



Briefing February 2005

Why Energy Efficiency?

INTRODUCTION

Energy efficiency (EE) is back—and business executives would do well to embrace it. The same phenomenon—high energy prices—that gave rise to EE in the 1970s has returned, but this time it is a combination of factors that underscore EE's new importance:

- energy costs are rising dramatically;
- global, North American and Canadian energy security is in question;
- climate change and air quality are increasingly critical social issues; and
- opportunities to commercialize existing technologies are going to waste.

EE is a sound business strategy, defined as simply the decrease of energy consumption for relatively the same amount of production. For example, a more efficient light bulb reduces the amount of energy used, but provides levels of light that are similar to a less efficient one. EE offers tremendous gain, with very little pain. It is an action that all Canadian companies can take today, with minimal risk and proven technology, and beyond this, it brings additional benefits.

In 2002, Canadian industry saved \$3.4 billion through effective energy management.

Source: Doug Speers, "Message from the Chair" (Ottawa: Canadian Industry Program for Energy Conservation [CIPEC]), *Annual Report*, 2003.

It is therefore no wonder that the Canadian Industry Program for Energy Conservation (CIPEC) and Natural Resources Canada (NRCan) sponsored a workshop in March 2004 on increasing investment in industrial EE. Doug Speers, Chair of the CIPEC Executive Board, challenged workshop attendees to find the answer to his question "What will it take to double industrial energy savings in three years?" This briefing, which was spurred by Speers' challenge, is intended to motivate Canadian business executives to exploit the EE opportunities available to them.

A volume of literature and technical advice exists on *how* Canadian industries can introduce EE in their plants and workplaces. *How* to pursue these activities is the easy part. The more difficult issue (and the purpose of this paper) is *why* business executives should pay attention and invest. EE:

- improves financial performance by reducing overhead costs, particularly in an era of increasing energy prices;

- offers low risk and predictable returns on investment;
- contributes to societal goals of energy security, climate change mitigation and improved air quality, and;
- can encourage commercialization of Canadian technology.

Canadian businesses can benefit tremendously from EE, whether it be in the form of a new plant or retrofit, incremental or breakthrough change, product or process improvement.

“All the low-hanging fruit hasn’t been picked and there are tremendous savings to be made; \$1 billion worth of EE projects has been identified in North America with a 12 to 36 month payback.”

—CIPEC Workshop, March 2004
Vice President of Business Development
Cogenex Corporation

This briefing makes a business case for EE. We first identify major barriers to EE and review business performance issues. We then explore EE’s role in energy security, climate change and air quality, the commercialization of existing technology, and suggest opportunities for action.

SO WHAT’S THE PROBLEM?

Why are more Canadian businesses not acting on this no-brainer? Two simple reasons exist, both of which relate to how executive-level investment decisions are made:

1. *Awareness:* Participants at the CIPEC energy efficiency workshop overwhelmingly agreed that business executives lack information and awareness of EE issues. The magnitude of these investments requires executive attention, but operating engineers have difficulty putting EE investment proposals into executives’ language, and in fact informed analysis may not even reach the executive suite. For many business leaders, EE does not register as a priority. They often assume that energy consumption is a minor, uncontrollable cost, not nearly as exciting as the development of a new product or a marketing

push into a new country. Furthermore, business leaders are not always aware of the associated societal benefits.

2. *Financing:* Aside from the easy “low-hanging fruit,” many EE projects produce payback periods that are slightly longer than most financial officers prefer. This simple investment criterion takes capital investment proposals off the executive agenda before they even appear. However, the *risks* of EE investments, which are lower or non-existent compared to alternative investments, are neither well-quantified nor well-communicated to business leaders.

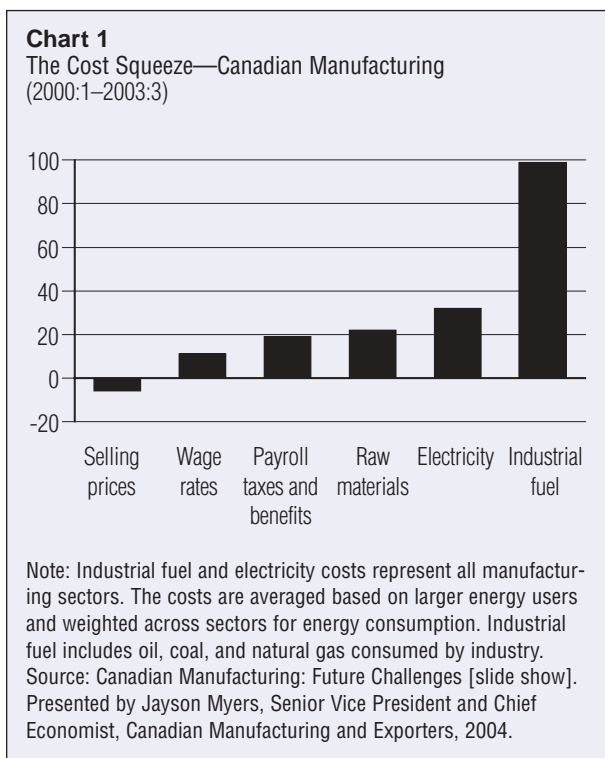
Business executives use a variety of methods and principles to evaluate investment decisions. They range from detailed financial analyses, risk assessments and decision-tree processes, to expert advice, community opinion and intuition. More innovative firms use *both* analysis *and* “gut feel” when making investment decisions.¹ Executives also apply different rules to different initiatives. For internal investments, payback periods of one to two years are typical. But for larger strategic investments—like entering the Chinese market—many companies sustain three or more years of losses before becoming profitable.² David Garvin, in a recent article from the *Harvard Business Review*, reported that it takes new businesses an average of seven years to become profitable.³ Thus, there are few consistent rules for businesses to follow when analyzing and deciding on investments.

All this having been said, many Canadian companies have found investment opportunities that offer very respectable payback periods. And third parties in the energy and financial communities are presenting innovative ways to assume initial capital costs.

BUSINESS PERFORMANCE: WHY NOT CASH IN ON THE QUICK HITS?

EE directly affects the bottom line: “A 20 per cent saving in energy consumption—easily achieved by many businesses—can have the same positive effect as a 5 per cent increase in sales.”⁴ By decreasing overhead costs through controlled energy use, a firm can bolster the competitiveness of its goods or services. With rising energy costs and a risky investment climate, it is no wonder that many of Canada’s leading manufacturers are catching on to EE.

As Chart 1 shows, energy costs are increasing more rapidly than virtually all other overhead costs. Industry fuel costs have risen by 99 per cent and electricity costs by 32 per cent in just two-and-a-half years. Meanwhile, markets are becoming more competitive and many firms' selling prices are falling. Improving business performance begins with identifying energy as a variable to be controlled. The same principles that are applied to the management of other production variables must be brought to bear on energy.



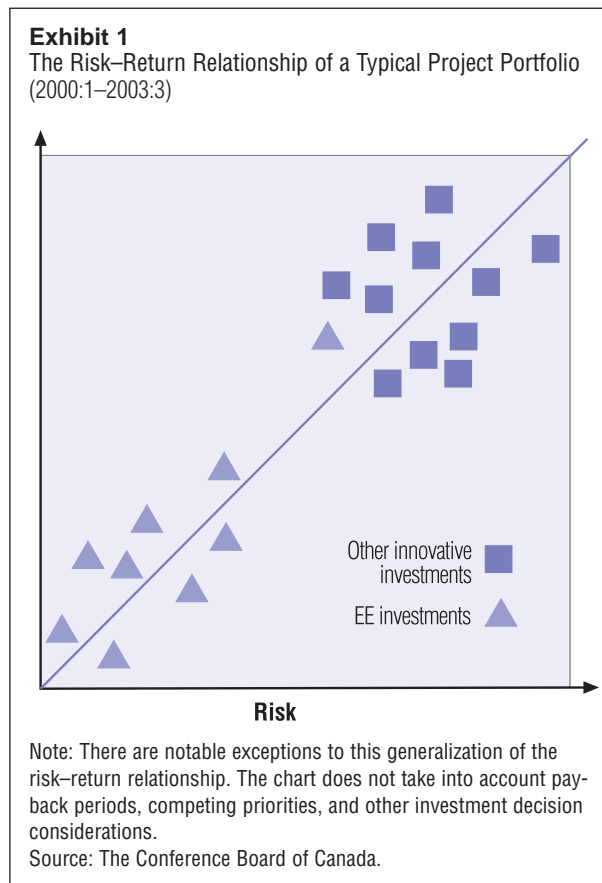
The first action to reducing energy costs should be the elimination of waste—and energy use that could have been avoided is simply “waste.” Experience from the United Kingdom and Scandinavia indicate that eliminating energy waste can reduce energy costs by 10 to 20 per cent.⁵ Simply making the operators who directly control the use of energy aware of the consumption they are responsible for—achieved by providing metered information—has produced reductions of up to 5 per cent. Generally, waste in production processes can be reduced or even eliminated by improving operating practices, writing new procedures, training operators and improving maintenance practices. For the average business operation, these actions typically only require a minimum of physical capital. They do, however, require a focus on energy use. They likewise require the firm to apply its standard management practices to energy use.

LOW RISK AND GUARANTEED RETURN

EE projects are invariably low-risk projects with a predictable return. So much so that firms called Energy Service Companies (ESCO) are willing to cover the initial investment and guarantee a reduction in energy costs. ESCOs are compensated by collecting a portion of their customers' energy savings. Exhibit 1 portrays a typical firm project portfolio. Energy efficiency projects generally exhibit a lower risk–return relationship than do competing investment opportunities.

BEYOND THE BOTTOM LINE

EE investments offer advantages beyond the bottom line. After the downfall of several high profile firms, corporations face increased pressure to act in an accountable and socially responsible manner. More and more, a firm's reputation is becoming a discriminating factor for many investors and customers. In 2002, sustainable development-based investing in Canada accounted for \$51.4 billion of assets held in mutual and labour-sponsored funds.⁶ In addition to traditional business fundamentals, these funds consider a firm's environmental management practices, investments in communities, and shareholder advocacy. They screen for positive as well as negative company practices.⁷



Sustainable practices support brand value and can bring about business efficiencies. Accordingly, the Dow Jones Sustainability Index has outperformed the Dow Jones Global Index over the past 10 years.

PRACTISING WHAT WE PREACH

Three companies, large and small, are leading the way in EE. What are they doing that most of us are not?

General Motors of Canada Ltd. (GM) has integrated environmental practices into its everyday business decisions. GM has decreased greenhouse gas (GHG) emissions by 37 per cent since 1990. Along the way, the company also reduced its energy use by 479 million kilowatts per hour (kWh). GM also has aggressive environmental targets, including a 25 per cent reduction in energy usage by 2005 from 1995 levels.⁸

Schneider Foods of Kitchener, Ontario, views EE as a strategic competitiveness issue. With financial assistance from Natural Resources Canada, Schneider Foods conducted a plant-wide energy audit and is in the process of implementing the recommendations. The audit identified three primary opportunities:⁹

- 20 per cent natural gas reduction, potential annual savings of \$270,000 and a payback period of less than a year;
- 15 per cent cutback in electricity use, potential annual savings of \$400,000 and a payback period of three years; and
- an on-site co-generation opportunity, with estimated savings of \$1.4 million a year.

Businesses are practising energy efficiency to save money, reduce waste and better the environment.

A plant does not need to be large to practise energy efficiency. Domtar Specialty Fine Papers Ltd. of Cornwall, Ontario, in partnership with the Ministry of Environment, conducted an energy analysis of its mill. The audit uncovered several areas where water and energy use could be reduced. The resulting efficiencies included a reduction of heavy fuel oil by 400,000 litres per year, a cut in emissions, and a savings of \$360,000 annually.¹⁰

SPEAKING IN THE LANGUAGE OF THE CFO

The business case for EE is a strong one. The surprise is that more firms are not adopting EE. Why not? One obstacle appears to be the way in which the case for EE is being communicated. Engineers and operations managers need to better motivate their executive team. They must speak in the language of the Chief Financial Officer (CFO) and Chief Executive Officer (CEO), citing not just the costs, but the savings, the low financial risk, the decreased waste and the social benefits. (See box, “Speaking in the CFO’s Language.”)

Speaking in the CFO’s Language

At Woodbridge Foam in Toronto, the manager of operations proposed that the corporate executive “spend \$1M in a major process efficiency initiative.” The proposal was rejected. Several months later, he made a virtually identical proposal, but presented it this way: “I can save the corporation \$xx per unit produced.” This time, his proposal was accepted.

Source: The Conference Board of Canada, *Voluntary Environmental Initiatives in Canada* (Ottawa: The Conference Board of Canada, 1996).

ENERGY SECURITY: WHY WORRY ABOUT FUTURE SUPPLY?

Every day, Canadian businesses depend on a secure supply of reasonably-priced energy for their very existence. Energy security is also a growing concern for the rest of the world—particularly the United States—which is increasingly looking to us as a source of energy exports. Through reduced demand, EE can make a significant contribution to energy security in Canadian business, in the country and around the world.

“Ontario is in talks with TransAlta Corp. aimed at getting a \$500M power plant running full out to help avoid electricity shortages in Canada’s biggest market . . .”

Reuters news service, August 4, 2004.

NEGAWATTS

Negawatts are watts saved. The concept arose from the 1970s work of U.S. energy efficiency expert Amory Lovins. It is estimated that Lovins' "negawatts" idea has turned into a \$5 billion a year EE effort.¹¹ Lovins makes a compelling business case for EE: "Every form of avoided resource depletion and prevented pollution is a potential candidate for an entrepreneur to find and exploit inefficiencies . . . the bigger the problem, the bigger the potential gain."¹²

Negawatts are watts saved—now a \$5 billion a year EE effort.

ENERGY SAVED FROM EFFICIENT MANAGEMENT

CIPEC reports that through effective energy management, Canadian industry saved 386 petajoules (PJ) or \$3.4 billion in 2002. This is equivalent to . . .

- more than 5 per cent of total Canadian energy demand in 2002;¹³
- more than 21 per cent of total Canadian electricity use during 2002;¹⁴
- more than eight times the industrial energy derived from coal in Canada during 2002; and¹⁵
- almost 47 per cent of the energy use derived from nuclear power during 2002.¹⁶

DEMAND SIDE INCENTIVE PROGRAMS

Businesses are energy consumers who can play a major role in bringing about greater energy efficiency. They can be motivated to reduce their energy use and change patterns of consumption (for example, altering energy use to off-peak times). This is called demand-side management (DSM). Governments can encourage consumers to be more efficient in their use of energy by enacting legislation and making resources available to support DSM initiatives. Here are some examples of DSM programs in various provinces:¹⁷

- *British Columbia:* BC Hydro's "Power Smart" program has a \$6 million fund that covers 10 to 50 per cent of the cost of the province's EE projects. A full 150 staff support the program, including an in-plant champion, whose job it is to identify EE opportunities. BC Hydro has recently expanded its Power Smart program to include targeted, community-level programs that are the most comprehensive in Canada.

- *Ontario:* In June 2004, the Ontario Ministry of Energy announced that it will offer financial support for initiatives to reduce electricity demand or increase generating reserve through new DSM projects—"a project involving a capital investment in energy efficient technology or technologies which exceed the applicable government or industry efficiency standards . . . and will result in verifiable electricity savings."¹⁸
- *Quebec and Saskatchewan:* The government-owned electric utilities in Quebec and Saskatchewan are not required to implement DSM programs, although they do undertake voluntary programs. (In the natural gas sector, Quebec's Régie de l'Énergie will allow a utility to increase its prices only if it has implemented a DSM program.)
- *DSM has three objectives:* energy conservation, energy efficiency, and load management. Programs such as those we have identified in the provinces can effectively contribute to the nation's energy security by providing energy users with opportunities to reduce their consumption.

CLIMATE CHANGE AND AIR QUALITY: WHY NOT REDUCE EMISSIONS FOR NO COST?

Energy generation and industrial processes are major contributors to GHG emissions and poor air quality. Energy efficiency can help protect Canada's future by decreasing pollutants and greenhouse gases.¹⁹

Canada is not doing as well as the United States and many other countries in reducing GHG emissions—and EE can help.

The Conference Board of Canada's *Performance and Potential 2004–05* finds that Canada ranks ninth out of 24 Organisation for Economic Co-operation and Development (OECD) countries on air quality and emissions indicators. It is GHG emissions that bring Canada's rank down (see Table 1). And another report that specifically compares Canada with the United States not only finds that we are not doing as well as the United States in terms of our emissions, but also suggests why. (See box, "Benchmarking Canada Against the United States.")

Table 1
Air Quality/Emissions Indicators (2003–04)

Rank	GHG Emissions		
	Absolute GHG emissions (1,000 tonnes carbon dioxide equivalent)	Carbon dioxide emissions (t/capital)	Carbon dioxide emissions per (t/\$1,000 U.S. GDP)
1 Sweden	G	G	G
2 Austria	G	G	G
2 Finland	G	S	B
4 Norway	G	G	G
5 New Zealand	G	G	S
6 Switzerland	G	G	G
6 Denmark	G	S	S
8 Iceland	G	G	G
9 Canada	B	B	B
9 France	S	G	G
11 Portugal	G	G	G
12 Germany	B	S	S

Note: G = gold; S = silver; B = bronze

Source: The Conference Board of Canada. *Performance and Potential 2004–05: How Can Canada Prosper in Tomorrow's World?*. (Ottawa: The Conference Board of Canada, 2004), p. 34–35.

Benchmarking Canada Against the United States

Canada is lagging its nearest neighbour in curbing air pollution. This is made clear in the annual Taking Stock report, drawn from submissions by more than 20,000 polluters in the United States and Canada.

- “North American emissions declined by 18 per cent from 1998 to 2001, Canadian emissions rose 3 per cent.”
- “The U.S. *Clean Air Act* sets binding regulations for air polluters, but Ottawa depends mainly on voluntary and negotiated agreements.”

Source: Dennis Bueckert, *Canada lags behind U.S. in curbing toxic emissions*, says NAFTA report [online], CP Wire, June 2, 2004, [cited August 11, 2004]. Available from World Wide Web: <<http://www.vanderbilt.edu>>.

But some Canadian industries are managing to lower emissions. For example, the manufacturing, mining and construction sectors managed to reduce their level of GHG emissions by 3 per cent between 1990 and 2002, sparing the world 25.2 megatonnes of emissions.²⁰

COMMERCIALIZATION: WHY BUILD SOMETHING NEW WHEN YOU CAN USE EXISTING TECHNOLOGY?

EE technologies exist here and now. The near-term solutions are not in funding more research and development (R&D), but in commercializing existing technology. The CIPEC workshop concluded that “incentives should be targeted towards the uptake of known technologies and less focused on funding R&D.”²¹

Governments and industry should invest in commercializing proven solutions at least to the extent that they do in R&D for unproven solutions.

Furthermore, the potential of many “future” technologies to make a substantial contribution to energy supply is doubtful. For example, studies²² suggest that, to replace one unit of the Darlington nuclear generating station with wind power would require a double row of wind machines covering most of the entire north shore of Lake Ontario, with environmentally-unfriendly battery storage systems. Aside from the cost, many decentralized or renewable sources of energy have neither the technical potential nor the energy intensity to serve our social and economic needs. It therefore makes sense for governments and industry to invest in commercializing proven solutions at least to the extent that they do in R&D for unproven solutions.

CANMET (Energy Technology Branch) is a main energy R&D arm of Natural Resources Canada. Currently, CANMET has various clean-energy technologies that are on the verge of commercial viability. One of its pre-commercialized products is a technology that converts low-grade waste heat into electricity.²³ Electric power stations, pulp and paper mills, steel works and petrochemical plants would be its primary target markets. CANMET claims that Canadian industry discharges over 100 PJ a year of waste heat and that such a technology could save industrial sectors tens of millions of dollars annually. These savings would be realized through increased process efficiencies and reduced fuel costs.

An energy-efficient light bulb is an example of an off-the-shelf EE technology that has been fully commercialized. High-efficiency pumps and furnaces are in the marketplace today. Building automation systems can provide dramatic energy savings. Yet these simple, existing technologies are not being used to their full potential.

From a policy perspective, the “commercialization” of Canadian technology is a current priority of governments across the nation. Data suggests that Canada lags in its commercialization of Canadian technology.²⁴ Investments in commercialization need to be in balance with R&D investments; current evidence suggests they are not. The upshot of this shortfall is that we have opportunities galore to commercialize Canadian R&D, both within the country and internationally.

OPPORTUNITIES FOR ACTION: HOW TO MOTIVATE INDUSTRIAL ENERGY EFFICIENCY

As suggested in the recent CIPEC Workshop, Canadian industry needs help in meeting both the awareness gaps and the financing hurdles related to EE. Workshop participants recommended that a public-private taskforce be set up to further investigate the barriers—and potential solutions—to investing in energy efficiency. They also suggested that CIPEC enhance its information clearinghouse, to further meet industry’s awareness and education needs (especially for small and medium-sized enterprises).

Industry can lever existing audits and incentives to catalyze upgrades of older equipment in plants. For their part, engineers and operations managers in business need to better communicate with their executive team. They must speak in the language of the CFO and CEO, citing not just the costs, but the immediate savings, the low financial risk, the decreased waste and the social benefits. To offer leadership and motivation, firms can create corporate policies regarding EE, identify corporate champions, and set EE targets.

Utilities and municipalities can take actions to motivate industry through information and DSM programs. Decreasing industrial energy intensity reduces the load on utilities’ typically constrained infrastructure. Municipalities have the opportunity to communicate with and influence local businesses as they represent the municipality’s largest source of tax revenue. Industrial energy savings can be a “source of energy” for the municipality.

At the provincial and federal levels, regulatory uncertainty makes long-term investment decisions difficult. For example, it is unclear how the Kyoto Protocol will be implemented in this country. Politicians could improve the situation by sending the signal that EE is a priority. Strong government leadership would help to close the information and motivation gaps on the part of business executives. Part of the solution is social awareness. Communication with workers, home owners and children, through municipal governments and education systems, could initiate such change (consider how quickly we changed our attitudes to recycling, drinking and driving, and smoke-free work spaces).

A fund similar to the Federation of Canadian Municipalities’ Green Municipal Fund could be established and expanded to incorporate EE projects. Government program expenditures should be better balanced towards the commercialization of known technology and less focused on R&D. Governments can also lead by example, with procurement policies that call for the most energy-efficient technology that is commercially available. Government might consider advising, mentoring or even subsidizing in-plant champions, perhaps through the National Research Council’s Industrial Research Assistance Program, particularly the technology advisor program.

Finally, more aggressive information programs are needed to promote EE opportunities (including current government programs) directly to *business executives* (such as CFOs). Educators and the academic community can contribute by raising the awareness of EE opportunities, especially in a business context. For example, Master’s of Business Administration case studies should analyze the business impact of rising energy costs. Engineers, designers and architects should learn how to integrate efficiencies into product, building and process design.

In sum, considering EE’s many benefits and the four factors that make EE so critical at this time—rising energy costs, uncertain energy security, climate change, and wasted chances to commercialize existing technologies—EE should be on the forefront of management’s radar screen. Abundant opportunities exist for various stakeholders to pursue and promote EE. The time for EE is right and it’s risk-free.

Why energy efficiency? Why not?

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Supporting the Development of a Strategic Energy Framework for Canada

Over the past year, energy sector participants have been calling for a new federal–provincial “energy framework.” However, the composition of such a framework is an open matter. For some, the need is for little more than regulatory streamlining. For others, fundamentally different conceptions of Canada’s energy future require debate.

The Conference Board of Canada is in the process of launching an Energy Research Program in the winter of 2005 to *support the development of a strategic energy framework for Canada*. This program will bring together key players on the Canadian energy scene for two purposes: to identify Canada’s major energy issues; and to recommend a program of research to identify possible solutions.

If you wish to join this important program, please contact either:

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Water Pressure Is Building In Canada!

Policy-makers face increasing pressures to keep clean, fresh water available to all those who need it. But contrary to public perception, Canada’s available fresh water is limited. Concerns include:

- Water quality
- Aging infrastructure
- Complicated public governance, as watersheds often cross jurisdictions

The Conference Board is launching a three-year Leaders’ Forum on Water to analyze these challenging issues and propose solutions.

Using balanced research and dialogue among stakeholders, The Leaders’ Forum on Water will examine governance and management of this resource and also explore how to address the estimated \$50 billion water infrastructure deficit.

Findings will be communicated to policy-makers. Major participants include: federal, provincial and municipal governments, private industry and major industrial associations.

To join, contact John Roberts at
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Why Energy Efficiency?

by *Brian Guthrie* and *Paul Mitchell*

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