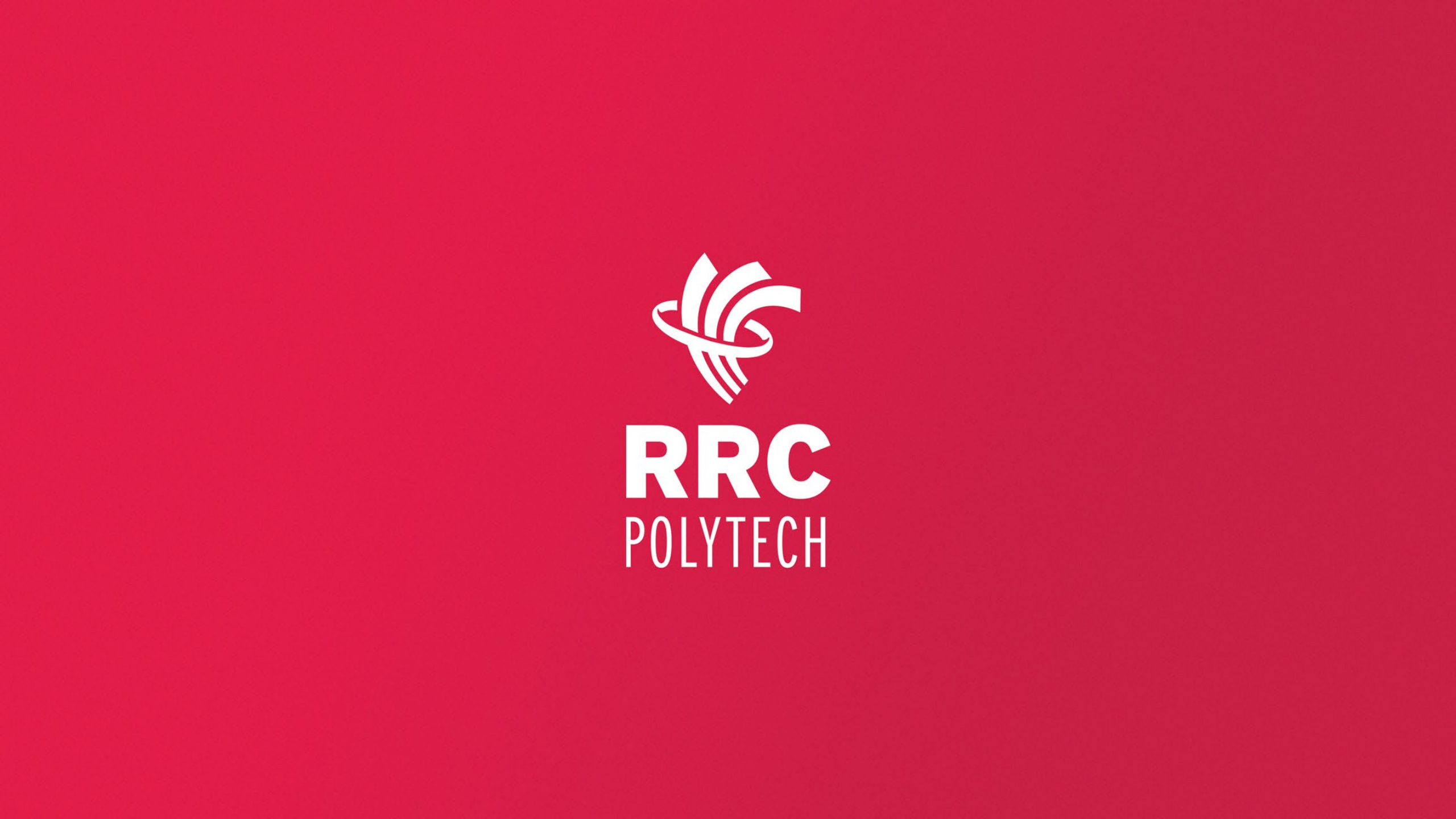

RRC
POLYTECH

Accelerating Towards a Zero-emission Transportation Future

Future Focused: *Developing Tomorrow's Talent*

Fanshawe College, London, Ontario

May 18, 2022

Jojo Delos Reyes

Outline

RRC Polytech Profile

Overview of VTEC

Meet SpaRRCky - prototype BEV

Building a remote-controlled EV tractor

Battery second life applications

EV training for upskilling

Promoting workplace charging – a ZEVAI project

RRC Polytech

- Manitoba’s largest institute of applied learning
- Over 200 full- & part-time academic programs
- Eight campuses across Manitoba
- Annual research enterprise funding between $6 and $9 million
- Over $85 million research infrastructure
- Three NSERC Technology Access Centres and two Build Innovation Enhancement programs

RRC Polytech's Research Enterprise

BETAC

Helping design more durable, energy efficient buildings in Manitoba.

Prairie Research Kitchen

Developing new and innovative products from locally-sourced ingredients.

SECD

Leading the way on the Science of Early Child Development.

TACAM

Assisting aerospace and manufacturing businesses with specialized facilities.

VTEC

Connecting heavy vehicle manufacturers with specialized facilities and emerging technologies.

Driving innovation forward on low to zero emission transportation since 2005.

Vehicle-related
Applied Research
and Demonstration

Electric Vehicle
Technology and
Education Centre

E-Bus Prototype
and Demonstration

2005/08: Solar Car

2005/06: HHICE/HFC Bus

2008/10: Prius PHEV

2010: MCI J4500

2011/13: EV Winter
Operational Testing

2012: Prototype e-Bus

2013/17: e-Bus Demo

Vehicle Technology & Energy Centre

Established in 2016 – NSERC's Build Innovation Enhancement Grant

Build applied research capacity on

- cold-weather/climatic testing
- emissions testing
- vehicle-related electronics and software
- energy conservation and alternatives
- light weighting/materials
- technology integration

Gained applied research capacity and technical expertise on electric vehicle technology

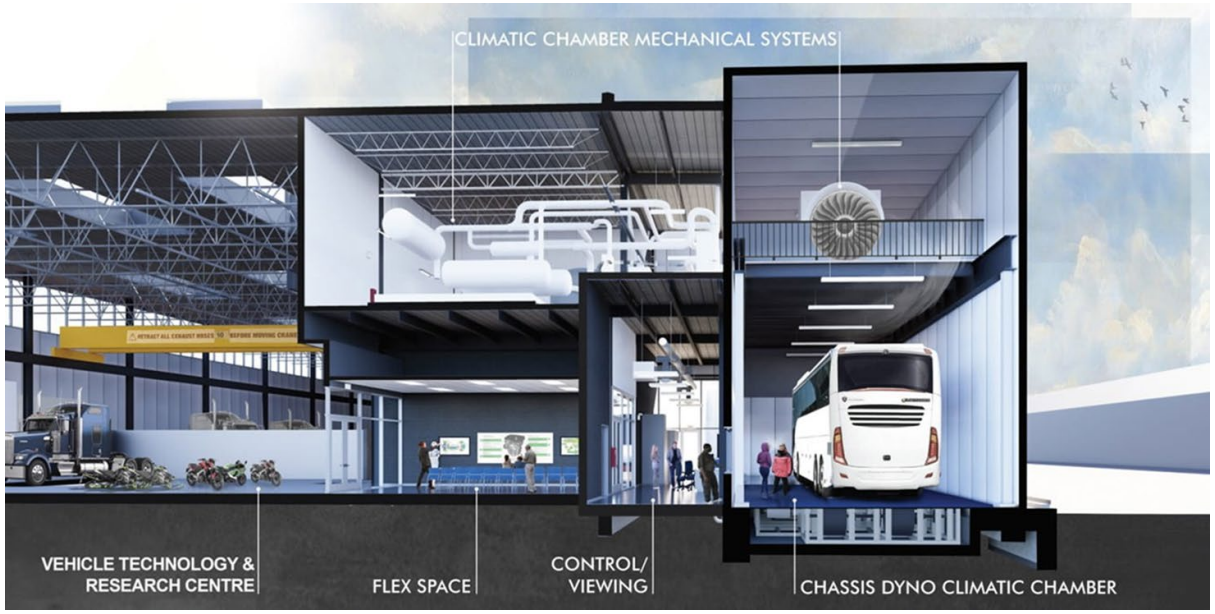
Motivelab

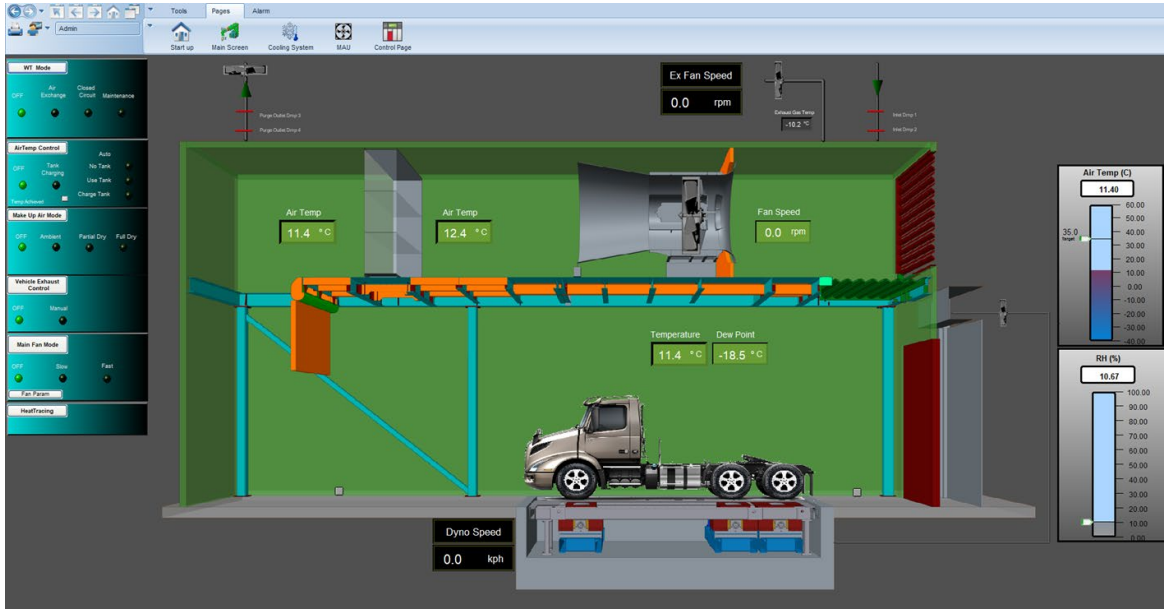
Environmental and performance testing

- various types of vehicles
- low to zero emission vehicles
- specialized equipment and processes

-40ºC

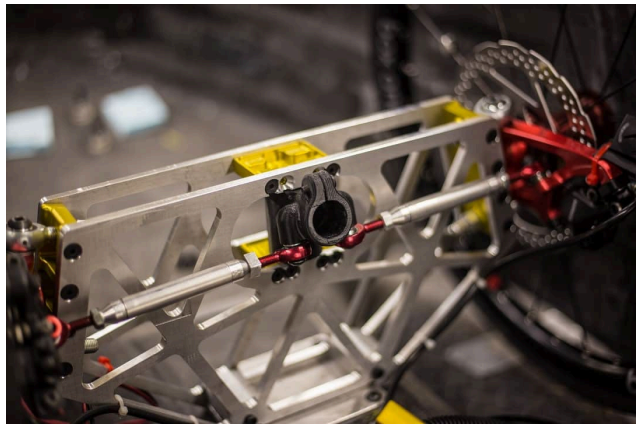
+50ºC





Enhancing the student experience

Shell Eco-Marathon: Make the Future



Shell Eco-Marathon: Make the Future

Shell Eco-marathon

Shell Eco-marathon Americas 2019
Final results: Prototype Battery-electric

Rank	Team n°	Team name	Country	Organization	Institution type	Competition category	Energy type	Best attempt (m/kWh)
1	309	Eco Illini Supermileage	United States	University of Illinois at Urbana-Champaign	University	Prototype	Battery-electric	152
2	306	Milhagem UFMG Elétrico	Brazil	Universidade Federal de Minas Gerais	University	Prototype	Battery-electric	141
3	305	Resistance Racing	United States	Cornell University	University	Prototype	Battery-electric	139.9
4	326	UOE Racing	Canada	University of Ottawa	University	Prototype	Battery-electric	127.8
5	315	Kiri FAN	Argentina	Universidad Tecnológica Nacional - Facultad Region	University	Prototype	Battery-electric	100.1
6	323	Trine Thunder	United States	Trine University	University	Prototype	Battery-electric	67.9
7	320	Red River College	Canada	Red River College	University	Prototype	Battery-electric	62.5
8	318	Miztli	Mexico	Universidad Nacional Autónoma de México	University	Prototype	Battery-electric	56.9
9	308	CNS Performance Engineering UC	United States	Cicero North Syracuse High School	School	Prototype	Battery-electric	52.1
10	328	Electratón CEM	Mexico	Instituto Tecnológico y de Estudios Superiores de	University	Prototype	Battery-electric	35.1

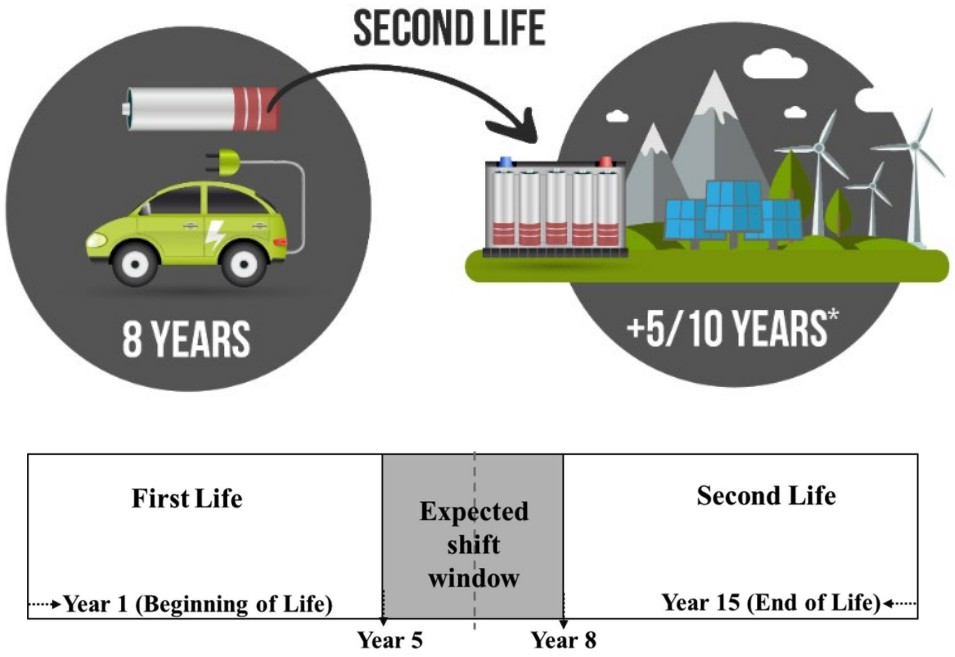
Roll-Over Training Tractor

How to teach farmers roll-over safety without putting anyone at risk?

Roll-Over Training Tractor

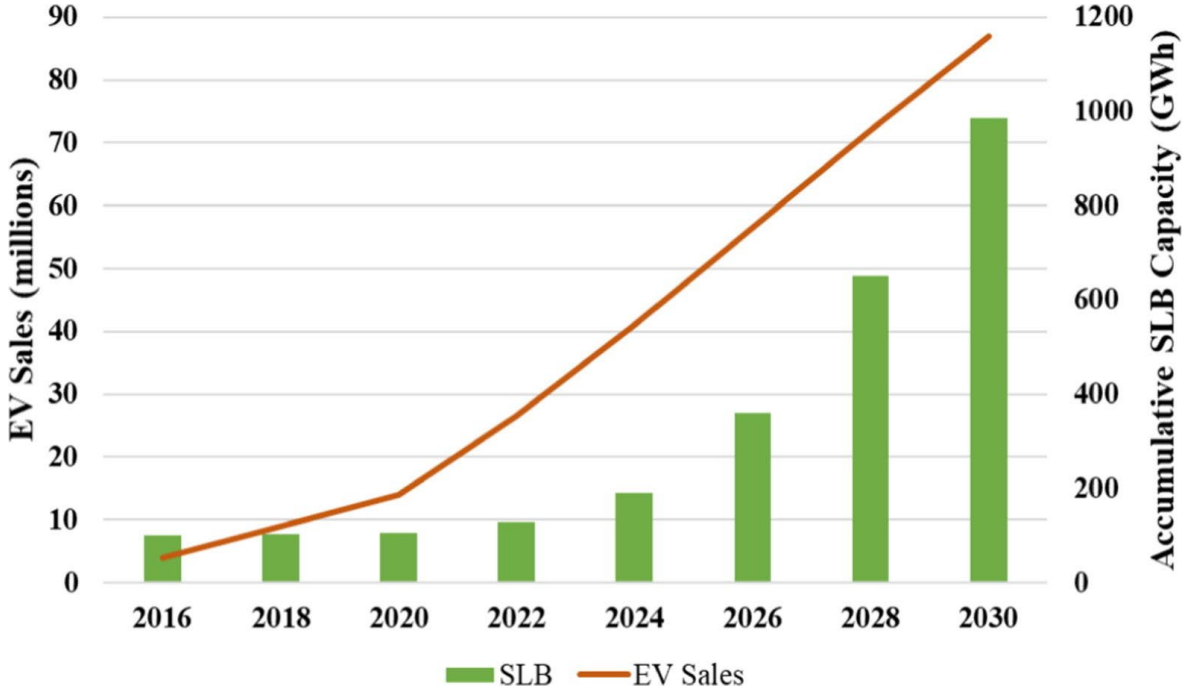
Battery Second-life

Battery second life



Source: K. Venkatapathy, E. Tazelaar, B. Veenhuizen, A systematic identification of first to second life shift-point of lithium-ion batteries, in: 2015 IEEE Vehicle Power and Propulsion Conference, VPPC 2015 - Proceedings, 2015.

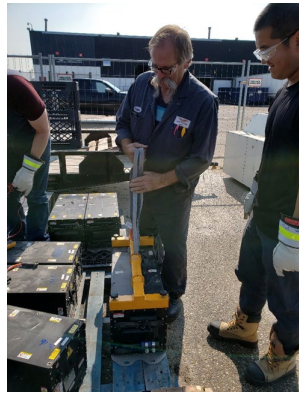
Global accumulative sales of EV and SLB capacity



Source: G. Reid, J. Julve, Second life-batteries as flexible storage for renewables energies, 2016

Battery second life

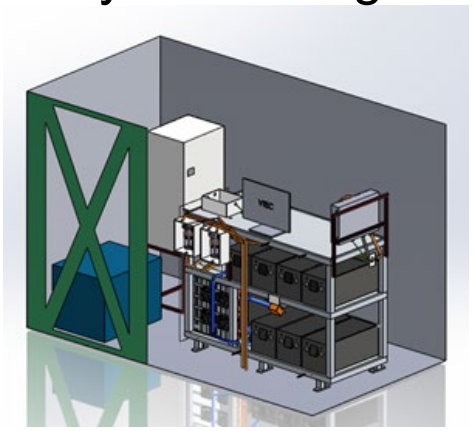
Selection process



Transfer

Detailed testing

System design



Build/certification

Demonstration

EV Tundra Buggy

Project milestones

- Initial assessment
- Research and technical feasibility
- Evaluation and review
- Prototyping
- Demonstration

EV Tundra Buggy

Initial assessment – visiting Churchill, Manitoba

EV Tundra Buggy

Left: VTEC team working on the battery pack integration on the EV Tundra Buggy (EVTB).

Above: EVTB unveiling at RRC Polytech.

EV Tundra Buggy

The EV Tundra Buggy crossing the Churchill River from their northern lights season.

Video footage courtesy of Frontiers North Adventures.

Supporting industry upskilling

Intro to e-Bus/EV Training

Project milestones

- Conversation with key stakeholders
- Technical assessment
- Outline review and feedback
- Curriculum and training aid development
- Pilot run
- Student feedback and material update

Intro to e-Bus/EV Training

All training aids were developed in-house to align with the course materials

Designed and fabricated by VTEC research team with close coordination with the Academic team

Maximize new and current strategic partnerships

Zero Emission Vehicle Awareness Initiative (ZEVAI)

RRC POLYTECH

NAIT

SASK POLY TECH

Share of Canadian ZEV New Vehicle Registrations 2019 - 2021

Province	2021	2020	2019	Share Change 20 - 21
British Columbia	13.0%	9.4%	8.6%	3.6%
Quebec	9.5%	7.5%	6.2%	2.0%
Yukon Territory	4.5%	1.7%	0.5%	2.8%
Ontario	3.3%	1.8%	1.3%	1.5%
Prince Edward Island	2.9%	0.8%	0.7%	2.1%
Alberta	1.8%	0.9%	0.7%	0.9%
Nova Scotia	1.6%	0.6%	0.3%	1.0%
Manitoba	1.4%	0.7%	0.5%	0.7%
New Brunswick	1.4%	0.6%	0.4%	0.8%
Saskatchewan	1.2%	0.5%	0.4%	0.7%
Northwest Territories	0.7%	0.1%	0.1%	0.6%
Newfoundland & Labrador	0.6%	0.3%	0.1%	0.3%
Nunavut	0.0%	0.0%	0.0%	0.0%
National	**5.6%**	**3.8%**	**3.1%**	**1.8%**

CMA	2021	2020	2019	Share Change 20 - 21
Vancouver	15.6%	11.4%	9.8%	4.3%
Montréal	10.7%	8.6%	6.9%	2.1%
Toronto	4.3%	2.5%	1.5%	1.8%

Note: Canadian Light Vehicle Registrations 2019 - 21
Source: IHS Markit

January 2022 to March 2023
$225,000 funding
Natural Resources Canada

Key Takeaways

Students benefit the most when they engage in applied research projects.

- Gain technical knowledge
- Learn the value of teamwork
- Technical and communication skills are improved
- Practiced problem solving and critical thinking
- Learn new skills

Industry driven applied research provides the opportunity to stay ahead of the skills required in the future

Thank You! Any Questions?

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