizing the manufacturing process while increasing quality assurance and consumer safety.

Organizations that achieve sustainability leadership will be those whose sustainable production practices transform from cost and resource management to practices that innovate and differentiate.

## Summary

- Rising prices and shortages of resources, whether of talent, dollars, energy, or materials have re-written the economics of manufacturing. Sustainability is no longer just the right thing to do; it's a business imperative.
  - Sustainable production is cleaner, safer, and more energy efficient.
  - While regulatory compliance may have been the motivator in the past, today's resource shortages and economic demands require safer, cleaner, and more energy efficient manufacturing.
  - Strategies that make good sense and reduce manufacturing costs also improve productivity, reduce energy, eliminate waste, and reduce water consumption.
  - Safety is viewed by industry leaders as a priority on their sustainability agendas. You can't have a sustainable operation if you don't take care of your people and have systems that are designed to enhance productivity and safety.
  - Safety that is engineered and embedded into systems and processes at the front end provides safe, flexible, and efficient systems that increase productivity.
  - Data visibility is required because if manufacturers can't record data, they can't control it, and they can't measure the improvement they want to achieve. Gathering data allows manufacturers to show they make a difference in their factories.
  - In times of economic trouble, sustainable companies become survivable companies.
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## Resources

Please contact the following companies for more information on sustainable production solutions and successes.

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