LEADING CHANGE: HOW U OF T IS ADVANCING THE GREEN ECONOMY

To meet its ambitious pledge to reach net zero by 2050, Canada depends on innovation that will shift energy sources from fossil fuel-based to zero-carbon, a determined and skilled workforce and a public policy and regulatory framework that enables widescale transformation. In this race against time, the University of Toronto, Canada's top university and ranked No. 18 in the world, is setting the pace for public institutions and providing the fuel for national goals. Every part of the university is dedicated to the same mission: deploying the significant research, teaching, innovation and operations resources to support a transition to a prosperous and inclusive green economy.

This factsheet provides information on the activities underway at the U of T to support Canada's leadership and competitiveness and the opportunities to partner with us.

U of T's whole-of-institution approach encompasses:

- A commitment to divest from investment in fossil fuel companies in its $4-billion endowment fund in the next 12 months, and to divest from indirect investments no later than 2030.
- A comprehensive operations sustainability plan that will see the campus become Climate Positive by 2050, with the country's largest urban geo-exchange system at its core.
- Leading-edge research into energy storage, carbon utilization and decarbonization. This work leverages Canada's competitive advantages in renewable energy and aims to bring renewable energy supply in sync with demand through long-term solutions for energy storage.
- Development of policy recommendations on promoting inclusive global growth through the energy transition period.
- A research, commercialization and entrepreneurship ecosystem that has drawn $1.5-billion in investment, and supports the scaleup of cleantech firms, among other advanced sectors.
- Implementation of the Living Lab model across disciplines, bringing together students, faculty, industry, or community organizations to design solutions to sustainability challenges.
- Leadership in the postsecondary sector as the first university in the world to join the UN-Convened Net-Zero Asset Owner Alliance, a group of institutional investors committed to achieving increasingly demanding targets every five years. U of T is also a founding member of the University Climate Change Coalition, a group of leading North American research universities committed to reducing greenhouse gas emissions.

The changes needed to control global temperatures are vast. The benefits will also be significant. By 2030, depending on the policies adopted, as many as 24 million jobs could be created globally, within a $26-trillion green economy that will continue to grow for decades to follow. Canada is well positioned to benefit from this economic transformation. Ranked at No. 2 on the Global Cleantech Innovation Index, the country has 11 companies in the global cleantech 100 and is seeing resurgent investment in clean technology after the pandemic.

SOLUTIONS TO GRAND CHALLENGES

Humanity's grand challenges – inequality, climate change, pandemics – demand a cross-disciplinary approach to address the scale of problems before us. Drawing on the University's deep research excellence, innovation and talent, U of T is bringing interdisciplinary teams together to provide creative and innovative answers to these issues.

The **Climate +VE Energy Initiative** is among the most ambitious of the university's strategic initiatives. The initiative is a unique, interdisciplinary approach that facilitates the collaboration of over 90 researchers across eight faculties and 28 divisions to tackle the technological, political, and societal factors that pose barriers to reaching net zero. U of T researchers, in partnership with global industry and local startups, will improve renewable energy generation, storage, transmission, and efficiency to reduce emissions and decarbonize energy systems.

At the same time, the social, political, economic, and climate implications of clean energy policies and technologies will guide just technology development in the service of global communities. The project will also help talent understand the relationship between technology, society, policy, and climate and educate technology-ready graduates through industry partnerships and connections to other U of T initiatives including the School of Cities, BioZone, the Mass Timber Institute and the Munk School's Environmental Governance Lab.

With a focus on adoption, commercialization and market creation, this collaboration will play a critical role in transforming Canada from one of the highest CO2 emitters per capita to a model for the rest of the world.

RESPONSIBLE GROWTH AND RENEWABLE ENERGY

The University of Toronto has started a transformation of its operations that will see its carbon footprint decrease by 37 per cent below 1990 levels by 2030 and lead to a **Climate Positive** (net negative emissions) St. George campus by 2050.

The shift from being one of Ontario's largest public sector greenhouse gas emitters sets a remarkable standard for the contribution a public institution can make to regional, provincial, and national goals.

At the centre of operational activities is a geoexchange system that will create Canada's largest urban ground source heat pump system under King's College Circle. Above ground, expanded public green space will enhance Toronto's public realm.

Responsible growth, renewal and resilience are the principles informing the university's strategy.

- Fossil fuels will be replaced by electrification and increased demand management.
- An aggressive building energy modelling and performance standard includes strict carbon and energy budgets for new construction.
- A deep energy retrofit program will reduce existing building energy use intensity by more than 40%.
- Solar energy generation, on and off campus, will make up a larger portion of energy used in operations.

Hundreds of boreholes have been drilled into the front campus, creating Canada's largest urban ground source heat pump system.

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SUPPORTING COMPETITIVENESS

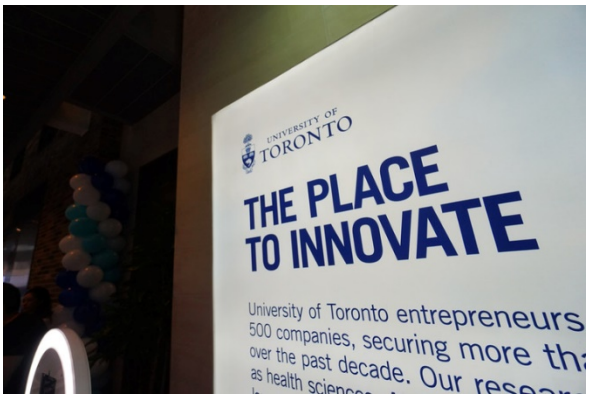
The Toronto region is a dynamic global hub of activity in the renewable energy and clean technology sectors, estimated to have an annual impact of $6.55-billion and employs over 60,000 people.

From discovery science, to entrepreneurship, commercialization and industry partnerships, U of T is supporting the competitiveness of the private sector and regional prosperity.

- The **Collaboration Centre for Green Energy Materials** (CC-GEM), a partnership between the National Research Centre and the university, accelerates the development of clean materials and production processes.
- U of T research is supporting the development of Electric Vehicles in Ontario. The **University of Toronto Electric Vehicle Research Centre** is a university-industry partnership focused on a state-of-the-art battery and power electronics lab studying energy management and storage, advanced power modules and next-generation powertrains.
- The **Centre for Power and Information** is researching solutions that integrate renewable energy and storage into existing power grids (such as storage of solar or wind power in hydrogen cells), cyber and physical security, and power electronic converters.
- Complementary partnerships with the City of Toronto span multiple divisions and research applications, including with the School of Cities.

ADVANCING INNOVATION

U of T is among the world's **"most innovative" universities** (measured by patenting and commercialization activities) at 27th globally and 1st in Canada. U of T's ecosystem of startups, training, and commercialization is helping students and research-based companies bring their ideas to market and connect to customers globally.



U of T's innovation system includes assistance with developing ideas and research into products, protecting intellectual property, finding investors and building a community of entrepreneurs.

- Clean tech companies at U of T have raised over $292-million over the past decade and are advancing research in converting CO2 into renewable fuels and materials, decarbonization technologies, hydrogen, and renewable energy such as solar.
- The University's Asset Management Corporation (UTAM) is allocating 10 per cent of its endowment portfolio, representing an initial commitment of $400-million, to sustainable and low-carbon investments by 2025.
- **UTEST**, the university's early-stage accelerator program, is successfully helping companies bring ideas to market. Its graduates include CERT – a carbon-tech company that enables decarbonization of manufacturing industries and hydrogen production from fossil fuels – and Solistra – which is developing technology for large-scale CO2 utilization for producing carbon-based products.

TEACHING AND LEARNING

Talent is the foundation of the transition to a green economy. Ranked in the top 10 engineering schools among North American public universities, the Faculty of Applied Science & Engineering supports green employment, with approximately 70 sustainability experts across energy, aerospace, power grid analysis, transportation, and geochemistry. New initiatives such as the Cimate +VE Energy Initiative are embedding industry training in their design, making it possible for graduates to take their idea from lab bench to market.

At all levels of study, students have multiple opportunities to embed sustainability in their academic and extracurricular, on-campus activities. Examples include:

- The **Living Lab curriculum**, facilitating student engagement in emissions reductions and sustainable building projects on the university's campus, such as converting waste to energy and evaluating new building technologies including mass timber.
- The King's College Circle geoexchange system will become an applied learning classroom that will showcase the energy distribution system.
- Partnerships between students at the School of Cities and the **City of Toronto** that aim to build a more resilient, greener city.

Public space is being expanded and re-imagined as part of the Landmark Project, above the geoexchange system being installed on the St. George campus.

When the Parties to the Paris Agreement meet in Glasgow this fall, they will bring renewed commitment to reaching the targets necessary to mitigate and reverse climate change and its disastrous effects for the planet. At the University of Toronto, our actions are aimed at accelerating the transition to a low-carbon economy and inspiring other institutions. Every student, researcher and staff member is contributing to sustainability. Our hope is that this powerful model inspires other institutions in the private and public sectors to build a better world for future generations.

$400M

Amount the University of Toronto Asset Management Corporation will allocate to sustainable and low-carbon investments by 2025.

5000

Students engaged annually on sustainability projects at U of T and with external partners.

2021

Named among Canada's Greenest Employers for the eighth time.

107

U of T startups in clean tech-related engineering disciplines in the last 10 years.

$292M

Amount raised by cleantech companies and startups at U of T over the past decade.

$496M

Research funding dedicated to cleantech and renewable energy related projects.

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If you would like to be part of our work, get in touch.

For more information, contact:
University of Toronto
Government Relations Office
Simcoe Hall, 27 King's College Circle,
Room 5
Toronto, Ontario M5S 1A1
gro.utoronto.ca

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