

RESETTING THE COST BASE

Technology is creating opportunities and threats for the supplies of traditional industries from utilities to pulp and paper to construction.

Counting on a gradual pace of change, established industries have long been cautious in adopting or responding to advancing technologies. That posture is starting to shift in three industries, as this package will show. In the electric-power industry, battery improvements are bringing down storage costs faster than expected, allowing customers to “defect” from grids—with disruptive consequences—but also offering utilities a chance to defer major investment in new capacity. In pulp and paper, data analytics and artificial-intelligence applications are opening surprising operational improvements across new and existing plants—areas where veterans assumed gains were foreclosed. And in engineering and construction, a new crop of start-ups deploying robust mobile apps and GPS monitoring are improving managers’ efforts in the field and lowering costs, pushing digital benefits far beyond the back office.

WILL BATTERIES DISRUPT THE UTILITIES INDUSTRY?

A rapid decline in storage prices encourages customers to produce a greater share of their own power, partially “defecting” from the grid.

by David Frankel and Amy Wagner

Cheap solar energy is already a challenge to utilities. But cheap storage will be even more disruptive, raising the prospect that individual and business customers will bypass traditional suppliers for greater parts of their consumption.

Storage prices are dropping much faster than anyone expected—battery costs in 2016 were one-quarter of what they were in 2010. In this new world

of low-cost storage, solar users can stay connected to the grid in order to have 24/7 access but rarely have to use or pay for energy, instead using stored energy, which helps dramatically reduce their utility bills. So-called partial grid defection reduces demand for power provided by utilities (because consumers are making their own energy) and likely increases rates for those who remain (because there is less consumption to cover fixed grid costs). This is already happening in places where electricity is expensive and solar is widely available, such as Australia and Hawaii. On the horizon are other solar-friendly markets such as Arizona, California, Nevada, and New York (exhibit).

Storage, though, can also benefit utilities in markets where loads are expected to be flat or falling. In some US states, for example, utilities can earn returns by providing contracts for distributed energy resources. This would, among other things, allow them to defer expensive new investments.


Exhibit

Partial grid defection likely makes economic sense within a few years; full defection will take longer.



¹ Levelized based on upfront capital cost and annual operations over total energy production.

² Grid-defection economics are estimated based on solar power and storage for a hypothetical Arizona residential customer. Partial grid defection assumes that 10% of power needs will be supplied by the utility grid. Full defection assumes addition of a small generator for backup power.

The future of storage is a matter of balance. The ideal would be a regulatory system that strives to balance the desire for a healthy storage market and greater freedom for customers to manage their own energy requirements against the need to ensure the economic sustainability of the utilities and access to electricity service for all customers. Getting this right will be tricky, and no doubt there will be missteps along the way. But there is also no doubt that storage's time is coming. 

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The authors wish to thank Jesse Noffsinger and Matt Rogers for their contributions to this article.



For the full article, see "Battery storage: The next disruptive technology in the power sector," on [McKinsey.com](https://www.mckinsey.com).

PULP AND PAPER: WHERE DIGITAL HELP FAR OUTWEIGHS THE HURT

While the industry's prospects vary by product and region, digital offers opportunities across the board to improve costs—and capture new growth.

by Peter Berg and Oskar Lingqvist

With the strong tide pulling readers away from paper to digital modes of communication, it's no surprise that paper demand has suffered. But for the paper and forest-products industry overall, digital is giving as well as taking away. Most conspicuously, ever-increasing online purchasing is generating new sales of fiber-based transport packaging. Less visibly, digital technologies are driving across-the-board opportunities to improve efficiency throughout the value chain.

Paper and board producers already collect a lot of data, and companies that are able to apply advanced analytics and artificial intelligence to it can learn how to better run their plants. Improvements include predictive maintenance, which helps keep machinery running, as well as more stable production processes, which in turn lead to lower consumption of energy and bleaching chemicals. Remote process controls for mills and other uses of automation can also reduce costs.

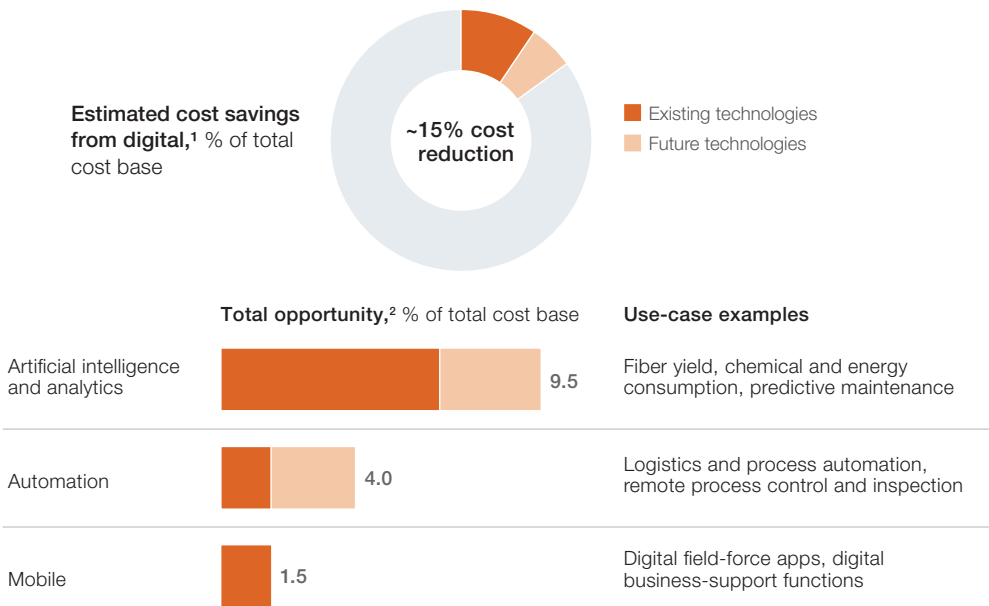
The exhibit shows our rough estimate of the new benefits accruing from adoption of existing technologies at the plant level for pulp and paper

manufacturing—based on what is already starting to be achieved. It also offers a cautious interpretation of potential gains, as digital technologies evolve and are applied to new areas in plant operations. Meanwhile, digital has potential elsewhere in the industry. In forestry, drones are already boosting the precision with which tree growth is monitored, harvesting decisions are made, and logging crews are deployed. Downstream, there are new product-development opportunities, for example, in packaging that can be better traced or that incorporates new security features. Digital also opens the potential for more efficient customer interactions and even direct B2C relationships between paper-product makers and end consumers, for example, in tissue products.

Exhibit

The digital revolution offers cost-improvement opportunities.

Example: pulp and paper manufacturing, all figures are approximate



¹ In addition to cost savings, digital applications in predictive maintenance, throughput debottlenecking, and quality control could improve overall equipment effectiveness by -5 percentage points.

² Excluding purchasing, marketing and sales, and upstream areas such as forestry.

While opportunities exist across the technology spectrum, perhaps unsurprisingly, data-intensive applications involving artificial intelligence and advanced analytics offer the biggest opportunities for gains.

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For a more complete set of findings, see “Pulp, paper, and packaging in the next decade: Transformational change,” on [McKinsey.com](https://www.mckinsey.com).

A DIGITAL UPGRADE FOR ENGINEERING AND CONSTRUCTION

Construction-technology start-ups are helping the industry tackle long-standing productivity problems.

by Jose Luis Blanco, Andrew Mullin, and Mukund Sridhar

Engineering and construction companies have struggled with low productivity for decades. But digital solutions, many developed by specialized technology start-ups, are helping the industry identify and extract new sources of value.

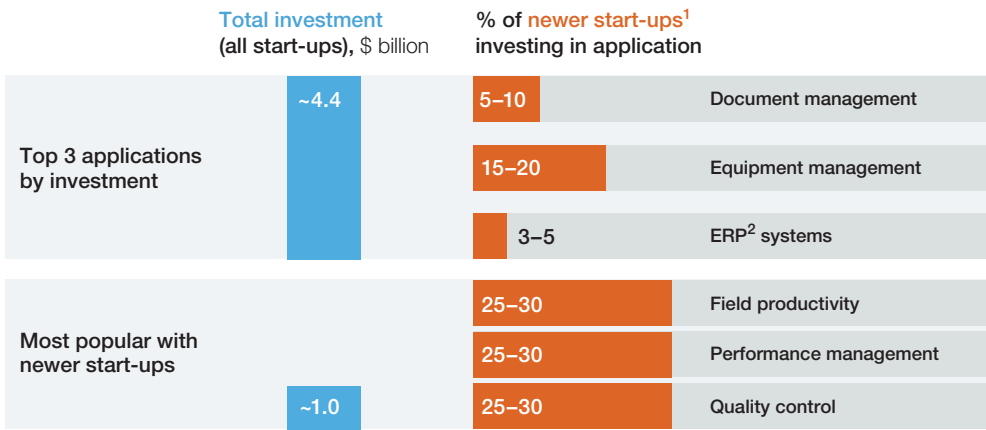
To better understand the evolving productivity landscape, we examined the products of more than 1,000 construction-software start-ups (representing \$10 billion in investment funding) between 2011 and 2017. Those start-ups have brought to market thousands of innovative project tools, whose capabilities include everything from improved quality control to predictive analytics. New ones are emerging all the time, and the mix of capabilities on offer appears to be changing.

Overall, the preponderance of tools created by these companies has been for the construction phase, with far fewer aimed at design, preconstruction, operations, or management. Many start-ups have focused on basic collaboration tools that compile or share project information (such as document-management solutions) or core back-office digitization (such as enterprise-resource-planning systems).

The priorities of newer start-ups—those actually founded in the last five years—suggest digital productivity opportunities are becoming richer. Almost 30 percent of those companies offer on-site performance-management and field-productivity tools. Quality-control tools, including GPS and images to monitor sites, also ranked high: 27 percent of recent start-ups offer them (exhibit). More advanced tools are in demand, including predictive analytics to help manage projects, the use of drones and the Internet of Things for monitoring, and wearable and virtual-reality technologies to improve safety.


Exhibit

When it comes to investing in construction technologies, **newer start-ups break rank** with others in their choice of tools.



¹ Those founded in past 5 years.

² ERP = enterprise resource planning.

With productivity within the construction sector about half that of the total economy, digital solutions alone will not close the gap. But as the range of digital possibilities grows, the importance of engaging with the start-ups offering them will, too. 

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For the full article, see “The new age of engineering and construction technology,” on McKinsey.com.