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The Foreign Policy Research and Foresight Division at Global Affairs Canada is proud to support and be associated with the Graduate Fellowship Program/Young Thinkers on Global Trends Initiative. The challenges facing Canada today are unprecedented and truly global. Tackling those challenges require fresh ideas and engagement with new generations of thinkers, researchers, and activists to help create opportunities for a sustainable future. We would like to thank the students and professors of the Balsillie School of International Affairs for their time, effort and commitment throughout the year to make this initiative successful. The results of their work, which has been encapsulated in this anthology, will help inform the work of Global Affairs Canada as it relates to foreign policy, trade and international development.

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Ending Energy Poverty: Canada as a Global Leader

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Issue

Universal access to clean energy remains a protracted problem that has detrimental impacts for both developing countries and rural or remote communities in Canada. Through leadership on the world stage, and within forums such as Mission Innovation (MI), Canada has the opportunity to improve rates of energy access in the most energy impoverished regions of the world, while advancing overarching governmental priorities.

Background

Energy Access Context

Energy access is defined by the International Energy Agency (IEA) as "a household having reliable and affordable access to both clean cooking facilities, and to electricity, which is enough to supply a bundle of energy services initially, and then an increasing level of electricity overtime to reach the regional average" (IEA 2017). The "bundle of energy services" comprises a level of minimal energy requirements necessary for lighting and communication. Households without access to clean cooking facilities or the defined minimal level of energy services are living in energy poverty.

Globally, approximately one to 1.3 billion people are without electricity (World Bank 2018). Lack of energy access is felt most acutely in regions of Sub-Saharan Africa (SSA) where 62.5 percent of the population are without electricity, and Southeast Asia where 20 percent of the population are without electricity (World Bank 2017a). Within these energy-impoverished regions, a stark energy divide exists between urban and rural areas, with urban electrification at 97 percent compared to rural electrification at 76 percent (World Bank 2018). Despite recent progress, mainly in developing Asia, population growth continues to outpace electrification rates, and future projections by the IEA suggest that by 2030 an estimated 674 million will still be without electricity (ibid.). Within Canada, approximately 280 rural and remote northern communities are not connected to the grid. Two-thirds of these communities are home to Indigenous peoples and are reliant on expensive fossil fuels transported over long distances, resulting in constrained levels of energy access (Brooks and Moore 2017).

Global Drivers for Universal Clean Energy Access

SDG 7 and the Multiplier Effect

Energy access has been recognized as a universal priority through Sustainable Development Goal 7 (SDG 7), which seeks to "ensure universal access to affordable, reliable and modern energy services" by 2030, along with improving the efficiency and technology of energy services (United Nations Development Programme 2016). Also considered to be a critical enabler, SDG 7 has many positive spillover effects associated with its linkages to other SDGs, including poverty reduction (SDG 1), education (SDG 4), gender equality (SDG 5), and climate action (SDG 13).

Climate Change

Dominated by fossil fuels, global energy production and consumption accounts for two-thirds of total GHG emissions and 80 percent of CO2 emitted in 2017 (IEA 2018). A recent International Renewable Energy Agency (IRENA) report projects that energy transformation powered by modern sources of renewable energy can provide over 90 percent of the reduction in energy-related CO2 emissions by 2050 (IRENA 2018b). As development remains linked to an increase in energy consumption, prioritizing clean energy access in the world's most energy-impoverished regions enables developing countries to "leapfrog" past harmful carbon-emitting sources of energy, while limiting the increase of global fossil fuel consumption.

Gender

Today, women and girls disproportionately bear the burden of energy poverty. In regions of SSA and developing Asia women and girls face increased security risks travelling alone at night in unlit areas, and spend hours each day collecting biomass for cooking and heating, suffering from the health effects of cooking indoors in unventilated spaces (Global Alliance for Clean Cookstoves 2017). Indoor cooking using fuelwood and coal represents the largest environmental cause of death annually, exceeding the toll of tuberculosis, malaria, and AIDS combined (Brooks and Moore 2017). Lack of electricity in clinics and households also contributes to complications in childbirth (We Care Solar 2017). Enabling consistent access to energy services supports women in escaping the poverty trap through time freed from traditional duties collecting fuel wood, creating safe forms of lighting after-hours, and electrifying women's small and medium enterprises (ENERGIA, World Bank Group/ESMA, and UN Women 2018).

Falling Costs of Renewable Technologies: The Case of Solar

From 2010 to 2017, costs of solar electricity have fallen by over 75 percent (IRENA and CPI 2018). This dramatic price decrease creates an opportunity for low-cost, sustainable energy production for energy-impoverished areas that receive high levels of solar radiation such as SSA (Quanesh, Adaramola and Mensah 2016). A recent IEA report estimates over 60 percent of new electricity access from 2018 to 2030 will be provided by low-cost, off-grid solar battery systems connected to high-efficiency appliances and mobile pay-as-you-go networks (IEA 2017). As more technological innovations for clean energy access continue to emerge, policies designed to harness these opportunities must be tuned to reflect differences in local contexts.

Barriers to Universal Energy Access Initiatives

Not accounting for diverse local context and resources has posed barriers to the success of some clean energy initiatives in the past. One of the most prominent cases of this was the promotion of solar-powered irrigation pumps, which were found to have significant disparities in environmental impacts based on levels of regional water scarcity (IRENA 2015). Relatedly, another barrier is rooted in the deficiencies of current technology transfer. Research shows that enabling social and economic environments that include the presence of skilled technicians, access to credit and flexible financing, and cultural appropriateness, are all required for successful clean energy technology adoption (Miller, Iles and Jones 2013; Urmee, Harries and Holtorf 2016). Components are often missing from one-off or short-term development initiatives (ibid.).

Barriers can also arise from new initiatives themselves. Incorporating universal clean energy access in the 2015 SDG framework gave rise to a plethora of new international initiatives. However, some multilateral efforts such as the UN's Sustainable Energy for All (SE4ALL) initiative, exist parallel to, and often in competition with local small-scale energy start-ups as well as traditional bilateral forms of official development assistance designed for universal clean energy access development (European Union Energy Initiative Partnership Dialogue Facility 2016).

Canada's Role in the Clean Energy Access Movement

Domestically, Canada has already taken measures to improve clean energy access. Federal initiatives such as the Pan-Canadian Framework on Clean Growth and Climate Change and the Canadian Energy Strategy recommend clean energy transitions as a way to work towards achieving mitigation targets outlined in the Paris Agreement. In particular, energy access in off-grid, rural and remote communities is stressed as a transitional challenge for Canada to overcome. So far, Canada has pledged $220 million over six years in addition to the $400 million already pledged to the Arctic Energy Fund,

and a previous $21.4 million commitment to support the deployment of renewable energy projects in diesel-reliant communities (Government of Canada 2018).

Internationally, Canada has also championed clean energy access through its inclusion in the Feminist International Assistance Policy (Global Affairs Canada 2017). At the One Planet Summit in December 2017, Canada and the World Bank also announced a partnership to support effective climate action including supporting the acceleration of developing countries' transition away from coal-fired electricity towards clean energy and supporting small island states in expanding their renewable energy infrastructure (World Bank 2017b).

Why Improving Universal Energy Access Is in Canada's Interest

Universal energy access can help to realize three overarching objectives of the Canadian government. First, by leapfrogging over high-emitting energy sources in energy-impoverished areas, clean energy sources will help to prevent future emissions and work to realize the Paris goal of limiting global average temperatures to well below 2°C. Second, increased access to clean energy technologies has the potential to significantly impact female health and women's empowerment, which are two priorities identified in Canada's feminist policy (Global Affairs Canada 2017). As demonstrated through initiatives such as the Barefoot Women's Colleges and Kenya's Upesi Rural Stoves Project, by targeting women as agents of change within clean energy development and service provision, there is an opportunity to mainstream women's empowerment within the clean energy access movement (African Development Group Bank 2016). Finally, clean energy solutions can dramatically improve livelihoods in rural and remote Indigenous communities at home, thereby having the potential to contribute to reconciliation efforts.

Canada's Role in Championing Universal Energy Access

Individually, Canada lacks the resources to solve the complex challenge of universal energy access, but through harnessing its strength as an international collaborator, Canada has the potential to develop contextually appropriate solutions for the most energy-impoverished areas of the world. Previous and current global initiatives led by Canada, such as the G20 Child and Maternal Health Initiative or the recently introduced Powering Past Coal Alliance, support this notion and demonstrate Canada's expertise in bridging together a diversity of multi-stakeholder interests to pursue a common goal.

There is now an opportunity for Canada to spearhead a new universal energy access initiative. Through MI, a multilateral forum that brings together 22 countries and the EU to "dramatically accelerate global clean energy innovation," Canada has the opportunity to leverage its leadership role as a member of the MI steering committee and channel resources into developing research hubs focused on context-specific energy access solutions (Mission Innovation n.d.a).

Recommendations for Canada

MI should pursue the creation of six Energy Access Information Centres (EAICs) in the most energy-impoverished regions of the world. This includes three in Africa, one in South-East Asia, and one in Latin America. The final centre is to be located in Canada's North, with the goal of improving energy access in remote and Indigenous off-grid communities. The EAICs — based on Affordable Energy for Humanity's 2017 concept — will provide three main functions (Brooks and Moore 2017). First, the EAICs will provide a collaborative center for research, development, and deployment of scalable, context-appropriate clean energy technologies. Second, the EAICs will enable capacity building through new partnerships between state and non-state actors, local entrepreneurs and international private sector investors. Third, the EAICs will host a program that trains a new generation of clean energy entrepreneurs, or "change agents," that will be challenged with ensuring long-term sustainability for clean energy access through extension services, suited to meet the needs of local contexts.

MI funding should be leveraged with other existing public and private sector commitments to finance the proposed EAICs. As co-leader of the MI Steering Committee Analysis and Joint Research Sub-group, Canada is uniquely positioned to leverage MI funds to build and maintain the proposed EAICs. MI members have already committed USD$31 billion to identify clean energy opportunities that drive transformational change (Mission Innovation, n.d.b). In addition to state funding, MI also has developed partnerships with private investors, such as the recent collaboration between five MI members, including Canada, and the Breakthrough

Energy Coalition, a group of 28 high net worth investors who have created a USD$1 billion fund to finance clean energy initiatives (ibid.). Moreover, additional financing can be secured through international development banks, many of which have made new commitments to clean energy initiatives, such as the African Development Bank, German bank KfW and the World Bank, which offer partial risk guarantees for clean energy access funding (IRENA 2018a). An estimated breakdown of total annual costs for the EAICs is included in Appendix I of this brief.

Emphasize EAICs as collaboration centres that prioritize the engagement of local actors. As demonstrated through regional centres established by the Consultative Group of International Agricultural Research, tangible centres for collaborative research and development have benefited local populations and offered returns on international investments for decades. However, it is essential that partnerships with three groups of local stakeholders — researchers, entrepreneurs, and end-users — be at the forefront of EAIC mandates. First, in addition to acting as sites of international research collaboration, EAICs will include a granting mechanism for funding local research projects, carried out in partnership with local universities. Second, the EAICs will engage in partnerships with local clean energy enterprises and existing development projects, including regional partnerships such as donors and SE4All hubs, with a special focus on those that support women's engagement. Third, EAICs will also focus on capacity building for local youth through academic exchanges between partner universities and, most importantly, through the recruitment and training of local change agents to operate regionally as extension workers. Within this role, individuals — supported by EAICs — will receive the training necessary to ensure that maintenance, education and support is available for clean energy enterprises and end-users.

The final EAIC should be built in Northern Canada. Building on the ongoing work being done through the Canadian High Arctic Research Station in Cambridge Bay, Nunavut, Canada's own EAIC department can work together with Indigenous communities to develop clean energy technologies and services for Canada's most remote communities. The centre could serve as a networking platform between existing provincial and territorial initiatives, and those funded under Natural Resources Canada's Clean Energy for Rural and Remote Communities program, as well as provide access to the international network of EAICs.

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Appendix I: Cost Breakdown of EAICs

Expenses	Cost/Year in CAD
Global Operations and Administration	$917,525
Annual EAIC Administrative	$1,913,695
Annual Program Budget per EAIC	$5,636,225
Total Annual Expenses per EAIC	$7,549,920
Annual Expenses x 6 EAICs	$40,241,073.60**
Total Annual Expenses	$41,158,598.60

**Accounting for a smaller budget in the Canadian EAIC

Source: authors, based on information from Nathwani, Jatin, Joachim Knebel, Daniel M. Kamman, Robert Stoner, Fred McBagonluri, Malcolm McCulloch, and Ortwin Renn. (2017).

Works Cited

African Development Bank Group. 2016. "Empowering Women in Africa through Access to Sustainable Energy." African Development Bank.

Brooks, Michael and Nigel Moore. 2017. "Open Access Energy." Waterloo: Waterloo Global Science Initiative.

ENERGIA, World Bank Group/ESMA, and UN Women. 2018. *Global Progress of SDG7 Energy and Gender.* High-Level Political Forum on Sustainable Development. https://sustainabledevelopment.un.org/content/documents/17489PB_12_Draft.pdf.

European Union Energy Initiative Partnership Dialogue Facility. 2016. "Mapping of Energy Initiatives and Programs in Africa." Eschborn: European Union Energy Initiative Partnership Dialogue Facility.

Global Affairs Canada. 2017. *Canada's Feminist International Assistance Policy.* Ottawa: Global Affairs Canada.

Global Alliance for Clean Cookstoves. 2017. *2017 Progress Report*. Washington: Global Alliance for Clean Cookstoves. http://cleancookstoves.org/resources/reports/2017progress.html.

Government of Canada. 2018. "Clean Energy for Rural and Remote Communities: Capacity Building Stream." www.nrcan.gc.ca/energy/science/programs-funding/20477.

IEA. 2017. "World Energy Access Outlook 2017: From Poverty to Prosperity." www.iea.org/publications/freepublications/publication/WEO2017SpecialReport_EnergyAccessOutlook.pdf.

———. 2018. *Global Energy & CO2 Status Report 2017.*

IRENA. 2015. *Renewable Energy in the Water, Energy, & Food Nexus.* Abu Dhabi: International Renewable Energy Agency.

———. 2018a. *Renewable energy auctions: Cases from sub-Saharan Africa, Abu Dhabi*. Abu Dhabi: International Renewable Energy Agency.

———. 2018b. *Global Energy Transformation: A roadmap to 2050.* Abu Dhabi: International Renewable Energy Agency.

IRENA and CPI. 2018, Global Landscape of Renewable Energy Finance, 2018, Abu Dhabi: International Renewable Energy Agency.

Miller, Clark A, Alastair Iles, and Christopher F. Jones. 2013. "The Social Dimensions of Energy Transitions." Science as Culture 22 (2): 135–48.

Mission Innovation. n.d.a. "About Mission Innovation." http://mission-innovation.net/about/.

———. n.d.b. "Mission Innovation Launches New Initiatives at the One Planet Summit Aimed at Promoting Public-Private Collaboration." http://mission-innovation.net/2017/12/12/mi-launches-new-initiatives-at-one-planet-summit/.

Nathwani, Jatin, Joachim Knebel, Daniel M. Kamman, Robert Stoner, Fred McBagonluri, Malcolm McCulloch, and Ortwin Renn. 2017. *Affordable Energy for Humanity: Annex I.* Waterloo: Affordable Energy For Humanity (AE4H). https://ae4h.org/

Quansah, D. A., M. S. Adaramola, and L. D. Mensah. 2016. "Solar Photovoltaics in Sub-Saharan Africa – Addressing Barriers, Unlocking Potential." *Energy Procedia* 106: 97–110.

United Nations Development Programme. 2016. "UNDP Support to the Implementation of Sustainable Development Goal 7." www.undp.org/content/dam/undp/library/Sustainable%20Development/1_Poverty_Jan15_digital.pdf?download.

Urmee, Tania, David Harries, and Hans-Gerhard Holtorf. 2016. *Photovoltaics for Rural Electrification in Developing Countries.* Zurich: Springer.

We Care Solar. 2017. *Annual Report 2016.* Berkeley: We Care Solar. https://wecaresolar.org/wp-content/uploads/2017/07/annual-layouts-p-sep-covs-hi-qual-mod-optimized.pdf.

World Bank. 2017a. "State of Electricity Access Report 2017." Washington, DC: World Bank. http://documents.worldbank.org/curated/en/364571494517675149/pdf/114841-REVISED-JUNE12-FINAL-SEAR-web-REV-optimized.pdf

——— 2017b. "Canada and the World Bank Group to Support the Clean Energy Transition in Developing Countries and Small Island Developing States." www.worldbank.org/en/news/press-release/2017/12/12/canada-and-the-world-bank-group-to-support-the-clean-energy-transition-in-developing-countries-and-small-island-developing-states.

———. 2018. "Tracking SDG 7: The Energy Progress Report 2018." Washington, DC: World Bank. https://trackingsdg7.esmap.org/data/files/download-documents/tracking_sdg7-the_energy_progress_report_full_report.pdf