Ontario Made

Rethinking Manufacturing in the 21st Century

FULL REPORT

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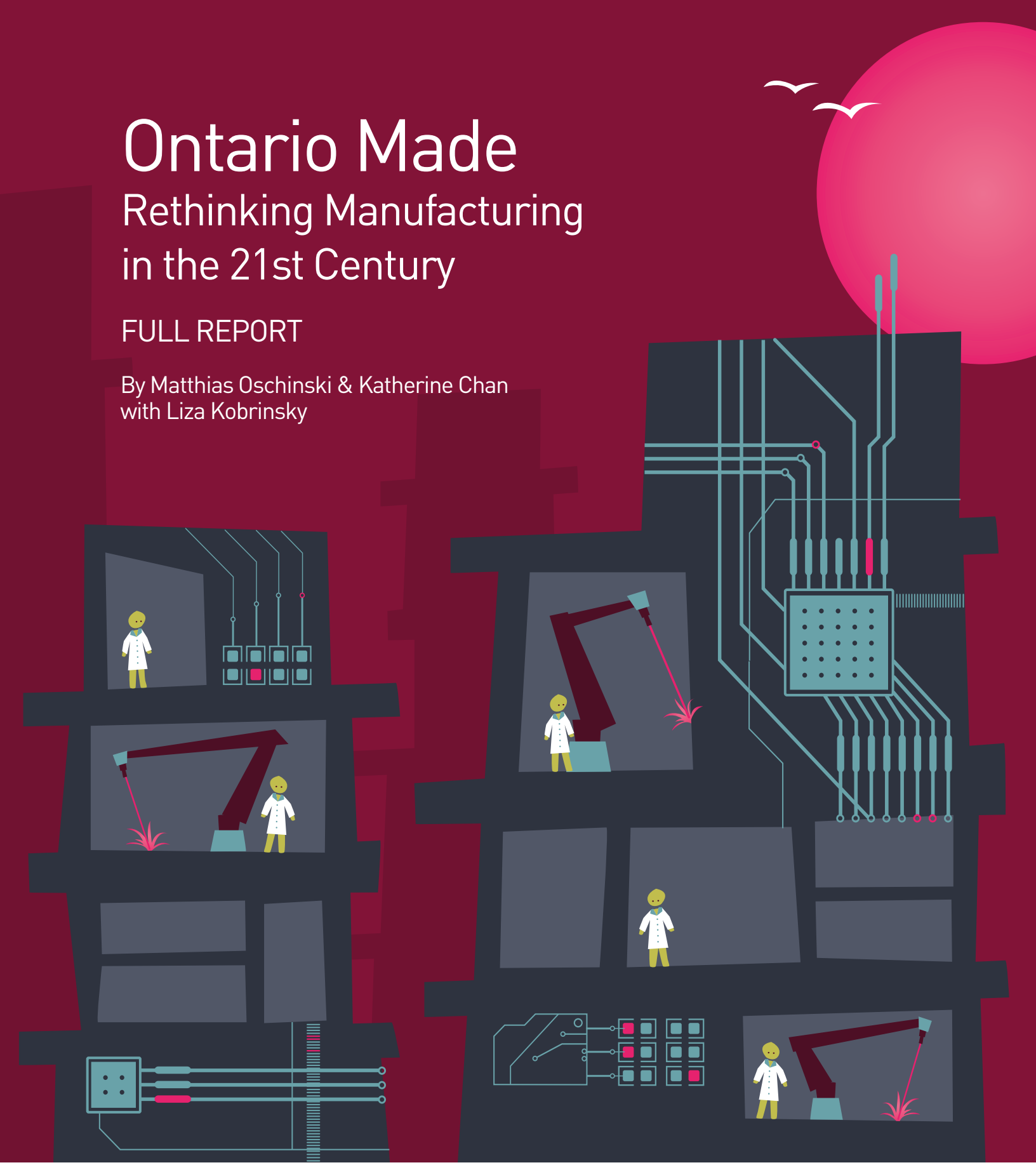
with Liza Kobrinsky



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This implies greater affordability of ICT investments for Canadian manufacturers relative to firms in the overall business sector, a further advantage over US manufacturers when prices are compared to US total business sector ICT investment. This trend presents an opportunity for Canadian manufacturers to invest more heavily in ICT M&E now if the sector is to remain competitive in the long run.

Ontario has also made significant headway in restructuring the business tax system to make it easier for firms to invest, through the harmonization of provincial and federal goods and services tax, the elimination of the capital taxes for manufacturing firms in 2007, and the reduction of Ontario's corporate income tax rates.[23] Furthermore, the lower relative price of M&E from the rising Canadian dollar provides additional incentive for manufacturers to invest more heavily in new M&E. However, Ontario manufacturers have yet to take full advantage of these opportunities. Why?

There are a few possible explanations to new capital investments lag. Firm size, access to financing and the issue of scalability remain obstacles for firm expansion. However, risk aversion and lack of competitive pressure are also factors that contribute to the under-investment in machinery and equipment and the widening productivity gap.[24]

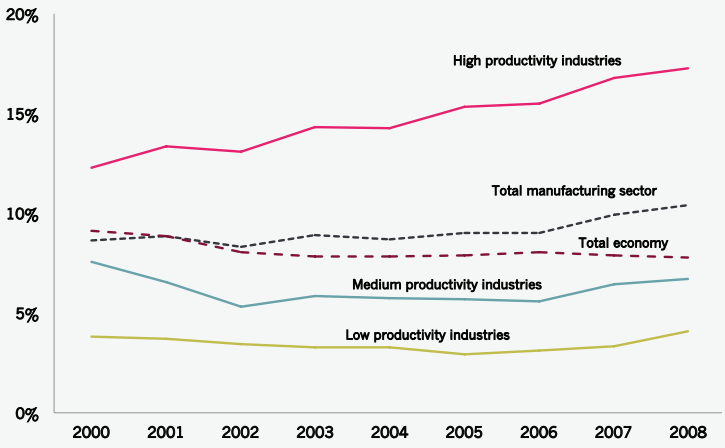
Energy efficiency

In addition to labour and capital, energy and water utilities are important input factors in the manufacturing production process.

Taking into account production numbers sheds some light on the efficiency with which these input factors are being used. Calculating the ratio of real value added to total utility costs for manufacturing in Ontario, Quebec and the rest of provincial Canada shows that Ontario's utility efficiency is actually highest in this group (see Figure 27). In other words, the data suggest that, in general, Ontario's manufacturing sector uses energy and water more efficiently than industries in other Canadian provinces—which might, in part, be due to the larger scale of production in this province.

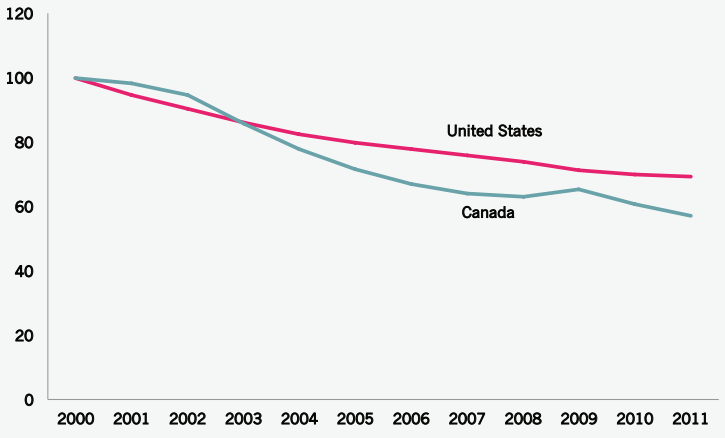
A look at disaggregated industries also reveals that energy is of varying importance as an input factor within the manufacturing sector. Figure 28 below illustrates that petroleum and coal manufacturing, paper manufacturing, primary metal manufacturing, non-metallic mineral manufacturing, chemical products manufacturing and wood product manufacturing are relatively energy intensive compared to other industrial subsectors.

FIGURE 24
Capital expenditures on M&E as a percentage of total output, 2000-2008



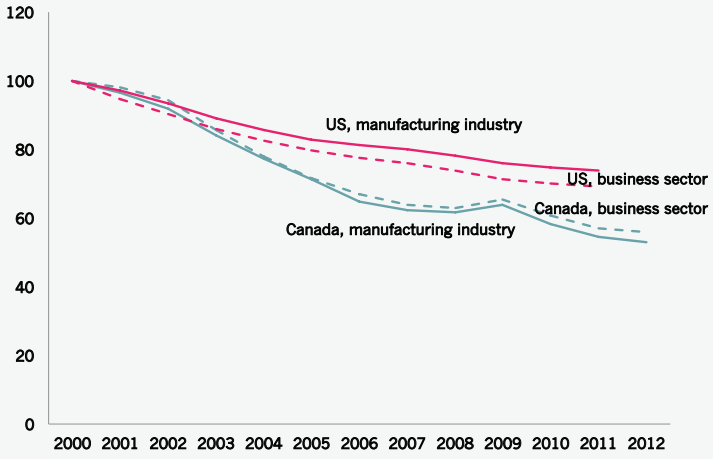
Source: Statistics Canada, CANSIM Tables 379-0025 and 029-0005

FIGURE 25
Price trend of total ICT investments in Canada vs United States (Price Index 2000 = 100)



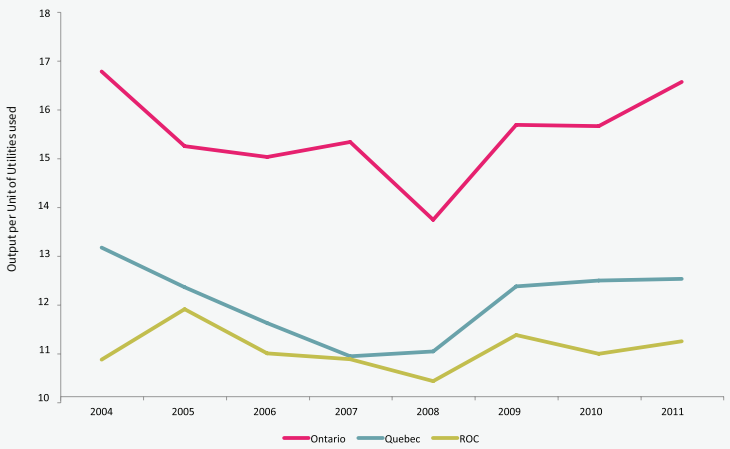
Note: Calculated as the change from total ICT investment implicit price deflators for total computer, communication and software ICT in the business sector in the US and Canada.
Source: CSLS Database of Information and Communication Technology (ICT) Investment and Capital Stock Trends: Canada vs. United States, available online: http://www.csls.ca/data/ict.asp

FIGURE 26
Price trends of ICT Investments, by sector (Price index 2000 = 100)



Note: Calculated as total ICT investment implicit price deflators for total computer, communication and software ICT investment in the US and Canada.
Source: CSLS Database of Information and Communication Technology (ICT) Investment and Capital Stock Trends: Canada vs. United States, available online: http://www.csls.ca/data/ict.asp

FIGURE 27
Utility Cost Effectiveness – Ontario, Quebec and Rest of Canada, 2004-2011



Source: Statistics Canada, CANSIM Table 301-0006, 379-0025

In order to assess Ontario's competitiveness with regard to energy usage, we compare energy efficiency in manufacturing industries relative to that of U. S. peers and peer jurisdictions in Germany. Given that Germany is currently the most productive manufacturing country, an inclusion of German peer jurisdictions in this analysis serves as a useful benchmark for Ontario's manufacturing sector.[25]

With regard to energy usage itself, our analysis focuses on the consumption of electricity and natural gas as input factors in the manufacturing production process. According to data provided by Natural Resources Canada, electricity and natural gas combined amounted for nearly 60 percent of energy consumption in manufacturing in 2010.

At around 30 percent, electricity usage was slightly higher than the consumption of natural gas, which had a share of roughly 28 percent of total energy usage. Oil, another common input factor in energy usage, was not considered in this analysis because consumption data is often missing at the detailed industry level. Moreover, as opposed to prices for electricity and natural gas, the price of oil is largely determined on international markets. Hence, regional variations in cost structures are likely to be less pronounced with regard to oil consumption compared to the use of electricity and natural gas.

To account for a proper comparison between Ontario and its peer jurisdictions, all energy consumption data were re-calculated to KWh.

Figure 29 displays energy efficiency—in terms of electricity and natural gas consumption only—in total manufacturing for Ontario relative to U.S. and German peers. As the ranking shows, Baden-Württemberg is the most energy productive jurisdiction in this group both with regard to electricity and gas usage, followed by Indiana, Bavaria and North Carolina. Out of these 19 jurisdictions, Ontario ranks 17th, or third last, in terms of energy efficiency.

It is important to note here that the results here reflect, at least in part, the composition of the manufacturing sector in each jurisdiction. As such, jurisdictions with a relatively high share of very energy intensive industries, such as paper manufacturing, primary metals and coal, will always end up at the lower end of the ranking.

To get a more detailed picture, it is therefore important to disaggregate the manufacturing sector and compare sub-industries. When this is done for Ontario and its international peers in the U.S. and in Germany, our main result still holds—that Ontario lags most international peers in energy efficiency. This is in line with anecdotal evidence,

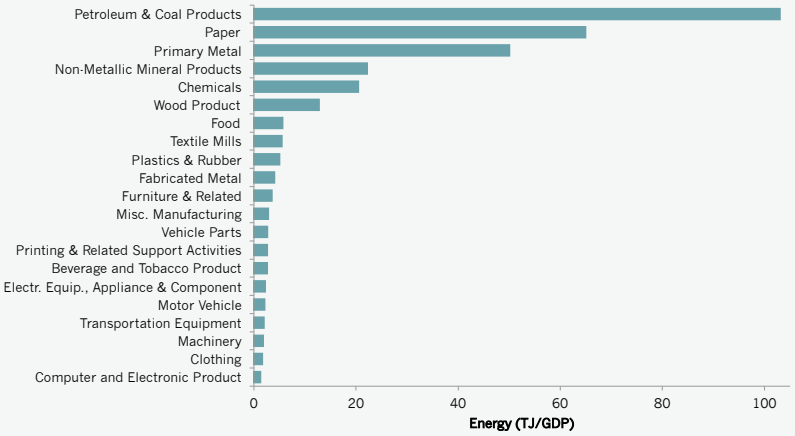
which asserts that comparatively low electricity prices for industrial consumers in the past provided little incentive to upgrade machinery and equipment for more energy efficient production. In more recent years, however, energy costs in Ontario have been increasing and will continue to do so at least over the medium term. This should lead an added incentive to make energy efficiency a higher priority.

Over the past while, there has been ongoing discussion regarding rising electricity prices in Ontario and an increasing concern that price differences relative to U.S. states would harm the competitiveness of Ontario's manufacturers.

Does this concern hold? Figure 30 depicts electricity rates for industrial consumers in Ontario and its U.S. peers from 2000 and 2012. In 2000, the average price for electricity in U.S. peers was 3.4 cents per kWh compared to 5.4 cents per kWh in Ontario. The gap in electricity prices narrowed in subsequent years and reached a difference of roughly 0.7 cents per kWh by 2010.

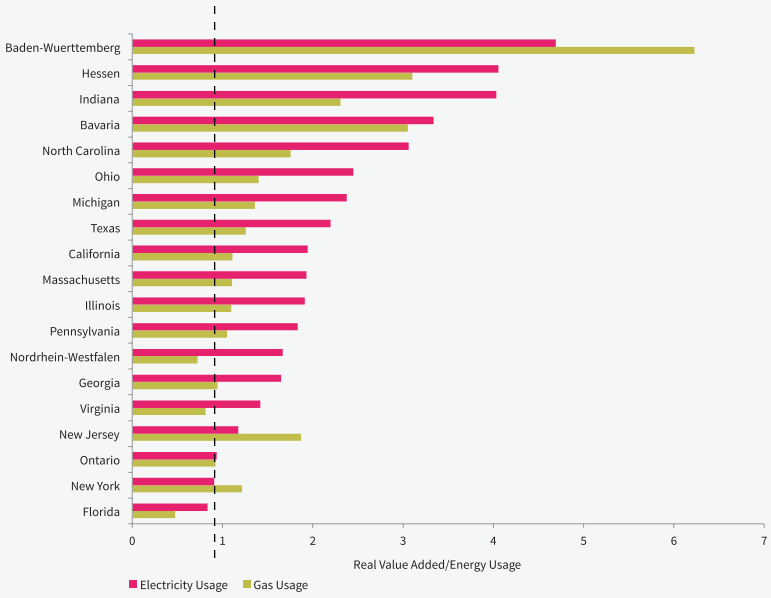
Yet, as Figure 30 also shows, prices began diverging drastically in 2011 and 2012 with Ontario experiencing a significant increase from around 8 cents per kWh in 2010 to 10.9 cents per kWh in 2012. At the same time, electricity prices in U.S. peer states dropped slightly from 7.4 cents per kWh in 2010 to 7.2 cents per kWh in 2012.

FIGURE 28
Energy Intensity in Canadian Manufacturing Industries, 2011



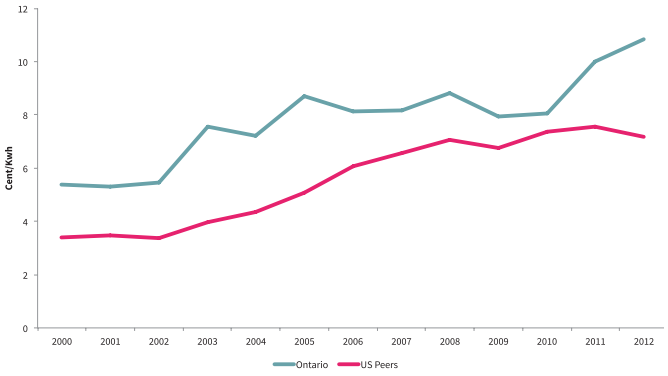
Source: CIEEDAC, Simon Fraser University

FIGURE 29
Energy Productivity Total Manufacturing - Ontario vs. US and German Peer Jurisdictions, 2010



Source: Source: Statistisches Bundesamt, US Energy Information Administration, AMPCO and IESO.

FIGURE 30
Electricity Cost Ontario vs US Peers, 2000-2012 (in Cents/KWh)



Source: NEB and EIA

A direct comparison between selected Canadian provinces and U.S. states illustrates this point further (see Figure 31). In 2000, electricity rates for industrial consumers were 5.4 cents/kWh in Ontario, compared to 3.2 cents/kWh in Michigan, 3.4 cents/kWh in New York and 2.8 cents/kWh in Ohio. By 2010, prices had converged, significantly narrowing these differences. From 2011 onward, however, the gap in prices has started to increase again.

The last column in Figure 31 reveals another interesting fact. While price levels were higher in Ontario compared to most North American peers in recent years, annual price increases occurred at similar speed: from 5.27 percent per year in New York to 7.2 percent per year in Alberta. The only notable exception in this group is Quebec where prices grew on average by 2.65 percent per year.

While comparing electricity costs across jurisdictions is important, a more insightful question might be around the efficiency of Ontario manufacturers in using electricity in production. Figure 32 below illustrates that manufacturers in U.S. peer jurisdictions manage to gain more output using the same amount of electricity compared to Ontario firms. Hence, while companies are not able to control the price of electricity in the province, they can, at least to a certain extent, influence the actual cost of electricity in the production process by addressing the issue of energy efficiency.

A look at international jurisdictions outside North America reveals that prices for electricity are about twice as high in Germany compared to the U.S. and prices for natural gas are about four times as high.

How, then, are German manufacturers able to stay competitive? A recent study by the European Commission shows that the answer is higher energy efficiency, i.e. the smarter use of energy in production.[26]

Thus, with electricity prices set to rise further in Ontario over the medium term, addressing the issue of energy efficiency in manufacturing production will become a crucial issue.

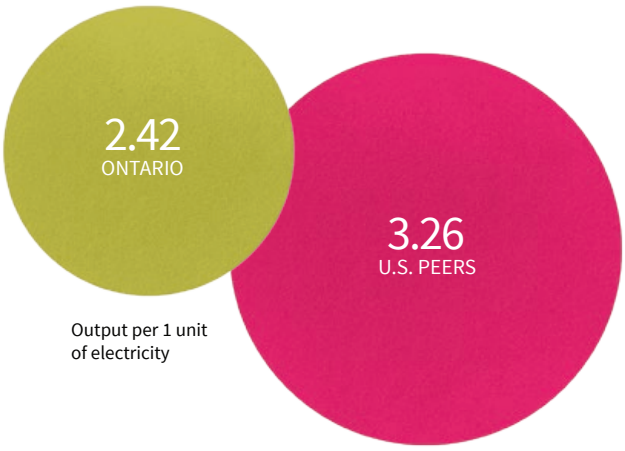
Alongside productivity and the related costs of inputs to production, additional success indicators serve to demonstrate the potential of firms to scale up and the possibilities for sustainable growth. The following two sections analyze Ontario's current situation at the sub-industry level.

FIGURE 31
Electricity Prices in selected Canadian provinces and U.S. states.

JURISDICTION	2000	2005	2010	2012	CAGR
Ontario	5.4	8.7	8.0	10.9	6.03
Alberta	4.6	6.1	7.2	10.6	7.20
Michigan	3.2	4.2	6.5	7.2	6.99
U.S. Peers Avg.	3.4	5.1	7.4	7.2	6.45
New York	3.4	6.4	8.1	6.3	5.27
Ohio	2.8	4.0	5.9	5.9	6.41
Quebec	3.8	4.3	5.2	5.2	2.65

Note: Values in real Canadian dollar; CAGR=year-over-year growth rate from 200-2012
Source: NEB and EIA.

FIGURE 32
Efficiency of electricity use in manufacturing—Ontario vs. U.S. peers



Source: NEB and EIA.

Scalability

A firm's ability to scale up production is an important indicator of success. In order to analyze and quantify the situation for Ontario's manufacturing sector, this analysis focuses on three aspects: high growth firms, survival rates and bankruptcies. Taken together, this can help identify the sector's resilience and those sub-industries with the highest growth potential.

High growth firms

Although productivity is an important ingredient to firm success, it is not the sole ingredient and should not be the end-goal for policymakers. Rather, empirical evidence shows that high growth entrepreneurial firms are responsible for a considerable share of job creation along with the added value they generate in an economy.

Though it is important for policymakers to focus on increasing the number of entrepreneurial manufacturing firms in Ontario, we recognize that growth does not automatically follow. Rather, it is imperative to foster the *quality* of entrepreneurship and to build on the support systems that help promising firms reach their full potential.[27]

As previously noted, the vast majority of manufacturing firms are small, accounting for as much as 86.6 percent of all firms. Small firms may be intentionally small in size to serve different needs. These include niche markets with customized products, since stylized products do not lend themselves to more standardized processes.

Correspondingly, while this report acknowledges the value smaller firms bring to the sector, it focuses on the opportunities for small firms to expand. Larger firms have a greater tendency to exert the potential direct and indirect benefits on employment, wages and value added on the economy. Empirically, the use of advanced production technology also tends to increase with plant size, with large manufacturing firms being more likely than smaller ones to engage in productivity-enhancing (albeit, riskier) production and process innovations.

This is significant for manufacturing firms in particular, since relatively larger firms (100 employees or more) are as much as 24 percent more productive than smaller firms, even after controlling for industry composition effects, firm age and organizational types. This trend does not appear in non-manufacturing sectors, where the relationship between size and productivity appears to be statistically insignificant within industries.[28]

A smooth and accessible growth path is therefore critical for small and medium-sized manufacturing firms. Expansion support for firms has a significant impact on the economy, especially considering that around 20 percent of the Canadian-US productivity gap can be explained by the relatively larger small business sector in Canada.

Furthermore, assisting smaller firms to scale up would not only increase the quantity and quality of employment, it would also place the necessary pressure for larger existing firms to remain competitive and help steer an innovation-driven manufacturing sector forward. The potential economic benefit becomes even more apparent when taking into account that as much as 58.3 percent of all manufacturing employment flows from total small and medium-sized enterprises in Ontario.[29]