

energy [r]evolution

A SUSTAINABLE CANADA ENERGY OUTLOOK



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GREENPEACE

canada's energy [r]evolution

A BLUEPRINT FOR CANADA'S RENEWABLE ENERGY FUTURE



Global warming is the greatest threat to life on earth. Entire populations and ecosystems are threatened by devastating impacts such as drought, heat waves, fires, floods, storms and rising sea levels. To successfully combat climate change, we urgently need a revolution in our energy use.

In the fight to prevent a global climate change catastrophe, Canada's greenhouse gas emissions could be reduced 40% below 1990 levels by 2020.

The Greenpeace report *Energy [R]evolution: A Sustainable Canada Energy Outlook* provides a blueprint for a green energy future using research by DLR—the Institute of Technical Thermodynamics, Department of Systems Analysis and Technology Assessment, Germany.

The report shows how we can save the environment and preserve a livable world for our children.

image A WORKER INSPECTS A SOLAR PLANT IN SPAIN ABLE TO POWER 180,000 HOMES.

image ENERGY-EFFICIENT HOME AND OFFICE APPLIANCES ARE A SIMPLE, INEXPENSIVE WAY TO MAKE A DIFFERENCE.



energy efficiency measures

One of the main ways that Canada can fight climate change is to use energy more efficiently. Efficiency measures can reduce energy *bills*, even if energy *rates* increase.

Some of the cleanest, cheapest and easiest ways to reduce greenhouse gas emissions include measures such as:

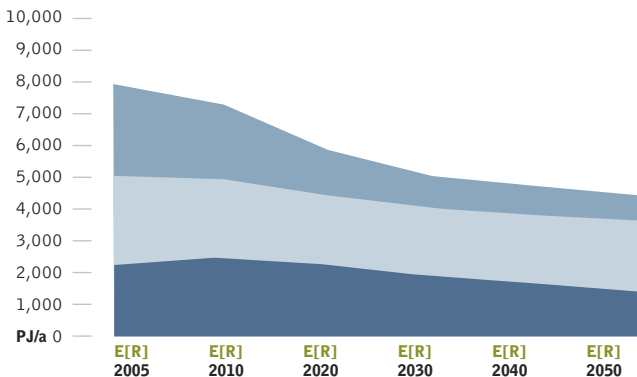
- Improving the insulation and design of our homes and offices.
- Making appliances more efficient.
- Switching fuel, to replace electric space- and water-heating with solar thermal systems.

Under the Energy [R]evolution scenario, primary energy demand decreases almost 50% between now and 2050, whereas under the reference scenario (business-as-usual), it decreases less than 10%.

image GREEN OFFICE BUILDING UTILIZING THE LATEST ENVIRONMENTAL TECHNOLOGY THROUGH THE USE OF SOLAR PANELS. CALGARY, CANADA.

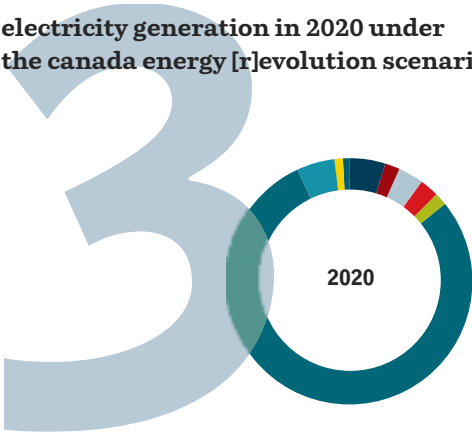


final energy demand by sector under the energy [r]evolution scenario



renewable energy

electricity generation in 2020 under the canada energy [r]evolution scenario



The Canada Energy [R]evolution Scenario shows how, by 2020, over 80% of our electricity can be generated by renewable energy. This trend will be strengthened through to 2050 as renewable energy technologies such as wind and solar photovoltaic expand.

- COAL
- LIGNITE
- GAS
- NUCLEAR
- BIOMASS
- HYDRO
- WIND
- PV
- OCEAN ENERGY



CANADA SHOULD ENACT A NATIONAL FEED-IN TARIFF TO SUPPORT THE AGGRESSIVE EXPANSION OF RENEWABLE ENERGY.



wind power: clean safe and reliable

With an Energy [R]evolution, wind farms and efficiency will replace over 12,000 megawatts of coal-fired generating stations. Wind farms will be spread across the country, ensuring a clean, safe and reliable electricity system.

image SHELburn IS HOME TO ONE OF ONTARIO'S LARGEST WIND FARMS.

image A COW IN FRONT OF A BIOREACTOR IN THE BIOENERGY VILLAGE OF JUEHNDE. IT IS THE FIRST COMMUNITY IN GERMANY TO PRODUCE ALL OF ITS ENERGY NEEDED FOR HEATING AND ELECTRICITY FROM CO₂-NEUTRAL BIOMASS.



keeping energy affordable

By moving away from fossil fuels and reducing greenhouse gas emissions, Canada's Energy [R]evolution scenario reduces energy costs for Canadian consumers.

Assuming average costs of 1.7 cents/kWh for energy efficiency measures, Canada's Energy [R]evolution scenario will save \$5.9 billion for Canadian electricity consumers in 2020.

image EVACUATED TUBE COLLECTORS IN A GERMAN SOLAR THERMAL FACILITY.



a decentralized energy future

THE CITY CENTRES OF TOMORROW'S NETWORKED WORLD WILL PRODUCE POWER AND HEAT AS WELL AS CONSUME IT. THE ROOFS AND FAÇADES OF PUBLIC BUILDINGS ARE IDEAL FOR HARVESTING SOLAR ENERGY. "LOW ENERGY" WILL BECOME THE STANDARD FOR ALL BUILDINGS. GOVERNMENTS COMMITTED TO TIGHT CLIMATE-PROTECTION TARGETS WILL HAVE TO IMPOSE STRICT CONDITIONS AND OFFER INCENTIVES FOR RENOVATING THESE BUILDINGS. THIS WILL HELP TO CREATE JOBS.



city



1. PHOTOVOLTAIC, SOLAR FAÇADES WILL BE A DECORATIVE ELEMENT ON OFFICE AND APARTMENT BUILDINGS. PHOTOVOLTAIC SYSTEMS WILL BECOME MORE PRICE-COMPETITIVE AND IMPROVED DESIGN WILL ENABLE ARCHITECTS TO USE THEM MORE WIDELY.
2. RENOVATION CAN CUT ENERGY CONSUMPTION OF OLD BUILDINGS BY AS MUCH AS 80%—WITH IMPROVED HEAT INSULATION, MORE EFFICIENT WINDOWS AND MODERN VENTILATION SYSTEMS.
3. SOLAR THERMAL COLLECTORS CAN PROVIDE WATER AND SPACE HEATING FOR INDIVIDUAL BUILDINGS OR THE DISTRICT.
4. COMBINED HEAT AND POWER (CHP) STATIONS WILL COME IN A VARIETY OF SIZES—FITTING THE CELLAR OF A HOUSE OR SUPPLYING WHOLE BUILDING COMPLEXES OR APARTMENT BLOCKS WITH POWER AND WARMTH WITHOUT TRANSMISSION LOSSES.
5. CLEAN ELECTRICITY FOR CITIES WILL ALSO COME FROM OFFSHORE WIND FARMS AND SOLAR-POWER STATIONS.

phasing out coal

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image A WINDMILL ON
A PRAIRIE AT PINCHER
CREEK, ALBERTA, CANADA.



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Coal is one of the largest contributors to Canada's greenhouse gas emissions. Canada's Energy [R]evolution scenario shows that by increasing the amount of renewable energy; using natural gas as a transitional fuel; and introducing aggressive energy efficiency measures, almost all coal-fired electricity plants can be phased out by 2030. The final two coal stations would be shut down in 2050.



CANADA SHOULD BAN NEW COAL-FIRED POWER STATIONS
AND COMMIT TO A PHASEOUT OF EXISTING PLANTS.



© GREENPEACE

just transition

image AN ENGINEER WORKS ON THE ROTOR OF A WIND TURBINE OFFSHORE FROM COPENHAGEN, DENMARK.



CANADA SHOULD ENACT LEGISLATION TO PROVIDE FUNDING FOR WORKERS AFFECTED BY THE SHIFT TO GREEN ECONOMY.



Governments must support workers making the transition to a green economy as fossil fuel and nuclear industries are phased out. The development of a “green” workforce will require training and apprenticeship programs. A green economy will provide more jobs for each dollar invested.

image MAN USING A METAL GRINDER ON PART OF A WIND TURBINE MAST IN THE VESTAS FACTORY, CAMBELTOWN, SCOTLAND, GREAT BRITAIN. RENEWABLE ENERGY IS A GOOD SOURCE OF EMPLOYMENT.

image above GREENPEACE INSTALLS SOLAR PANELS ON A SCHOOL IN PALMA DE MALLORCA, SPAIN.



reducing transport emissions



image ELECTRIC-POWERED VEHICLES ARE ANOTHER KEY ELEMENT IN REDUCING CANADA'S EMISSIONS.

Changes must be made in Canada's transport sector to reduce greenhouse gas emissions:

- Set strict mandatory fuel efficiency standards for all vehicles.
- Increase support for mass transit and rail transportation.
- Support the large-scale expansion of electric vehicles.

In the Canada Energy [R]evolution scenario, biofuel use is small because of sustainability concerns. Biofuel use must not threaten food security or increase greenhouse gas emissions, for example by encouraging deforestation for biofuel plantations.

image SHELburn IS HOME TO ONE OF ONTARIO'S LARGEST WIND FARMS.



how low can we go?

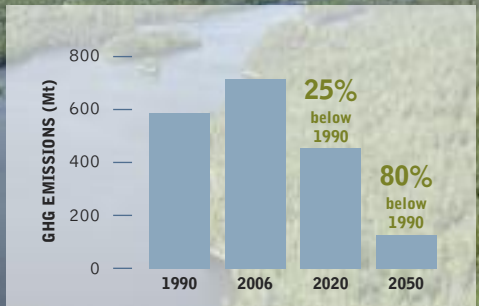
Canada's Energy [R]evolution focuses primarily on energy use. In the low-carbon society of the future, there will also need to be major reductions of greenhouse gas emissions in other sectors, including industry, agriculture, and forestry.

image DEFORESTATION IS A MAJOR CONTRIBUTOR TO GREENHOUSE GAS POLLUTION.



Canada's Energy [R]evolution shows significant reductions in the energy sector, reducing CO₂ emissions 40% below 1990 levels by 2020, and 82% by 2050.

There is no question that Canada can reduce total greenhouse gas emissions at least 25% below 1990 levels by 2020 and 80% by 2050.



we must take action now

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image TECHNICIANS WORK ON AN EXPERIMENTAL WIND TURBINE.



The Canadian government must act now to achieve an Energy [R]evolution and prevent an uncontrollable, runaway climate crisis.

Canada's climate action plan must include:

- A legally binding target to reduce national greenhouse gas emissions at least 25% below 1990 levels by 2020, and 80% by 2050.
- A price on greenhouse gas pollution, starting at \$30/tonne and rising to at least \$75/tonne by 2020.
- A cap-and-trade system for Canadian industry.
- Efficiency regulations for vehicles and buildings.
- Massive support for renewable energy.
- Support for developing countries to fight global warming and adapt to climate-change impacts.
- "Just transition" funding for workers affected by the shift to a green economy.



image THIS GERMAN SOLAR FARM IS THE LARGEST OF ITS KIND IN THE WORLD, WITH 1500 PHOTOVOLTAIC PANELS.

image A STORAGE FACILITY THAT USES WOOD CHIPS TO POWER ELECTRICAL TURBINES. COGENERATION OF ELECTRICITY USING ALTERNATIVE FUEL SOURCES, CANADA.



you can make it happen

get active!

Sign the KYOTOplus Petition at
www.greenpeace.ca/kyotoplus

Write to your Member of Parliament.
(You can see model letters on our website.
Go to KYOTOplus and check if your MP has
already taken the KYOTOplus Pledge.)

countdown to copenhagen

In December 2009, a pivotal decision
will be made at the United Nations climate
conference in Copenhagen, Denmark.
This is the last best chance for the world
to adopt a bold, strengthened second phase
of the Kyoto Protocol and avert a global
climate catastrophe.

More information: To see a full copy
of Canada's Energy REvolution, visit:
www.greenpeace.ca/energy-revolution



image WINDMILLS
AT PINCHER CREEK,
ALBERTA, CANADA.

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ENERGY noituvlovə[r]



Greenpeace is an independent, campaigning organization which uses non-violent, creative confrontation to expose global environmental problems and to focus attention on solutions for a green and peaceful future.

Greenpeace is now the world's largest environmental organization, with offices in 40 countries, and over 2.9 million supporters worldwide.

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