


# *The Next Frontier*



**Heavy industries** play a critical role in the energy transition, and Canada's have a **low-carbon** advantage. **What's missing is an action plan**

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## The Next Frontier

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Cover photos: B.C.'s Mercer Celgar is looking to become North America's first net-zero pulp mill. Courtesy of Mercer Celgar

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MORRIS J. WOSK  
CENTRE FOR DIALOGUE



# Our race to lose

W

hen imagining what will build and power a net-zero world, it's hard not to contemplate the future of Canada's largest export: crude oil. One might even conclude that the energy transition puts Canadian industry at a disadvantage.

The truth, fortunately, is that Canada has a number of advantages as global markets undergo this historic shift.

Our commodity exports are as vast and varied as the country itself: steel, wood, fertilizer, cement, minerals, some of which are already the world's cleanest thanks to Canada's electricity grid (now 83% emissions-free).<sup>1</sup> All told, these heavy industries employ 300,000 Canadians, compared to 237,000 in oil and gas. And with our largest trading partners (the U.S., EU, and China) all committing to carbon neutrality, **Canada's low-carbon advantage means it's ideally positioned** to grow these industries alongside new ones.

In other words, far from being at a disadvantage, this is our race to lose.

And yet, while the EU and the U.K. have robust plans to better position their heavy industries in a transitioning world, Canada's commendable climate efforts could do more for these vital sectors.<sup>2,3</sup>

What's currently missing? At a high level, an action plan for clean industry would pursue four additional avenues. First, a "Buy Clean" approach in which the federal government builds infrastructure with low-carbon materials and incentivizes other levels of government to do the same, thus increasing demand for comparatively clean Canadian goods. Second, a strategic focus on the products that Canada can competitively supply a net-zero world. Third, investment and support for these well-positioned industries. And fourth and finally, when it comes to exports, Canada needs a rebrand.

**We need to not only export low-carbon goods—but a new "Clean Canada" brand to the world.** That won't happen when pipelines keep dominating local headlines. If Canadians can't see that their country is home to an abundance of clean energy and low-carbon goods, how can we expect other nations to notice?

Canada's updated climate plan is a promising start.<sup>4</sup> In addition to pricing pollution, it invests in making industrial facilities cleaner while spurring the use of low-carbon fuels.

But U.S. President Joe Biden's commitment to a clean electricity grid and zero-emission vehicles—along with the cancellation of the Keystone XL pipeline—should be a wake-up call that Canada needs to rethink its export opportunities. The new Roadmap for a Renewed U.S.-Canada Partnership

unveiled in February similarly centres our shared climate ambitions.<sup>5</sup> If we want Biden's "Buy American" approach to include an asterisk beside

Canada, we must adapt to what this new administration wants more of (clean energy and low-carbon goods) and what it wants less of (fossil fuels and emissions-intensive products).

Luckily, **Canada is well-positioned to capitalize on what's been called the green economy supercycle, during which sustainably produced energy and mineral prices soar.**<sup>6</sup> The production of certain metals and minerals could increase by up to nearly 500% over the next three decades to meet growing demand for clean technologies, according to the World Bank Group.<sup>7</sup> Global steel demand, meanwhile, is projected to increase by up to 55%; Canadian steel and aluminum are among the world's cleanest and could be even cleaner.<sup>8,9</sup> Mining companies such as Vancouver-based Teck are also global leaders in copper production, while Canada is the world's fifth-largest nickel producer—both key metals for electrifying transportation.<sup>10</sup> And Albertan companies like E3 Metals and Summit Nanotech are finding ways to recover lithium wastewater from oil and gas sites.<sup>11</sup>

But despite its relative advantages, heavy industry also represents a challenge in need of a solution: 11% of Canada's emissions come from heavy industry, and that's excluding oil and gas (which by itself represents just over a quarter of all emissions in Canada).<sup>1</sup>

Canada is one of 127 countries—together responsible for 63% of global emissions—that have adopted or are considering net-zero targets.<sup>12</sup> Alongside these national commitments, companies and investors are announcing their own net-zero goals.<sup>12,13</sup> In short, the climate signal and the market signal are rapidly becoming one and the same.

And whether seen through a lens of climate action or economic resilience, **heavy industry is the next frontier we must navigate.**



A stylized, handwritten signature in dark ink, consisting of a large, flowing loop followed by a smaller, more defined loop.

**Merran Smith**, Executive Director



## Facing a net-zero reality

The world is changing quickly as nations and corporations announce climate actions in line with, or even exceeding, those of the Paris Agreement. Fundamental to reaching our net-zero future is reducing the carbon footprint of the industries that will help us build out the transition. And while doing the same for oil and LNG production is championed by some, Canada needs to consider whether these investments would be better directed at the industries that will be foundational to our future.

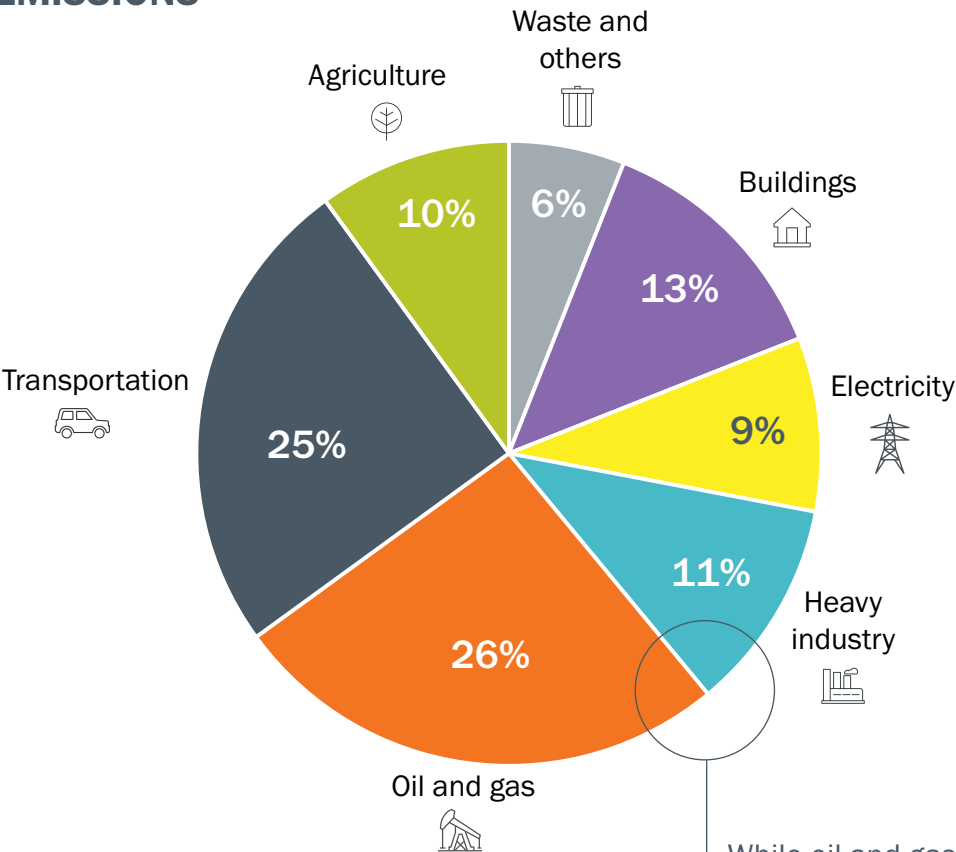
**According to the International Energy Agency, if the world is to keep climate change limited to 2°C, oil supply will need to peak in 2022 and gas in 2025 before declining indefinitely.**<sup>14</sup> Later this spring, the IEA will release its net-zero plan for the energy sector, which will likely further demonstrate that growing fossil fuel exports are inconsistent with a carbon-neutral 2050.<sup>15</sup> Other recent studies have shown that Paris commitments can only be reached if existing coal and gas power stations throughout the world are decommissioned.<sup>16</sup>

The investment community is similarly bankrolling

this transition with some of the world's largest banks and investment funds divesting from higher carbon activities.<sup>17–19</sup> **BlackRock, the world's largest fund manager, is demanding that companies they invest in disclose plans for how their business models work in a net-zero economy,** while a number of global banks have announced fossil fuel divestments of varying degrees, including BNP Paribas, Deutsche Bank, HSBC, ING Group, Mitsubishi UFJ Financial Group, and UBS.<sup>20,21</sup> These investment trends are accompanied by a growing roster of companies—some of them Canadian—announcing their own net-zero goals.<sup>22</sup>

Canada also has legislated climate targets to meet. And while our heavy industries are often lower carbon than competitors in other countries, their combined carbon footprint is nonetheless significant, accounting for 11% of national emissions (excluding oil and gas, which by itself represents just over a quarter).<sup>1</sup> If Canada is to meet its 2030 and 2050 climate targets, we need cleaner heavy industries.

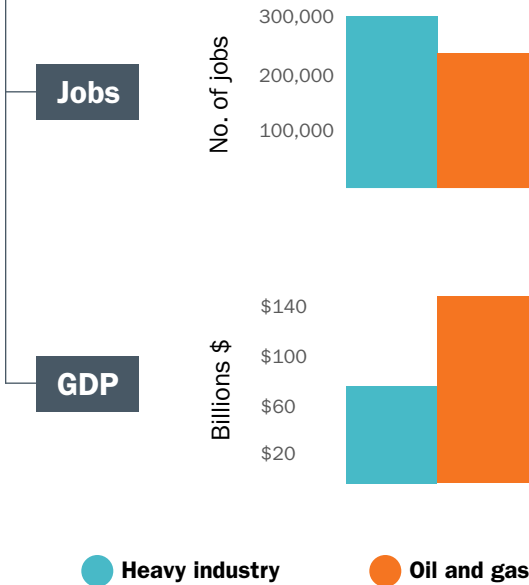
# CANADA'S EMISSIONS BY SECTOR



While oil and gas contributes more to GDP, **heavy industry employs more Canadians**

## WHAT DOES HEAVY INDUSTRY INCLUDE?

Sector	GDP	Emissions in Mt CO <sub>2</sub> e	Jobs
Chemicals and fertilizers	\$20.8 billion	24 Mt	91,700
Iron and steel	\$4.0 billion	16 Mt	26,800
Cement	\$4.0 billion	11 Mt	31,200
Non-ferrous metals	\$7.7 billion	10 Mt	30,100
Mining	\$32.9 billion	8 Mt	63,400
Pulp and paper	\$7.3 billion	8 Mt	54,100
Lime and gypsum	\$0.4 billion	2 Mt	2,400
<b>Total</b>	<b>\$77.1 billion</b>	<b>78 Mt</b>	<b>299,600</b>



Data relates to 2018. GDP in chained (2012) \$CDN. Employment includes direct jobs only. GDP and employment based on selected North American Industry Classification System (NAICS) codes to align reporting under Canada's emissions inventory. Sources: Statistics Canada, Environment and Climate Change Canada, Canadian Energy and Emissions Data Centre at Simon Fraser University.



## METALS AND MINERALS USED IN EVS

Metal / Mineral	Production in Canada
Cobalt	Canada is the world's sixth-largest producer of cobalt. <sup>23</sup>
Lithium	Canada has a number of lithium projects. <sup>24</sup> Its first lithium mine started production in 2018. <sup>25</sup>
Aluminum	Canada is the world's fourth-largest primary aluminum producer. Its producers have the lowest carbon footprint of any country. <sup>26</sup>
Graphite	Canada is the world's third-largest producer of graphite. <sup>27</sup>
Nickel	Canada is the world's fifth-largest producer of nickel. <sup>27</sup>
Copper	Canada is the world's 10th-largest producer of copper. <sup>28</sup>



## Building blocks of the transition

Put simply, the world cannot build a sustainable economy without the materials to build it. And while heavy industries need to decarbonize, they also represent a foundational part of that very process. Wind and solar farms, electric vehicles, batteries: none are possible without the metals, minerals, and chemicals needed to build them. There are similarly few alternatives to using cement in many building applications.

These industries are also an important part of Canada's economic, regional, and social fabric. Indeed, we have an abundance of skilled workers, many of whom need to better understand how their roles and their industries fit into and help drive the energy transition, because the reality is that they bring an integral contribution.

**Heavy industries are foundational to the energy transition. Among other things, these sectors supply:**

- materials to build renewable energy projects, batteries, and transmission infrastructure
- materials to build zero-emission vehicles (such as EVs and hydrogen-powered trains)
- materials to decarbonize buildings and public infrastructure (such as energy-efficient HVAC systems and low-carbon steel and cement)
- chemicals and fertilizers to fuel the low-carbon economy



**COMPANIES LIKE CARBONCURE** and Svante are injecting carbon into concrete, making the material cleaner in the process. Photos: CarbonCure



## A shifting global landscape

Canada would not be pursuing a clean industry action plan without some precedent. Building on the European Green Deal of late 2019, the European Commission's *New Industrial Strategy for Europe* focuses on reducing the carbon footprint of industries such as steel, cement, and chemicals.<sup>2,29</sup> The U.K.'s *Ten Point Plan for a Green Industrial Revolution*, also released in 2020, commits the nation to an emissions-free electricity grid, a renewed manufacturing base, clean aviation and shipping, and green finance, while the country's 2021 *Industrial Decarbonisation Strategy* sets out plans to slash industrial emissions by two-thirds by 2035.<sup>3</sup> Additionally, the EU is exploring border carbon adjustments, where European nations would impose a tax on goods imported from foreign producers operating without a carbon price.<sup>30</sup>

U.S. President Joe Biden's "Buy American" executive order, meanwhile, strengthens rules favouring domestic suppliers.<sup>31</sup> While the president has said exceptions will be made for its northern neighbour, one way to make our preferred partner status even stronger is to demonstrate that Canadian products have low-carbon footprints and can help the U.S. realize its climate ambitions. **Both the EU and U.S. policies, while differing in intent, have the same implications for Canada: our export industries need to be nimble and increasingly clean.**

### A "BUY CLEAN" SOLUTION

"Buy Clean" policies require governments to only buy infrastructure materials that are low-carbon. California's *Buy Clean California Act*, for example, requires contractors bidding on state infrastructure and construction projects to disclose emissions for certain materials, such as steel and glass.<sup>32</sup> The *CLEAN Future Act*, proposed by House Democrats last year and now moving closer to reality, would establish a similar Buy Clean program nationally.<sup>33</sup> The goal of both initiatives: closing the "carbon loophole," where climate policies fail to consider imports when calculating national emissions. Research shows that up to around a quarter of emissions pass through this loophole, originating in regions lacking regulation and ending in countries with increasingly regulated carbon markets.<sup>34</sup> **Unless and until the carbon loophole is closed, the world will struggle to stop climate change.** As one European report put it, "We cannot keep pushing industrial carbon emissions around the world in an unaccountable manner."<sup>35</sup>



## IRON AND STEEL

The global steel industry is motivated to manufacture products for a net-zero world. Sweden's **SSAB** is bringing the world's first fossil-free steel to market by 2026 in hopes of supplying companies such as BMW seeking to source steel with a lower carbon footprint.<sup>36</sup> SSAB last year launched a pilot plant that uses 100% clean hydrogen.<sup>37</sup> Similarly, Germany's **ThyssenKrupp** is commissioning a large-scale iron plant using hydrogen in 2024, and Luxembourg's **ArcelorMittal** has plans for such a pilot plant by the end of the decade.<sup>38,39</sup> Others are focusing on electrification: U.S. startup **Boston Metal** is developing a process for emissions-free steel by replacing coking coal with electricity; investors include BHP and Bill Gates's Breakthrough Energy Ventures.<sup>40</sup> Finally, **Tata Steel** is currently operating a pilot plant using carbon removal technology in the Netherlands with further sites planned elsewhere in the country and in India; the process could lead to a 90% reduction in emissions.<sup>41</sup> National governments are also invested in clean steel production: Germany's "steel strategy" could help meet the country's climate goals while improving competitiveness and ensuring a future for German steel.<sup>42</sup>

## CEMENT

Numerous examples of low-carbon innovation can also be found in the cement sector. Norway's **Norcem** recently secured significant government funding to build the world's first full-scale carbon removal facility for cement by 2024, which would shrink the plant's carbon footprint by 50%.<sup>43,44</sup> Mexico's **Cemex**, the second-largest cement manufacturer in the world, has developed a process that replaces traditional limestone-based clinker with an alkali-activated binder, reducing emissions by 70%.<sup>45,46</sup> In Canada, **Lehigh Hanson** is pursuing full-scale carbon capture at its Edmonton facility, aiming to reduce emissions by over 700,000 tonnes per year.<sup>47</sup> Nova Scotia's **CarbonCure** is injecting CO<sub>2</sub> into wet concrete, strengthening the concrete while reducing the amount of cement needed.<sup>48</sup> CarbonCure's technology is being used in Amazon's new Virginia headquarters.<sup>49</sup> And B.C.-based **Svante** has partnered with **LafargeHolcim** and **Total SE** to build a plant in Richmond, where captured CO<sub>2</sub> will be re-injected and stored in concrete.<sup>50</sup> In fact, Canada is home to a host of carbon utilization technologies with applications in the cement sector, such as **Carbon Upcycling Technologies**, **Carboclave**, and **Pond Technologies**.



Canada is one of 127 countries—together responsible for 63% of global emissions—that have adopted or are considering net-zero targets.<sup>12</sup>

## FERTILIZER AND CHEMICALS

Norway's **Yara International** and Australia's **ENGIE** are working on producing the world's first carbon-free fertilizer.<sup>51</sup> Similar plants are planned in Chile, Germany, Morocco, the U.K., and the U.S.<sup>52</sup> Yara also just announced plans to upgrade its flagship chemical plant in Norway, which will soon use only clean hydrogen.<sup>53</sup> Saudi Arabia's **SABIC**, meanwhile, has developed a process that converts waste into a renewable feedstock for producing plastic, reducing emissions and the use of fossil feedstock during production. SABIC plans to use the process at a site in the Netherlands.<sup>54–56</sup> Germany's **BASF** has developed a production process for chemicals using renewable fuel derived from organic waste and vegetable oil.<sup>57–60</sup> And in Canada, **Methanex**, the world's largest producer of methanol, is shrinking its carbon footprint by fuelling 19 of its 30 ocean-going vessels with methanol, cutting emissions by 15%.<sup>61</sup>

## PULP AND PAPER

Sweden's **Södra Värö** pulp mill, which is fossil-fuel-free in its daily operations, also produces clean electricity, district heating, and biofuel.<sup>62</sup> In Finland, **Finpulp**'s proposed Kuopio project would produce carbon-neutral pulp while also adding electricity and biogas to the national grid.<sup>63</sup> Here in Canada, **West Fraser's** Hinton, Alberta, pulp mill produces lignin (a complex organic compound found naturally in plants) that can replace fossil-fuel-derived chemicals used in adhesives, foam insulation, and as a dispersant in the textile and pesticide industries. Lignin can even replace up to 50% of bitumen used in asphalt.<sup>64</sup>





## MINING

As one of the EU's leading mining nations, Sweden has an interest in maintaining its competitive position. The Nordic nation's 2013 mineral strategy helped create the conditions for **Northvolt AB** building Europe's first homegrown gigafactory for lithium-ion battery cells, which will source not only local metals but also 100% clean electricity to power its operations (with funding from the **European Investment Bank** and in partnership with government-owned Swedish mining company **LKAB**).<sup>65,66</sup> Not far behind is Norway, where **Morrow Batteries** is pursuing a similar factory, capitalizing on Norway's clean power,

domestic minerals, and proximity to European markets.<sup>67</sup> In terms of Canadian leadership, **Kirkland Lake Gold's** Macassa mine and **Goldcorp's** Borden mine both use electric vehicles in their operations.<sup>68,69</sup> Meanwhile, other miners across Canada are working to produce carbon-neutral nickel to win over buyers like Tesla, including **Giga Metals** in B.C. and **Canada Nickel** in Ontario.<sup>70,71</sup> The production of metals and minerals such as graphite, lithium, and cobalt could increase by up to nearly 500% over the next three decades to meet growing demand for clean technologies, according to the World Bank Group.<sup>7</sup>

# Canada well-positioned

The 2021 **Global Cleantech 100** list contains **11 Canadian companies**.<sup>80</sup>

Global markets are seeking more than just incremental improvements when it comes to the carbon footprint of commodities. As outlined previously, both the EU and Biden's America are accelerating their ambitions, and more fundamental shifts will be required to satisfy investors that the products they invest in will help economies achieve carbon neutrality. The good news: Canada is starting from a strong position, with a number of advantages working in its favour.

## ADVANTAGE #1: OUR CLEAN ENERGY

Heavy industries are energy-intensive. Cement requires temperatures above 1400°C, steel and aluminum production melts ore at 1600°C, mining haul trucks are some of the world's largest, and much of the chemical industry uses fossil fuel as a feedstock. While zero-emission options are limited in some cases, Canada has competitive advantages.

Our electricity grid is currently 83% emissions-free and among the world's cleanest, thanks partly to an abundance of hydropower.<sup>1</sup> Canada also ranked ninth globally for installed wind capacity in 2019, which, combined with solar power, currently meets 6% of our electricity demand.

**Wind and solar generation costs have declined 71% and 90%, respectively, in Canada since 2009.**<sup>72</sup>

Furthermore, Canada's electricity rates are the lowest in the G7, and Alberta and Saskatchewan are developing wind power at bid prices of approximately \$0.04 per kilowatt-hour, again among the world's lowest.<sup>73,74</sup>



**TECK RESOURCES'** Highland Valley Copper Operations near Logan Lake, B.C. Copper is heavily used in EVs. Photo: Teck Resources

Canada's clean grid means that our industrial products already have a carbon footprint that's, on average, lower than that of global competitors. A number of Canadian steel mills, while still using emissions-intensive technology, are the cleanest globally.<sup>8</sup> Canada similarly produces the world's cleanest aluminum and steelmaking coal, while the emissions intensity of Canada's pulp and paper sector is now among the lowest as well.<sup>9</sup>

**Canada is also among a small group of countries with the most potential for producing and exporting clean hydrogen**, which could prove particularly useful in decarbonizing industries like steel, cement, and chemical manufacturing.<sup>52,75</sup> Quebec is actively pursuing zero-emission hydrogen as evidenced by a partnership between Hydro-Québec and ThyssenKrupp to build an 88-megawatt electrolyser that will produce 11,100 tonnes of clean hydrogen annually.<sup>76</sup> Proton Technologies in Calgary, meanwhile, is developing a low-cost method for producing hydrogen that involves the underground combustion of remnant oil in abandoned reservoirs, keeping the emissions released during this process below the surface.<sup>76,77</sup>

Our clean energy advantage can also support Indigenous self-determination. Indigenous Clean Energy, established to advance Indigenous inclusion in Canada's energy future, has identified clean energy mining as an opportunity to further build on the **197 medium-to-large renewable energy generating projects with Indigenous involvement**.<sup>78</sup> In terms of heavy industry, the First-Nations-owned Meadow Lake Tribal Council Bioenergy Centre in Saskatchewan will generate carbon-neutral power using sawmill biomass feedstocks for power and heat.<sup>79</sup>

## ADVANTAGE #2: OUR CLEANTECH AND CARBON CAPTURING

A number of Canadian companies are developing and deploying technology that either prevents CO<sub>2</sub> from reaching the atmosphere or removes it when it does. For industrial processes where emissions cannot currently be reduced to zero, Canada is home to a number of successful examples of carbon capture, utilization, and storage. Calgary companies Enhance Energy and





**(LEFT) RESOLUTE FOREST PRODUCTS'** pulp mill in Saint-Félicien, Quebec, provides waste heat and CO<sub>2</sub> to the adjacent Toundra Greenhouses, where the carbon is used for the production of vegetables. Photo: Resolute Forest Products

**(BELOW) MERCER CELGAR** in Castlegar, B.C., is looking to become North America's first net-zero pulp mill by using previously discarded tree parts to generate power. An added advantage of this process is the ability to make bioproducts, such as biogas or industrial chemicals, that can replace those made from fossil fuels. Photo: Mercer Celgar



Whitecap Resources inject CO<sub>2</sub> (captured from a refinery, a fertilizer plant, and a coal power plant) into old oil reservoirs.<sup>81</sup> Ocean Networks Canada, a pan-Canadian marine research initiative, is pursuing perhaps the most permanent solution, injecting carbon into Canada's many basalt geological formations; the CO<sub>2</sub> mineralizes into basalt and is thus permanently removed from the atmosphere.<sup>82</sup> As noted earlier in this report, innovative companies like **CarbonCure and Svante are injecting carbon into concrete, making the material cleaner in the process.** Canadian company Resolute Forest Products' pulp mill in Saint-Félicien, Quebec, provides waste heat and CO<sub>2</sub> to the adjacent Toundra Greenhouses, where the carbon is used for the production of vegetables.<sup>83</sup> Lastly, the Alberta Carbon Trunk Line, the world's largest carbon capture pipeline, entered into operation earlier this year.<sup>84</sup>

### ADVANTAGE #3: OUR SUPPLY CHAIN

Canada can provide many of the raw materials used in its manufactured products, reducing both the costs and the carbon footprint of transportation. Despite this, we spend more than \$7 billion annually on imported steel and aluminum, materials that are typically higher-carbon than domestic options.<sup>85,86</sup> Canada is rich in the

minerals, metals, and smelted and manufactured products that underpin both battery (cobalt, lithium, nickel) and vehicle production (steel, aluminum, copper, plastics).

**Creating a domestic supply chain for batteries and zero-emission vehicles could give Canada an edge in the global EV manufacturing race,** thanks to cost and emissions savings from transportation and our comparatively clean electricity grid.

This is not wishful thinking. An agreement between Ford Motor Company and Unifor, Canada's largest union, will see nearly \$2 billion go toward the production of five EV models in Oakville, Ontario.<sup>87</sup> A separate almost \$1.5-billion deal between Unifor and Stellantis (formerly Fiat Chrysler) also targets EV production, creating 2,000 jobs at the latter's Windsor-based plant.<sup>88</sup> And Montreal's Lion Electric recently partnered with Amazon to manufacture up to 500 electric trucks per year for the e-commerce company.<sup>89</sup> Canada is home to a number of other EV makers as well, particularly in the bus category. Finally, a battery ecosystem is an opportunity to give new life to old oil operations. Calgary-based companies E3 Metals and Summit Nanotech, for example, can recover lithium wastewater from oil and gas sites.<sup>11</sup>

**ANGLO AMERICAN** is converting heavy-duty mining haulers (pictured) to run on hydrogen, with trials beginning in South Africa this year. Anglo is looking to convert 400 of its diesel-powered trucks. Photo: Anglo American



## A clean industry action plan

# H

ow does Canada seize its heavy industry opportunity? More than one answer exists to that question, which is why Canada needs an action plan to help kickstart demand and provide market certainty for private sector investors—something that’s currently

missing in this country. **A successful clean industry action plan would:**

### **Give Canada’s clean products a competitive advantage through domestic demand by**

- establishing a “Buy Clean” approach for federal procurement, ensuring all infrastructure is built with low-carbon materials, while encouraging other levels of government to do the same through funding incentives;
- launching a challenge fund to demonstrate the use of low-carbon building materials in public infrastructure and supporting their uptake;
- and using policies and regulations to create market certainty for the future growth of low-carbon products, for example a zero-emission vehicle standard or vehicle pollution regulations to spur the adoption of electric vehicles.

### **Identify where Canada can win by**

- strategically growing the products Canada can competitively supply in a net-zero world;
- and actively pursuing new industries that capitalize on Canada’s low-carbon advantages, such as establishing a self-sufficient battery and critical minerals supply chain

to build and grow domestic battery and clean technology manufacturing.

### **Support the industries of the future by**

- investing in the research, development, and deployment of clean technologies to support industries with growth prospects in a net-zero world, helping them become cleaner and more competitive;
- ensuring Canada gets a foothold in new industries where it can lead (such as clean hydrogen, battery manufacturing, and carbon removal);
- aligning tax structures and incentives while encouraging private investment in clean industry;
- and supporting workers and regional and Indigenous communities impacted by this transition.

### **Brand Canada as clean by**

- showcasing a “Clean Canada” export brand to the world by ambitiously promoting what Canada can offer a net-zero world (through trade missions, tech demonstrations);
- promoting Canadian technology and certification standards as part of this brand, including but not limited to clean fuels, carbon removal, and clean hydrogen;
- and advertising Canadian products as environmentally superior where true.

In our efforts to both halt climate change and strengthen Canada’s economy, heavy industry indeed represents the next frontier. Let’s navigate it wisely and actively. ■



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Clean Energy Canada  
Simon Fraser University, Morris J. Wosk Centre for Dialogue,  
Harbour Centre 3300-515 W. Hastings St.  
Vancouver, B.C., V6B 5K3  
[cleanenergycanada.org](http://cleanenergycanada.org)

