September 2013

MEDIA PLANET

ENERGY PLANNING & LOGISTICS

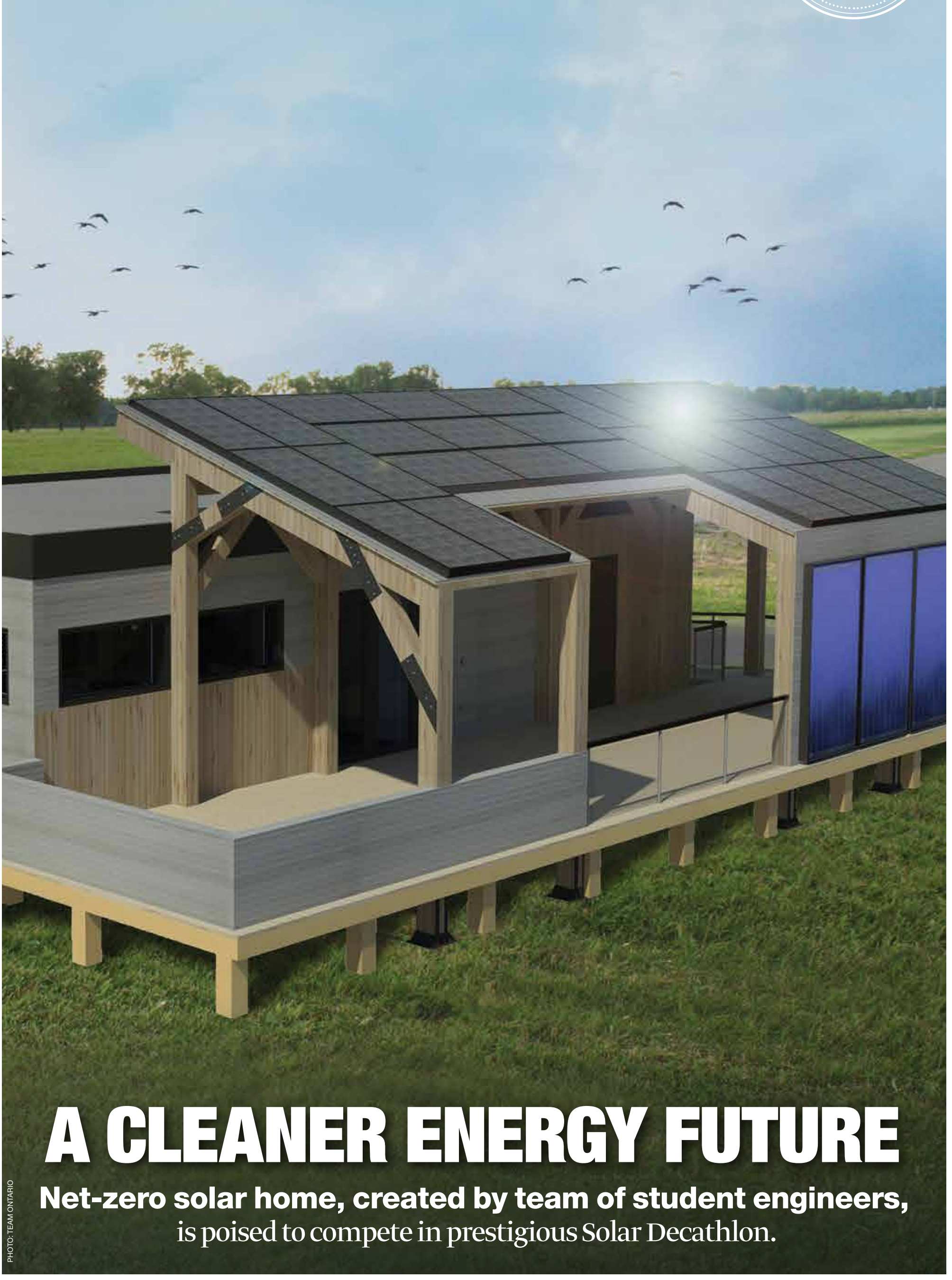
Featuring

HARNESSING WIND
Exploring sustainable energy

CHARTING OUR COURSE
Securing Ontario's energy future

MEANINGFUL CHANGE
Reducing waste with advanced biofuels

2 WAYS TO LOWER YOUR ENERGY BILL



A CLEANER ENERGY FUTURE

Net-zero solar home, created by team of student engineers, is poised to compete in prestigious Solar Decathlon.

PHOTO: TEAM ONTARIO

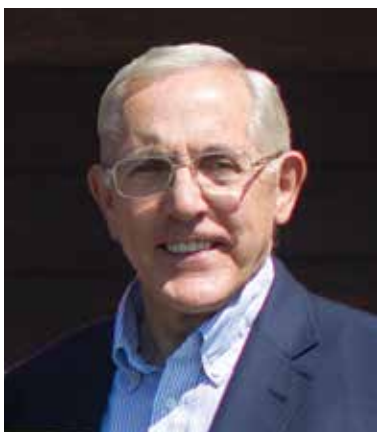
CHALLENGES

Minister Chiarelli tours the ongoing construction of the Lower Mattagami hydroelectric project in August, 2013.
PHOTO: HYDRO OTTAWA

1 INVEST IN ENERGY EFFICIENT WINDOWS AND DOORS

Ontario continues to lead the way in energy innovation and investment. Through an increased understanding of our energy landscape we can ensure **a cleaner, more efficient, and prosperous future.**

Ontario's bright energy future



Bob Chiarelli
ONTARIO MINISTER OF ENERGY

"We have been taking a hard look at our options, with the goal of choosing the best way forward."

This is an exciting time for Ontario's energy industry. As a leader in innovation and technological advancement, Ontario's energy sector has helped to drive the province's economy and bolster job growth over the last decade.

Global leader

Ontario is a global leader when it comes to renewable energy: today we have over 800 MW of solar capacity, which is enough electricity to power over 90,000 homes annually, and, for the first time last year, wind produced more electricity than coal.

Ontario's green energy strategy has attracted private sector investment that has helped create over 31,000 jobs, and attracted over $24 billion in investment. The strategy has also fostered a culture of energy conservation—which has resulted in $4 billion in avoided system costs.

As part of the development of the province's smart grid, over 4.7 million homes and small businesses now have smart meters.

These meters provide precise information on electricity consumption securely and privately. Smart meters not only help consumers save money, but they are a key component to supporting advanced consumer technologies and commercial and industrial needs.

Forging forward

The last six months have been a crucial period for the sector: as part of the review of our Long-Term Energy Plan we have been taking a hard look at our options, with the goal of choosing the best way forward.

This review process has included consultations and engagement sessions with the general public, municipal leaders, stakeholders and Aboriginal communities across the province as well as extensive online surveys and written reports.

It has been a dynamic, responsive and collaborative process, one that underscores our approach to renewal—when it comes to meeting our collective energy needs, we cannot be afraid to evolve our thinking. This has meant taking an honest look at our current policies and programs to determine if they remain relevant and worthwhile, and if necessary updating them to respond to changing conditions.

Taking action

Our government will continue to take decisive action to address the needs of communities, consumers, and ratepayers and we will continue to do so with an open door and a positive attitude.

Working together, I am confident that we will be able to tackle these challenges and continue to deliver a clean, reliable and affordable energy system that meets the needs of all Ontarians.

BOB CHIARELLI
editorial@mediaplanet.com

Natural resources putting Canada on the map

Canada is blessed with immense reserve of natural resources.

Our Government works hard so Canadians can derive the full benefits of this strategic sector, which directly and indirectly accounts for almost one-fifth of our economy, 1.8 million jobs, over half our exports and $30 billion in annual taxes and royalties, which fund critical social programs.

In Ontario alone, employment in resource sectors exceed 280,000 jobs. Major project investments underway or planned over the next ten years in the Province are estimated to reach to $70 billion, meaning there will be even more economic benefits from Ontario's resource industry.

To ensure development is done responsibly, our Government has taken action to reduce our environmental footprint and introduced world-class safety standards. We have invested $10 billion in clean energy since 2006.

As result of these initiatives, the International Energy Agency ranked Canada second in its rate of energy efficiency improvement among 16 developed economies.

Joe Oliver
MINISTER OF NATURAL RESOURCES

Generating prosperity

Innovation in clean technologies help transition industries to be more efficient and environmentally responsible. In 2010 industry invested over $1 billion in fossil fuel energy supply research, development, and demonstration.

Our Government's plan for Responsible Resources Development can generate prosperity and security for Canadians now and for many future generations.

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EDITOR'S PICK

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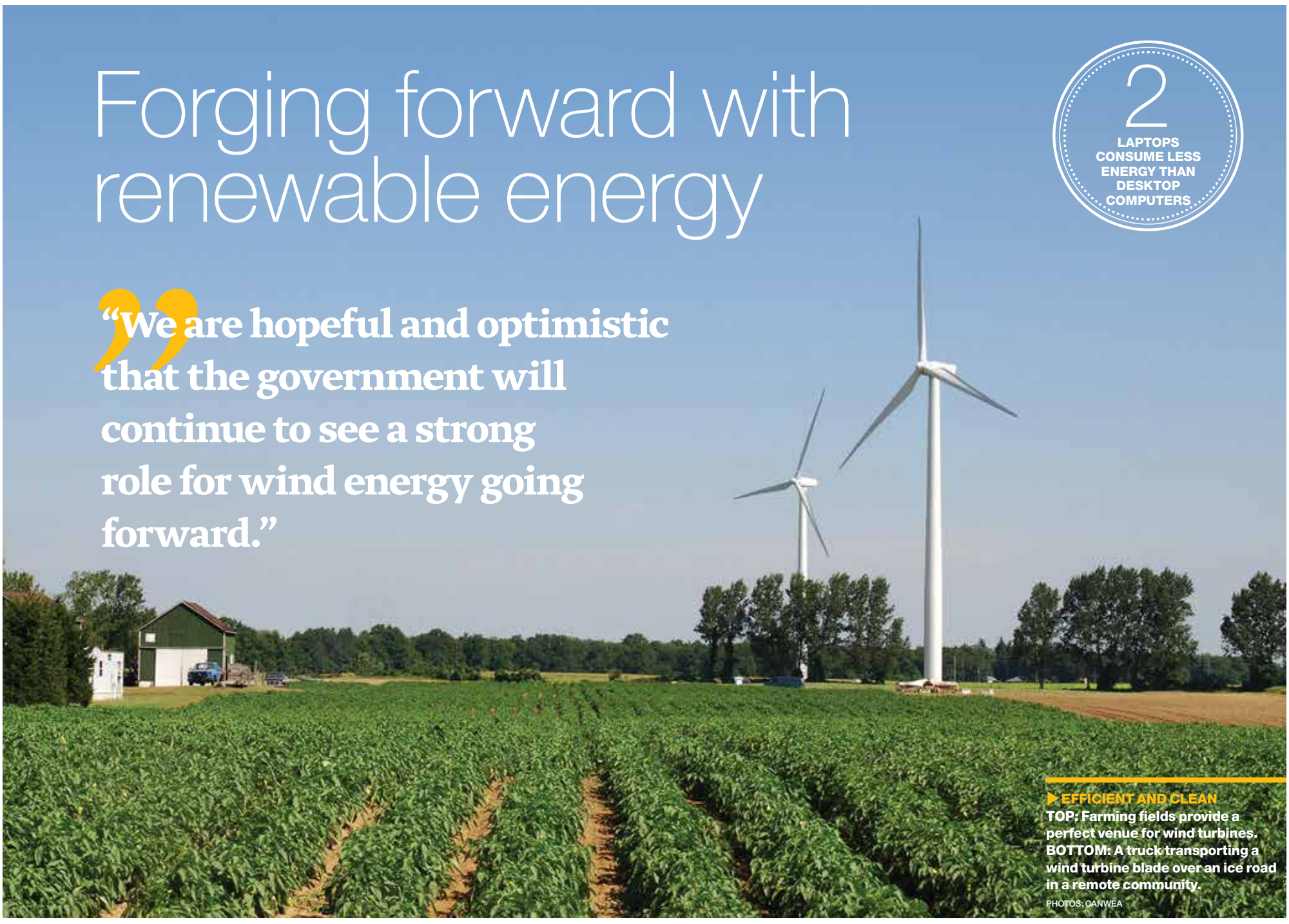
Forging forward with renewable energy

2 LAPTOPS CONSUME LESS ENERGY THAN DESKTOP COMPUTERS

"We are hopeful and optimistic that the government will continue to see a strong role for wind energy going forward."



EFFICIENT AND CLEAN
TOP: Farming fields provide a perfect venue for wind turbines. BOTTOM: A truck transporting a wind turbine blade over an ice road in a remote community.
PHOTOS: CANWEA

In addition to being one of the most environmentally friendly forms of electricity generation—it produces no air pollution, no water pollution, and no toxic or hazardous waste—wind energy also makes good sense from an economic stand- point.

Although, as with any new electricity supply, affordability and cost competitiveness need to be considered.

Ticking all of the boxes

"There are numerous studies that have demonstrated that wind energy is cost competitive with any other source of new electricity generation, with the exception of natural gas," explained the President of the Canadian Wind Energy Association (CanWEA), Robert Hornung.

"But, there's a great variability with natural gas prices, they do tend to fluctuate," he added. "There is no fuel cost with wind—once you build a plant you know what the costs will be for its entire life, and the costs continue to come down as we see technological advances."

An Industry on the up

2012 was a big year for wind energy development in Canada. The ongoing development of projects in Alberta, Manitoba, Ontario, British Columbia, North West Territories, Quebec and Nova Scotia saw Canada's wind energy output grow by almost 20 percent in a single year.

That growth resulted in over $2bn worth of investment and the creation of thousands of clean energy jobs. The wind energy industry installed 936 Megawatts (MW) of electricity in 2012, bringing Canada's total wind energy capacity to 6,200 MW.

Canada expects to reach a total of 12,000 MW of installed capacity by 2016, and CanWEA's WindVision target of supplying 20 percent of Canada's electricity from wind energy by 2025 continues to be a realistic possibility.

Ontario leading the way

Ontario is the biggest wind energy producer in Canada, with an installed capacity of over 2,000 MW, and development in the province isn't slowing down anytime soon.

Robert Hornung
PRESIDENT,
CANADIAN WIND ENERGY ASSOCIATION

"The Ontario Government's Long Term Energy Plan (LTEP) envisioned 7,500 MW of energy coming online by 2018, but at this point we're on track for about 5,500," said Hornung. "CanWEA is advocating for commitments to procure another 2,000 MW of wind over the next 4 years, that would allow Ontario to address shortfalls in supply arising from the refurbishment of nuclear plants."

As energy policy shifts further towards renewable sources, provincial and federal governments have important decisions to make in terms of trying to balance concerns around cost, environmental impact, and economic benefits.

"Wind energy is very favourable in all of those areas," said Hornung. "We are hopeful and optimistic that the government will continue to see a strong role for wind energy going forward."

JOE ROSENGARTEN
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Securing solar energy for the future benefits all Ontario consumers

Canada's leading Solar energy association wants all Ontarians to know just how much potential energy could be harnessed from their homes, businesses and properties.

CanSIA recently released its recommendations to the Ontario Ministry of Energy that, if adopted, would ensure that Ontarians reap the many benefits of solar energy far into the future.

Primarily, CanSIA recommends that the Ontario government adopt a target that sees, by the year 2025, 5 percent of the energy consumed on the grid produced from a solar photovoltaic (PV) source and, the re-establishment of support and targets for the solar thermal sector.

Filling the energy gap

"We may have an adequate supply of electricity today but projections show that we will need additional generation as early as 2016", said CanSIA President John Gorman. "The fact of the matter is we can't wait until we need the energy, to figure out where we'll get it. We have to start planning now if we're going to be able to meet future needs, and solar energy is a natural fit to filling the gap."

John Gorman
PRESIDENT,
CANSIA

"We have to start planning now if we're going to be able to meet future needs, and solar energy is a natural fit to filling the gap."

CanSIA points out in its submission that with a variety of unique and favorable characteristics Solar PV is unlike other sources of generation.

Notably, it is the only large-scale power generation source that has experienced a steep decline in cost in recent history, with costs continuing to go down.

Solar PV is the greenest form of energy, having the lowest environmental footprint of any electricity resource, zero airborne emissions, zero hazardous waste emissions, and almost zero noise. It supplements conventional generation by providing electricity during peak demand—during the day, which lessens the burden on the grid. And, it supports more jobs than any other energy source, producing high-quality local jobs in engineering, design and installation.

Smarter power

As the cost of solar continues to decrease, and electricity rates continue to rise, consumers' desire to manage their electricity requirements is driving change. Solar PV will become commonplace on existing residential, commercial, and industrial buildings, and new building construction will incorporate solar into the initial structural designs.

"Using existing technology, empowered consumers will not only be able to generate electricity through a rooftop solar PV array, they will store and supply electricity through their electric vehicle and manage their appliances from smart phones," said Gorman. "This smart electricity grid future is right around the corner. Solar is an inevitable part of that future and, with continued government commitment Ontarians will only benefit," he added.

Ushering new policies

CanSIA also recommends that the Ontario Ministry of Energy make the following changes:

- Continue its commitment to microFIT and small FIT targets as recently announced.
- Establish specific "solar PV targets" based on percentage of energy consumed.
- Set annual procurement targets for large-scale solar PV, similar to procurement targets set for microFIT and small FIT.
- Ensure that a viable net-metering policy to enable distributed solar PV generation for all consumers by 2018, uncapped based on consumer demand for solar.
- Include solar thermal technologies in conservation programming for both electricity and natural gas, as applicable and set targets for the solar thermal industry.

Gorman and the approximately 650 solar companies he represents are confident that Solar energy is poised to take its position as a leader in Canada's energy mix.

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DON'T MISS

DRIVING SOLAR INNOVATION

A team of young engineers is confident that solar powered cars will soon be a North American reality.

Ben Jurjevich, Ryan Lutz and their team from Western University's Faculty of Engineering have worked tirelessly to perfect their SunStang concept car in time for its 2014 debut in the American Solar Car Challenge.

"Every other year a combination of engineering and business students build a solar car to compete in one of three events," says Jurjevich. "These events range from endurance races on Grand Prix style racetracks to cross-country races that are over 2,500 kilometers long."

Cruising ahead

SunStang last competed in 2007 at the Panasonic World Solar Challenge, a 3,000km race across the spine of Australia. Expected to be one of the top cars in the competition, Western's 2007 SunStang submission ran into bad luck on Australia's unforgiving roads.

"In the first stages of the race the car struck a rock tearing the entire rear suspension unit from the carbon fiber chassis," Lutz shared disappointedly. Challenges aside, the team persisted and ultimately managed to complete the race.

"We are absolutely looking to pick up where our predecessors left off in 2007," added Jurjevich.

Looking forward

This year the team has commenced building the 2014 SunStang solar car that will be competing at the 2014 American Solar Challenge and, once again, the 2015 World Solar Challenge in Australia.

They will be using a solar panel array that has been optimized to fit within 6m² while providing optimal output to their single electric motor. They currently estimate to have an output from the solar cells of 850 to 1000 watts instantaneously from the sun.

This will propel SunStang to an estimated top speed of 135kmh and a targeted cruising speed of 75kmh. "More than anything we are eager to show the automotive community that solar power is here to stay as a source with which we can power our cars."

Teamwork

Past challenges aside, the team maintains a clear focus on their end goal of making Western proud at 2014's American Solar Car Challenge.

"The initial portion of the event will be a two-day endurance race at the Circuit of the America's in Austin, Texas," says Lutz excitedly.

Teams will drive for two 8-hour periods in an attempt to claim the greatest distance traveled. The second portion will be a 2,500km race starting in Austin and continuing North to a currently undisclosed location.

Although having not competed in 6 years, Western's SunStang team cannot wait for their shot at solar car notoriety. "More than anything I think we are excited to show Canada that innovation from the classroom can absolutely make its way to market," claimed Jurjevich. The SunStang team clearly aims to return from Texas with a lot more than just a suntan.

SOURCE: WESTERN UNIVERSITY
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TEAM ONTARIO

A model for collaboration and innovative design

1

Made up of students from Queen's University, Carleton University and Algonquin College, Team Ontario is a great example of the positive impact that institutional collaborations can have.

The team will take ECHO—their design for a functional home that generates more energy than it consumes—to the U.S. Department of Energy Solar Decathlon in October to compete against leading engineers from across North America.

A home for the future

"We really wanted to design and build a home for the next generation of homeowners," explained Cynthia Cruickshank, Assistant Professor of Mechanical and Aerospace Engineering at Carleton University. "It's a building that is just less than 1000 sq feet, so we see it as a home that a young family could grow into."

As well as incorporating vacuum insulation panels in the walls, floors and ceilings, and using highly efficient windows to minimize heat loss, Team Ontario designed and built a unique integrated energy system that uses solar energy as thermal input to a heat pump that provides space heating/cooling and domestic hot water.

"Over 80 percent of the secondary energy usage in the residential sector is used for heating and cooling demands, including domestic hot water, so we decided to find ways to increase efficiency in those areas," said Cruickshank. "We're demonstrating to people that if you have a good building envelope, energy and cost savings will happen."

Collaborating towards success

Business Coordinator for Team Ontario and student at Queen's University, Deng Pan, believes that, by bringing a multitude of skill sets together, these types of collaborations have the potential to achieve great things.

"Algonquin College offers a great trades program so their students are very knowledgeable about building the house and what makes it structurally sound, and Carleton and Queen's have been responsible for the engineering innovation," said Pan.

Staying in touch by email, Skype, and Google Chat has allowed the team to stay on track and enabled them to iron out any issues collectively, as they've arisen. "Current technology has made communication very accessible," said Pan. "Being able to have a constant flow of ideas between this number of people, all with their specific expertise, makes this a very unique and successful project."

Spreading the word

Team Ontario's hard work hasn't gone unnoticed by the powers in government, as Minister of Training, Colleges and Universities, Brad Duguid, pointed out: "by drawing on the collective knowledge and experience of students and faculty from Algonquin College, Carleton University, and Queen's University, this project shows how working together, we can build a highly skilled workforce to support our innovative economy."

The project has acted as another great opportunity for Ontario to showcase the crucial work that it is doing in laying the foundations for sustainable economies and healthy environments for future generations.

Ontario Minister of Energy, Bob Chiarelli, is a proud supporter of the work that Team Ontario has been doing. "I want to congratulate Team Ontario for their hard work and wish them the best of luck at the Solar Decathlon," said Chiarelli. "The ECHO home and the students behind it are a prime example of why Ontario is considered a global leader in renewable energy, conservation and smart grid technology."

The contest is a great platform for consumers to witness the innovations that students have made in the fields of renewable energy and sustainable living. The team is expecting 300,000 total house visits during the contest. But, the all-important question: do they have a chance of winning?

"Of course!" said Cruickshank. "We wouldn't be going if we didn't think that we could win; we definitely think that we have a good shot."

JOE ROSENGARTEN
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2


3

▲ POISED FOR SUCCESS

1. Team Ontario at the ECHO house.
PHOTO: TEAM ONTARIO

2. A concept image of the final product.
PHOTO: TEAM ONTARIO

3. Karl Kadwell, Project Manager, speaks at Team Ontario Open House.
PHOTO: CHRIS ROUSSAKIS

NEWS

▲ **MAIN IMAGE**
Aerial view of GreenField Specialty Alcohol Inc.'s Johnstown, Ontario facility.
▶ **INSET IMAGE**
Local corn being offloaded at GreenField Specialty Alcohol Inc.'s plant for conversion to ethanol.
PHOTOS: CANADIAN RENEWABLE FUEL ASSOCIATION

HOW ETHANOL BENEFITS CANADIANS

Canada is faced with meeting real, local energy demands while at the same time confronting global environmental problems and lowering the effects climate change.

Today, Canada's transportation sector accounts for nearly one-third of our country's total GHG emissions. Every car ride, bus commute, and airplane trip adds carbon dioxide to the environment, making it increasingly difficult to meet our world-class emissions reductions targets.

Thankfully, our renewable fuels industry is working to make transportation fuels cleaner, which means less harmful greenhouse gas (GHG) emissions and cleaner air. Ethanol is a practical alternative energy source that can be used in vehicles right now and which not only lowers GHG emissions but helps to reduce smog.

If Canadians are going to succeed in combating climate change, we're going to have to deal head-on with transportation fuels that generate large GHG emissions from our gas fuelled cars, trucks and other vehicles. Ethanol is the only practical, immediately available means of lowering this impact.

Canada's natural advantage

In Canada, we're fortunate to have vast energy reserves to share with the world. In addition to some petroleum based natural resources; we have a wealth of biomass and cropland from which energy crops can sprout. Ethanol comes from a variety of these land based sources. And when it comes to renewable fuels, Canada has more land and available biomass per capita than almost any other country on earth.

Scott Thurlow
PRESIDENT,
CANADIAN RENEWABLE FUELS ASSOCIATION

"Ethanol is a clear example of how we can use our existing fuel infrastructure to make real, meaningful reductions to GHG emissions," explained Scott Thurlow, President of the Canadian Renewable Fuels Association. "Depending on the feed stock, ethanol can reduce emissions by up to 62 per cent compared to traditional fossil fuels. When we look at advanced biofuels like cellulosic ethanol, these environmental benefits increase even more."

Meeting our environmental goals

Achieving the government's ambitious goals for GHG emission reductions in the transportation sector requires both clean technology and cleaner fuels.

> "We have created 14,000 direct and indirect jobs through the construction and operation of these plants. Canada really does have clean energy super power potential."

"We are adapting our fueling infrastructure so as to keep pace with clean technologies," said Thurlow.

"Regulations have established progressively more stringent GHG emission standards for Canadian vehicles starting in 2017. Meeting these regulations will require higher-octane fuels to power lighter engines. There is no better, cleaner source of high octane fuel than ethanol."

Advanced biofuels

Government investments in renewable fuels continue to deliver economic and environmental benefits across Canada. Without question, the platform built by Canada's traditional ethanol producers is at the forefront of driving innovation in the ways that we make our fuels. Cellulosic ethanol can be developed from many feedstocks or municipal solid waste and reduces GHG emissions by up to 87 percent compared to petroleum. By design, cellulosic ethanol solves multiple environmental problems at once.

"Right now we're focused on the starch of the corn, but the cellulosic process will allow us to get into the cob, the stover, and all of the waste so that we can maximize the value of our crops and our current plants," explained Thurlow. "These feed stocks have an even better GHG profile in the long run."

Canada's ethanol technology is poised to develop first-of-kind technology that's able to produce fuels and value-added agricultural and chemical products, from a growing range of biomass. The continued expansion of existing grain ethanol plants into biorefineries will help ensure Canada's economic and environmental wellbeing for generations to come.

A jobs and growth engine

With its abundance of biomass, natural resources, and crop land, Canada has the potential to be a world leader in biofuel production; a huge exporter of the clean energy that will power the world in the years to come.

"The 26 renewable fuel plants that are operating in Canada right now add $3 billion into the economy," said Thurlow. "We have created 14,000 direct and indirect jobs through the construction and operation of these plants. Canada really does have clean energy super power potential."

The technology is in place, the desire and expertise is there; all that's needed now is a policy environment that will help the production and use of domestic biofuels. This will continue to expand and push Canada onto the next level and help it become a true clean energy superpower.

"We, as an industry, are continuing to improve the processes by which we make our products and at the very same time we are complementing the oil and gas sector on how they integrate our products into their fuel mix," said Thurlow.

As we strive to meet our energy and climate demands in the years ahead, the economic and environmental benefits of biofuels—for consumers, our country, and ultimately our planet—will become more important than ever. Expanded use of biofuels remains the single best policy tool to achieve both the economic advantages we seek and the environmental benefits we need.

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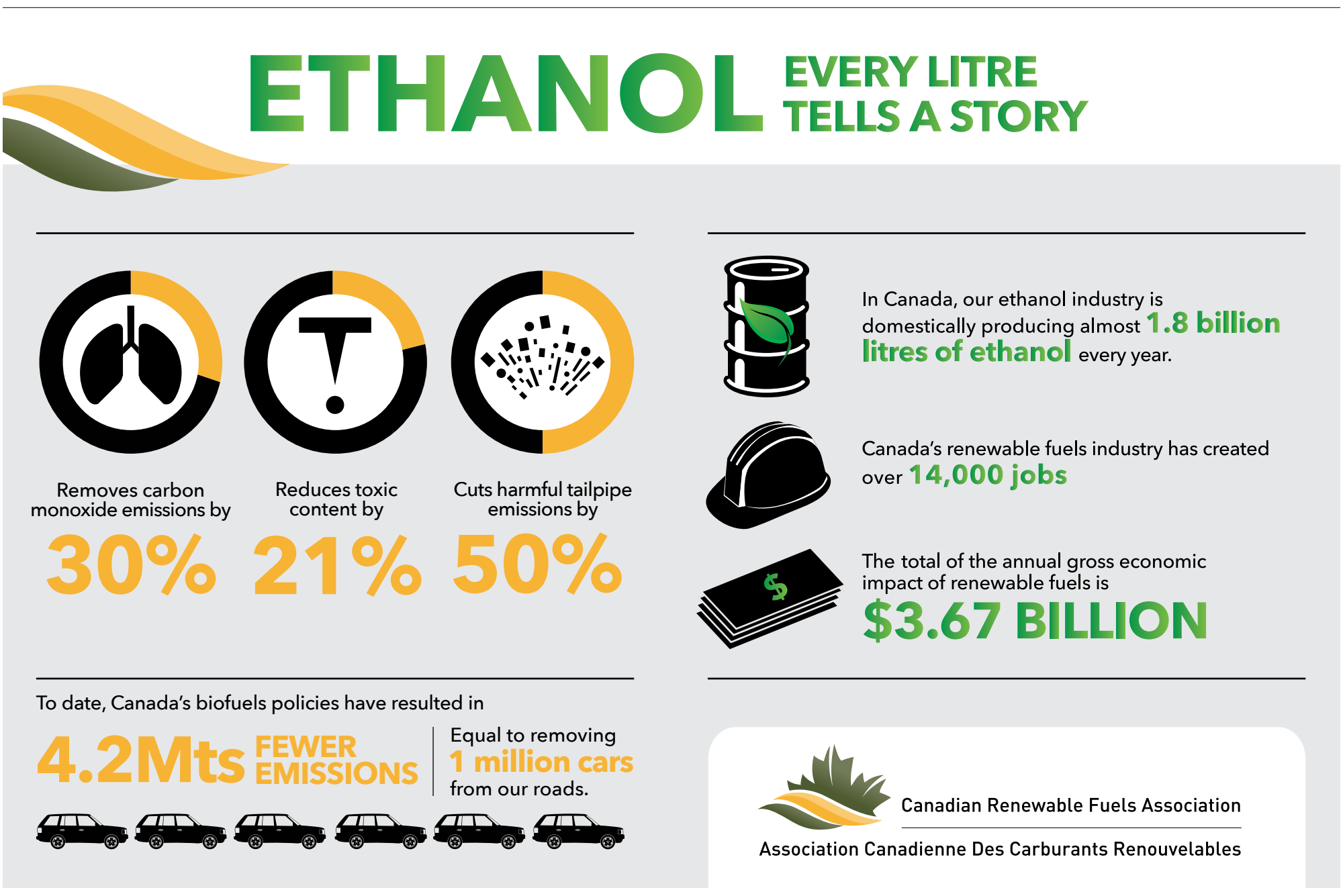

Ontario's Energy Future: Choosing the Smart Path

By Don MacKinnon
President
Power Workers' Union

Ontario is in the middle of a review of its 2010 Long-Term Energy Plan (LTEP). Many have speculated that with slower than forecasted growth in energy demand in Ontario, building out the full electricity generation capacity contemplated by the LTEP could result in higher than anticipated costs to ratepayers and unacceptably large surpluses of power generation at times. New and extremely important decisions on the future supply mix for Ontario may have to be contemplated.

To help inform the LTEP review, the Power Workers' Union and the Organization of Canadian Nuclear Industries commissioned Strategic Policy Economics Inc. (Strapolec) to assess the economic and greenhouse gas (GHG) emission impacts associated with two supply mix options for illustrative purposes. One scenario – Retained Wind – assumes that planned new wind generation goes forward while investments in nuclear power generation are curtailed. Under this scenario, additional gas-fired generation is needed as a backstop to the intermittency of wind generation. Wind generation produces electricity approximately 30 percent of the time. The other scenario – Retained Nuclear – assumes that the planned refurbishment of existing nuclear reactors and the building of new reactors would proceed while the proposed development of new wind generation would not.

The Strapolec study – *Ontario Electricity Options Comparison* – concludes that the Retained Nuclear scenario would offer tremendous advantages over the Retained Wind scenario. Retaining the currently planned nuclear capacity would produce $56 billion in direct benefits to Ontario's economy, $27 billion in savings to ratepayers and $29 billion in direct investment in Ontario. The net incremental benefit of this scenario, compared to the Retained Wind one, would be $60 billion. It would generate $9 billion more in direct employment income benefits than the Retained Wind scenario, including the creation of more than 100,000 person years of employment in high-value Ontario jobs, many in the advanced manufacturing sector. Additionally, GHG emissions would be reduced by more than 108 million tonnes, 80 percent less emissions than the Retained Wind scenario.

The study did not consider the impact of carbon pricing which would further tip the scales in favour of nuclear generation.

The study relies on publicly-available data from the Ontario Power Authority, the Independent Electricity System Operator and the Ontario Energy Board as well as economic impact assessments for wind generation from ClearSky Advisors and for nuclear generation from Canadian Manufacturers & Exporters. The data and assumptions used were validated and consistently applied in modelling the two scenarios to 2035, the planning horizon for the LTEP.

Ontarians should have as much accurate information as possible to make these important decisions about our energy future. The study confirms that investments in nuclear power generation will lead to significantly lower electricity costs, greater direct investment benefits in Ontario and much lower GHG emissions.

Ontario has one of the lowest carbon electricity system footprints in the world, thanks to our province's hydroelectric and nuclear electricity generation. For over 50 years, CANDU reactors have produced GHG emission-free electricity. Each year, Canada's nuclear reactors help avoid about 90 million tonnes of GHG emissions, about the same amount as taking 81 percent of Canada's cars off the road.

Ontario already hosts much of Canada's $6 billion-a-year nuclear industry, its 160 supply chain companies and its 60,000 direct and indirect high-value jobs.

Investing in our nuclear assets reduces Ontario's growing reliance on imported US shale gas, which means better energy security. It also means that in the future Ontario can continue to export low-carbon electricity to our fossil-fuel dependent neighbours and can power "Made-in-Ontario" zero-emission electric vehicles.

Ontario's future economic prosperity will be dependent upon ensuring that our businesses and industries continue to have affordable, reliable, low-carbon electricity.

The Strapolec study should help decision-makers make the right choices for Ontario's energy future.