



Innovation, Science and  
Economic Development Canada

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PROTECTED A

# CLEAN TECHNOLOGY

## INDUSTRIAL AND TECHNOLOGICAL BENEFITS POLICY

# Outline

1. Provide a refresh of the Industrial and Technological Benefits (ITB) Policy, including the Value Proposition
2. Provide details on Canada's clean technology industrial base, and the market for defence and dual-use applications, based on recent policy work
3. Outline ISED's current approach with regard to seeking business activities in clean technology under the ITB Policy

# SECTION I:

## ITB POLICY REFRESH

# The ITB Policy

The ITB Policy requires companies awarded defence procurement contracts to undertake business activity in Canada equal to the value of the contract

## General Aspects of the Policy

- **Market driven**
- **Targets work in industrial areas** identified through analysis and industry engagement
- Includes plans for regional distribution of **work across Canada**
- Investments in **small and medium-sized businesses** from across Canada
- Recognizes **incremental** business activity

## When Does it Apply?

- The ITB Policy applies on all eligible defence and Canadian Coast Guard procurements over \$100 million or to procurements to which the National Security Exception is invoked
- Eligible defence procurements valued between \$20-100 million are reviewed for the possible application of the ITB Policy

# The Value Proposition

The ITB Policy's Value Proposition enables ISED to target strategic investments across five pillars of economic benefit

## KEY DETAILS

- **Flexible:** Value Proposition requirements are developed by ISED on a procurement by procurement basis
- **Evidence-based:** Informed by market analysis, industry engagement and third party defence analytics
- **Evaluation Framework:** Assigned a set number of points and scored along with technical and price elements
- **Contractually Binding:** Value Proposition requirements become contractual sub-commitments following contract award

## OBJECTIVES OF THE VALUE PROPOSITION PILLARS



### WORK IN THE CANADIAN DEFENCE INDUSTRY

Support the long-term sustainability and growth of Canada's defence industry



### CANADIAN SUPPLIER DEVELOPMENT

Support the growth of prime contractors and suppliers in Canada, including SMBs in all regions of the country



### RESEARCH AND DEVELOPMENT

Enhance innovation through R&D in Canada



### EXPORTS

Increase the export potential and international competitiveness of Canadian-based firms



### SKILLS DEVELOPMENT AND TRAINING

Fill skills and training gaps within the Canadian economy to support a more innovative Canada






# Key Industrial Capabilities (KICs)

In addition, when a market-driven rationale exists, ISED can drive investments through the Value Proposition into Key Industrial Capabilities (KICs)


## WHAT ARE KICs?

- KICs are areas of emerging technology with the potential for rapid growth, established industrial capabilities in Canada, and where domestic capacity is essential to national security
- KICs were developed through analysis and expert input, and validated through extensive industry engagement
- KICs align with Government priorities and focus on defence technologies, but also include commercial and dual-use applications
- Detailed definitions for each KIC can be found on [ISED's website](#)

## EMERGING TECHNOLOGIES

- |   |   |
|---|---|
|  Advanced Materials                                   |  Artificial Intelligence |
|  Cyber Resilience                                     |  Space Systems           |
|  Remotely-piloted Systems and Autonomous Technologies |   |

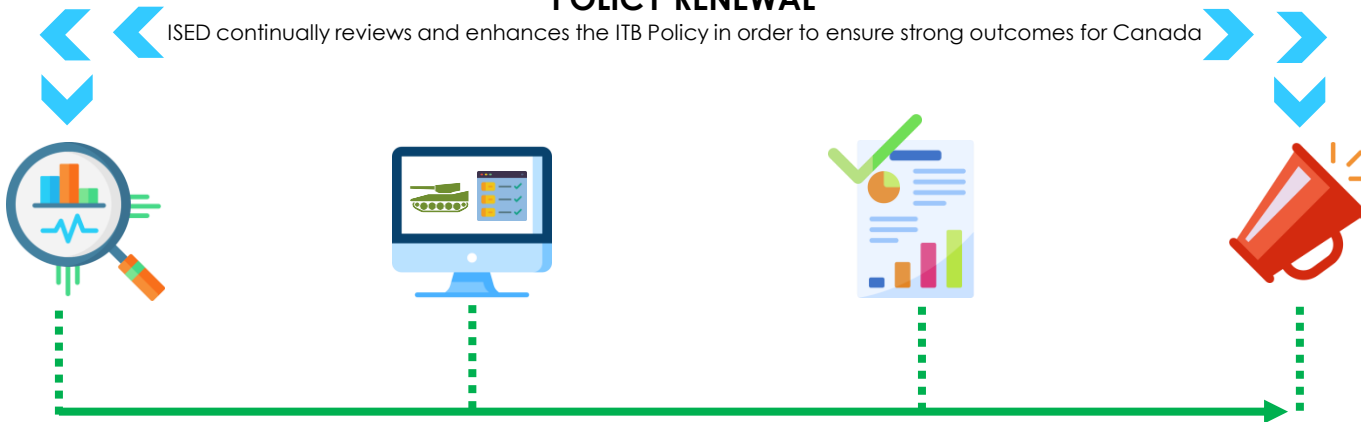
## LEADING COMPETENCIES & CRITICAL INDUSTRIAL SERVICES

- |   |  |
|---|--|
|  Aerospace Systems & Components                 |  Armour                             |
|  Defence Systems Integration                    |  Electro Optical / Infrared Systems |
|  Ground Vehicle Solutions                       |  In-Service Support                 |
|  Marine Ship-Borne Mission and Platform Systems |  Munitions                          |
|  Shipbuilding, Design and Engineering Services  |  Sonar & Acoustic Systems           |
|  Training & Simulation                        |  |

# ISED's Role is End-to-End

## POLICY RENEWAL

ISED continually reviews and enhances the ITB Policy in order to ensure strong outcomes for Canada



DEVELOPING ECONOMIC BENEFIT REQUIREMENTS	EVALUATING BIDS	VERIFICATION OF ECONOMIC BENEFITS	REPORTING ON PROGRESS
<ul style="list-style-type: none"> <li>ISED develops the Value Proposition requirements on a procurement-by-procurement basis</li> <li>This work is supported by the Regional Development Agencies</li> </ul>	<ul style="list-style-type: none"> <li>ISED, with support from the RDAs, evaluates the Value Proposition proposals of bidders</li> <li>DND and PSPC evaluate technical and contracting aspects of bids respectively</li> </ul>	<ul style="list-style-type: none"> <li>Each successful contractor is required to annually report on progress towards fulfilling its economic benefits obligation under the ITB Policy</li> <li>Progress is tracked through an internal ISED database, which enables the department to monitor, verify, and report on the fulfillment of this work</li> </ul>	<ul style="list-style-type: none"> <li>ISED publishes an annual Report on Contractor Progress online</li> <li>ISED also publishes a report on the economic impacts of the ITB Policy</li> </ul>

# SECTION II:

## MARKET OVERVIEW



## Background

- Green growth and clean technology continue to be **key priorities** for the Government of Canada
- Increased focus by **defence prime contractors**, including work activities submitted under the ITB Policy
- As a result, in the spring of 2020, the ITB Branch began to examine opportunities in this sector
- The following market analysis is drawn from this work

# Canadian Industrial Base

## GDP & JOBS

In 2020, clean technology activity contributed \$26.8B to Canada's GDP, and approximately 210,237 jobs were considered clean technology jobs<sup>1</sup>

## EXPORTS

In 2020, exports remained stable at \$7.1 billion, showing strong global demand for Canada's clean technology goods and services<sup>1</sup>



## INNOVATION

GDP associated with clean technology science and research and development services accounts for \$5.27B<sup>1</sup>

## SMALL AND MEDIUM ENTERPRISES

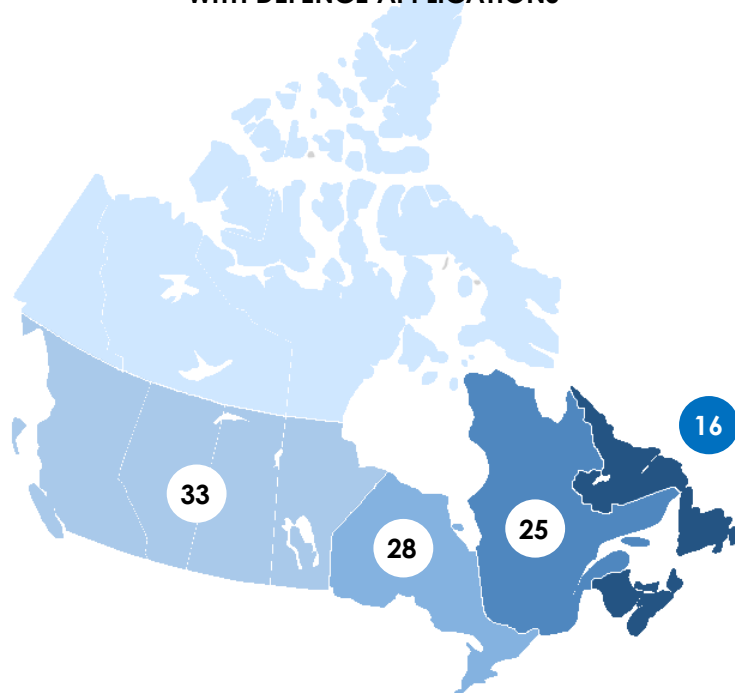
SMEs make up a large proportion of the sector, the majority falling into the size range of 5 to 19 employees (31%) and 20 to 99 employees (35%)<sup>2</sup>

**Data Sources:** 1. Statistics Canada - 2022 Environmental and Clean Technology Products Economic Account; 2. ISED – SME Profile: Clean Technology in Canada

# Spotlight on Defence and Dual-Use

- Research identified approximately 102 Canadian clean tech firms with demonstrated or potential applications for the defence, and subset of 300 companies with potential dual-use applications
- These firms are clustered mainly in the clean tech segments of energy generation, energy storage and energy management & distribution
- SMEs constitute the bulk of the companies identified, with 86% of the 102 firms having 200 or fewer employees based in Canada

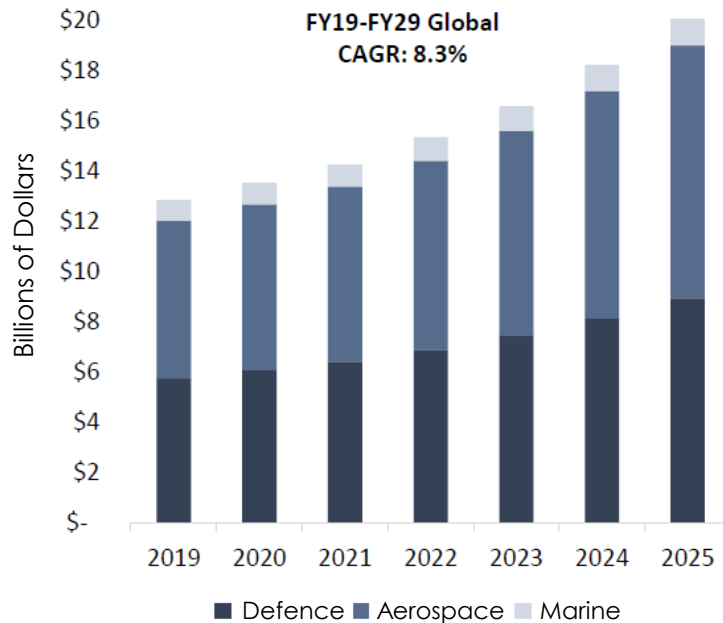
**REGIONAL DISTRIBUTION OF 102 CLEAN TECH FIRMS  
WITH DEFENCE APPLICATIONS**



# Global Market Outlook

- The **global defence and dual-use markets** for clean tech are expected to grow to \$20.1B by 2025, broken down as follows:
  - \$10B in Aerospace
  - \$8.9B in Defence
  - \$800M in Marine
- Key adoption drivers for military operators include potential cost efficiencies, operational advantages and considerations regarding climate security
- In terms of the aerospace and marine sectors, there is a push to reduce emissions and improve energy efficiency for operations and platforms

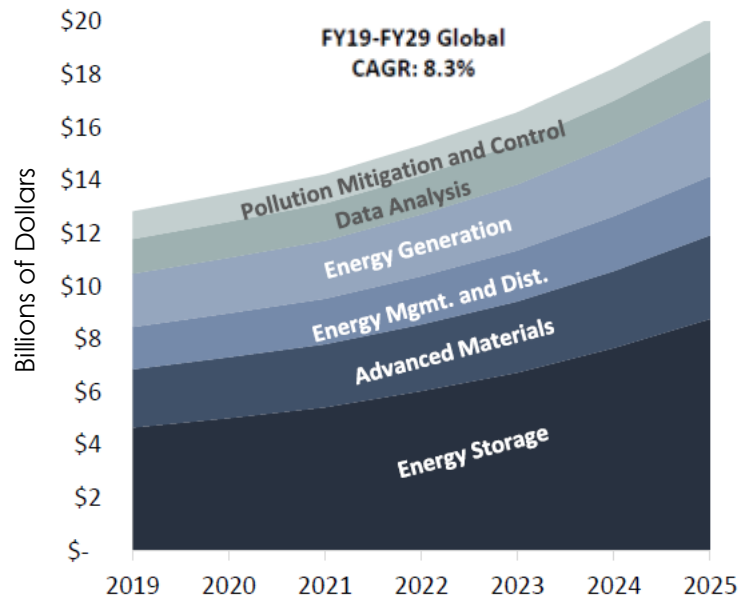
**GLOBAL DEFENCE AND DUAL-USE  
CLEAN TECHNOLOGY MARKET (BY DOMAIN)**



## Global Market Outlook (continued)

- **Energy storage** is an important segment for the defence and dual-use markets. However, many other opportunities exist for growth
- **Major prime contractors are investing in clean technology solutions** that are applicable to both defence and commercial applications, including:
  - Lockheed Martin (e.g., renewable energy, energy storage);
  - General Electric (e.g., energy management and distribution, renewable energy);
  - Airbus (e.g., hybrid electric propulsion); and
  - Boeing (e.g., biofuels, data analysis, sustainable manufacturing)

**GLOBAL DEFENCE AND DUAL-USE  
CLEAN TECHNOLOGY MARKET (BY SEGMENT)**



# Clean Technology Examples\*

COMPANY	TECHNOLOGY
	 <p><b>Water Treatment and Recovery</b></p> <p>BluMetric's Shipboard Reverse Osmosis Desalinator (SROD) provides water purification (fresh, brackish, salt, turbid) for naval platforms</p>
	 <p><b>Large-Scale Energy Storage Systems</b></p> <p>Lockheed's GridStar is a turn-key energy storage system scalable for 100 kW to multi-MW projects. Used in a 10 MW solar-plus-storage plant built for the U.S. Army's Redstone Arsenal in Huntsville, Alabama</p>
	 <p><b>Low-Carbon Emissions Flight</b></p> <p>Airbus' Vahana demonstrator is an electric, single-seat, autonomous electric vertical take-off and landing (eVTOL) vehicle</p>
	 <p><b>Waste Recovery</b></p> <p>Terragon's Micro Auto Gasification System (MAGS) converts combustible materials (e.g., plastics, oily rags, oils, sludges, etc.) into thermal energy</p>

# SECTION III:

## ITB POLICY & CLEAN TECHNOLOGY

## Strategic Considerations

- **Emergent Canadian industrial base** in defence, with wider foundation in dual-use and commercial spheres
- **Strong global market growth** in both defence and commercial clean technology spheres
- **Green growth and clean technology** are key Government priorities (e.g., Greening Government Strategy, Defence Energy and Environment Strategy)



# Integrating Clean Technology

- Over 2020/2021, **ISED developed a Clean Technology definition\*** for use in our Value Proposition terms & conditions, based on extensive research, internal consultations (e.g., DND, PSPC, TBS, other ISED units), and industry engagement
- Intended outcome is to seek business activities in clean technology in the defence, aerospace and marine sectors when there is a market-driven opportunity
  - **Grow our domestic capacity for clean technology defence applications;** position Canadian industry to support the current and future needs of the Canadian Armed Forces (e.g., technical requirements, IDEaS challenges) and allied forces
  - **Support innovation and growth;** ensure that Canadian defence, aerospace and marine companies are at the forefront of this emerging area

**Note\*:** See Annex A for our Clean Technology definition

## Current Approach

- On procurements where there is a market-driven opportunity, ISED may include Clean Technology as a mandatory or rated 'Focus Area' in our ITB Policy - Value Proposition requirements
- This criterion would seek a commitment from prime contractors to submit and complete clean technology business activities in Canada (e.g., supply chain work for Canadian firms, R&D)

# ANNEXES

# Annex A – Clean Technology Definition

Design, development, engineering, manufacturing or integration of:

- energy-efficient or emissions reducing propulsion systems (e.g., hybrid electric, electric), power distribution and management systems, and low-carbon intensity fuel sources (e.g., hydrogen, biofuels) for vehicle platforms;
- energy storage systems (e.g., pumped hydro storage, flywheel energy storage, zinc-ion batteries, lithium-ion batteries, flow batteries);
- renewable energy generation (i.e., solar, wind, hydropower, geothermal, wave energy, tidal current energy, river hydrokinetic energy, small modular reactors for nuclear fission, nuclear fusion);
- energy management & distribution systems (e.g., power system automation, automatic generation control, smart grids, microgrids) that improve energy efficiency, energy security, or reduce emissions;
- software and equipment used to measure, monitor and analyze the environmental impacts of pollution (e.g., particulates), waste (e.g., solid waste, waste heat, waste water), noise, or emissions;
- equipment and processes that directly reduce or eliminate pollution, waste, noise, or emissions; and,
- equipment and processes for water purification, water re-use, or that result in more efficient water-usage on vehicle platforms, or in forward operating bases, deployed camps, or other remote locations.

These technologies have broad application across military domains, as well as in commercial sectors.

For the purposes of this definition, the term 'emissions' refers to the following greenhouse gases: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), sulphur hexafluoride, perfluorocarbons, hydrofluorocarbons, and nitrogen trifluoride.

## Annex B – Helpful Links

### THE ITB POLICY

The ITB Policy is Canada's main tool to leverage long-lasting economic outcomes from defence procurement. To learn more about the ITB Policy, please visit:

- ITB Policy – How to Get Involved - ISED  
[https://www.ic.gc.ca/eic/site/086.nsf/eng/h\\_00113.html](https://www.ic.gc.ca/eic/site/086.nsf/eng/h_00113.html)
- ITB Policy – Model Terms & Conditions  
[https://www.ic.gc.ca/eic/site/086.nsf/eng/h\\_00011.html](https://www.ic.gc.ca/eic/site/086.nsf/eng/h_00011.html)
- ITB Policy – Key Industrial Capabilities - ISED  
[https://www.ic.gc.ca/eic/site/086.nsf/eng/h\\_00175.html](https://www.ic.gc.ca/eic/site/086.nsf/eng/h_00175.html)

### VALUE PROPOSITION GUIDE

The Value Proposition Guide was introduced in 2014 to provide guidance to industry on the Government of Canada's approach to leveraging economic benefits under the ITB Policy. To learn more about the Value Proposition, please visit:





- The Value Proposition – ISED  
<https://www.ic.gc.ca/eic/site/086.nsf/eng/00006.html#Intro>

### THE RDAs

Canada's RDAs are a key part of the Government of Canada's Innovation and Skills Plan, advancing and diversifying our regional economies and helping communities thrive. There are seven RDAs across Canada:


- Atlantic Canada Opportunities Agency  
<http://www.acoa-apeca.gc.ca>
- Canadian Northern Economic Development Agency  
<https://www.cannor.gc.ca>
- Canada Economic Development for the Quebec Region  
<http://www.dec-ced.gc.ca>
- Federal Economic Development Agency for Southern Ontario  
<http://www.feddevontario.gc.ca>
- Federal Economic Development Agency for Northern Ontario  
<http://fednor.gc.ca>
- Prairies Economic Development Canada  
<https://www.canada.ca/en/prairies-economic-development.html>
- Pacific Economic Development Canada  
<https://www.canada.ca/en/pacific-economic-development.html>

# Annex C - Clean Technology Examples\*

COMPANY	TECHNOLOGY
	 <p><u><a href="#">Water Treatment and Recovery</a></u></p> <ul style="list-style-type: none"> <li>▪ Ottawa-based BluMetric is active in environmental geosciences and engineering, renewable energy, water and waste water treatment, environmental contracting and environmental management</li> <li>▪ The company provides a variety of water treatment solutions, including those designed for military use</li> <li>▪ Pictured is the company's Shipboard Reverse Osmosis Desalinator (SROD) which provides water purification (fresh, brackish, salt, turbid) for naval platforms. These systems are currently installed on the RCN's Halifax-class frigates</li> </ul>
	 <p><u><a href="#">Large-Scale Energy Storage Systems</a></u></p> <ul style="list-style-type: none"> <li>▪ Lockheed Martin is active in renewable energy generation and energy storage, including its GridStar systems</li> <li>▪ <u><a href="#">GridStar Lithium Energy Storage</a></u> provides a turnkey outdoor-rated energy storage system including AC/DC protection, power conversion, energy storage, thermal management, and controls. Scalable for 100 kW to multi-MW projects             <ul style="list-style-type: none"> <li>○ Used as part of a 10 MW solar-plus-storage plant built for the U.S. Army's Redstone Arsenal in Huntsville, Alabama</li> </ul> </li> <li>▪ <u><a href="#">GridStar Flow</a></u> is a redox flow battery for long-duration, large-capacity energy storage applications. Designed to be resilient, for use with microgrids, in remote locations, and in military installations</li> </ul>





\*Selected technology examples are for illustrative purposes only. They do not reflect any preference on the part of ISED

# Annex C - Clean Technology Examples\*

COMPANY	TECHNOLOGY
	 <p><a href="#"><u>Small-Scale Batteries and Energy Storage Systems</u></a></p> <ul style="list-style-type: none"> <li>Edmonton-based Growing Greener Innovations provides advanced battery, energy storage systems, and battery energy storage systems (BESS)</li> <li>The company's GRENGINE battery won an Innovation Award from the U.S. military, and was a Round One winner under the IDEaS Pop up City Contest. Current in-house R&amp;D projects include power packs for dismounted soldiers and power solutions for temporary military sites</li> <li>Pictured is the GRENGINE UltraLite battery generator</li> </ul>
	 <p><a href="#"><u>Aerospace Engines</u></a></p> <ul style="list-style-type: none"> <li>Pratt &amp; Whitney is investing in technologies to reduce noise and emissions from the company's commercial engines. This includes:             <ul style="list-style-type: none"> <li>Design elements that reduce overall noise and vibration;</li> <li>The Technology for Advanced LOw Nox (TALON) combustor, designed for easier maintenance, and clearer burning/lower emissions; and</li> <li>Investments in sustainable aviation fuel</li> </ul> </li> <li>In addition, the company indicates that all of its engines are compatible with drop-in alternative jet fuels produced in accordance with ASTM D7566</li> <li>Pictured is the <a href="#"><u>Pratt &amp; Whitney GTF engine</u></a>, which according to the company, has reduced fuel consumption, noise, and nitrogen oxide emissions</li> </ul>

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# Annex C - Clean Technology Examples\*

COMPANY	TECHNOLOGY
	<p><u><a href="#">Low-Carbon Emissions Flight</a></u></p>  <ul style="list-style-type: none"> <li>▪ Airbus is active in the development of electric and hybrid propulsion, solar and hydrogen-powered flight, sustainable aviation fuel, and electrified urban air mobility</li> <li>▪ The company has designed, built and flown multiple demonstrator aircraft, including the E-Fan, Vahana, and City Airbus platforms. The company plans to introduce the first zero-emissions commercial aircraft by 2035, based on its ZEROe concept</li> <li>▪ Pictured is the autonomous eVTOL technology demonstrator, Vahana, which performed its first flight on January 31, 2018</li> </ul>
	<p><u><a href="#">Waste Recovery</a></u></p>  <ul style="list-style-type: none"> <li>▪ Montreal-based Terragon Environmental Technologies Inc. provides Total Waste Recovery (TRU) and water recovery equipment and solutions for various sectors, including marine platforms, military forward operating bases, the industrial and commercial sectors, and remote habitats</li> <li>▪ Terragon's technology was utilized on HMCS Protecteur, and the company was a Round 2 winner under the IDEaS Pop up City Contest</li> <li>▪ Pictured is the company's Micro Auto Gasification System (MAGS), which converts combustible materials (e.g., plastics, oily rags, oils, sludges, etc.) into thermal energy. The MAGS can generate 2,400 kWh of energy daily by processing up to 1 tonne per day of combustible materials</li> </ul>

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# Annex C - Clean Technology Examples\*

COMPANY	TECHNOLOGY
 <b>Nihtat Energy Ltd.</b>	<p><u><a href="#">Solar Energy Generation</a></u></p>  <ul style="list-style-type: none"> <li>▪ Inuvik-based Nihtat Energy Ltd. is an Indigenous-owned and operated firm focused on renewable energy installation and integration for northern communities, governments, and private entities</li> <li>▪ In 2021, the company was awarded \$800,000 as part of NRCan's Renewable Energy Indigenous Off-Diesel Initiative to pursue a series of staged projects in the Beaufort Delta region over 2021 and 2022. This includes a 60 KW solar project at the Government of Canada's Inuvik Satellite Station Facility (ISSF)</li> <li>▪ Pictured is the company's 99 KW solar PV installation at the Inuvik Mackenzie Hotel</li> </ul>
 <b>New Energy CORPORATION</b>	<p><u><a href="#">Hydrokinetic Energy Generation</a></u></p>  <ul style="list-style-type: none"> <li>▪ Calgary-based New Energy Corporation designs and installs water-to-wire systems, and provides associated services for hydrokinetic energy generation</li> <li>▪ The company has both fixed and floating systems, and has completed projects in Canada, the United States, India, Nepal, Myanmar, Oman, and the Netherlands, often in remote locations</li> <li>▪ Pictured is the company's Envirogen turbine, which is scalable from 5 KW to 250 KW, available as both a fixed or floating/mobile installation</li> </ul>

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