

All-girl, French-language
robotics team based in Aurora!

We'll be representing
Canada at an
INTERNATIONAL robotics
competition in May!

SUPER POWERED™



CHALLENGE

Dynamite FLL Team!

- Best in Ontario!
- Best in Canada!



FIRST LEGO LEAGUE
RAZORBACK
OPEN INVITATIONAL

May 18-21, 2023 • University of Arkansas • Fayetteville, Arkansas



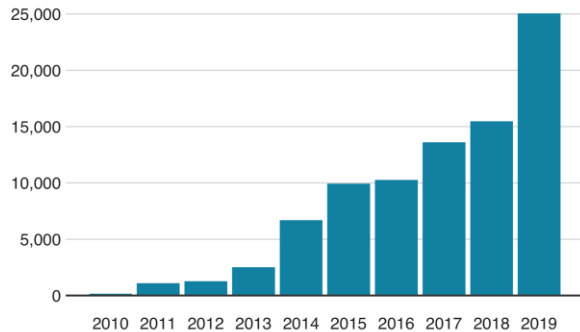
Our Problem Statement:

Switching to electric vehicles can greatly **reduce greenhouse gas emissions** and help **combat global warming**, but their use will significantly **increase our demand for electricity** and their environmental benefits depend on the **sources of this electricity**.

How can we provide additional, locally-generated, renewable energy to power our electric vehicles without requiring major infrastructure changes?

Zero-emission cars on the rise

Total UK annual registrations of battery electric cars



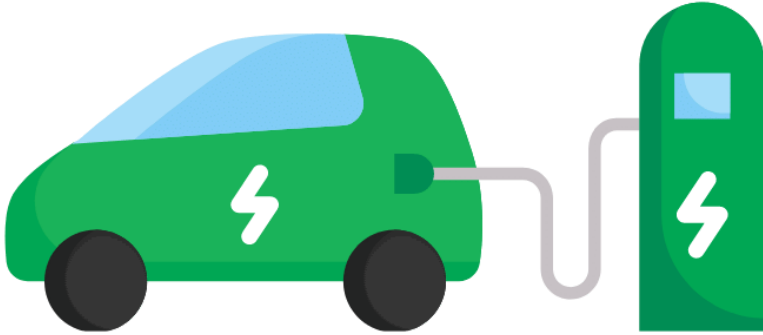
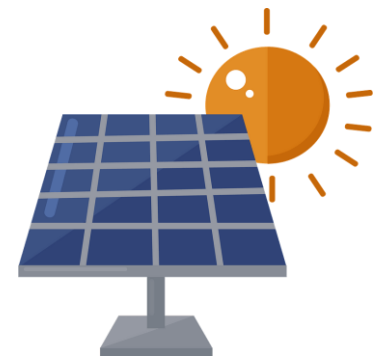
Note: 2019 shows data from January to September

Source: SMMT



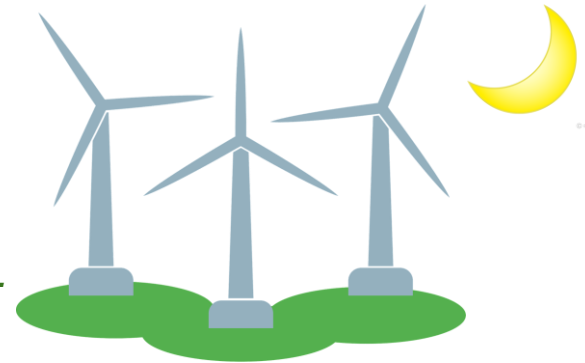
Our Solution:

Governments around the world are installing large numbers of public electric vehicle charging stations. Most of these charging stations are being installed where people work, play and live.



Since *daytime charging aligns with peak solar output* and *nighttime charging aligns with wind output*, our solution seeks to retrofit existing infrastructure near public charging stations with a combination of solar and wind energy sources.

Renewable energy will be *generated on-site* and used to charge the vehicles parked there, using the EVs themselves as a *large collective battery*. This will help offset the need for additional energy generation and storage, and will *prioritize the use of renewable energies.*





Full sun for lamp post solar panels



Many tall lamp posts for wind turbines



Can Renewable Energy power EV Charging Stations in the future?

Charging stations in middle of parking lot; suitable for a solar awning above them



Large flat roof for solar panel installation

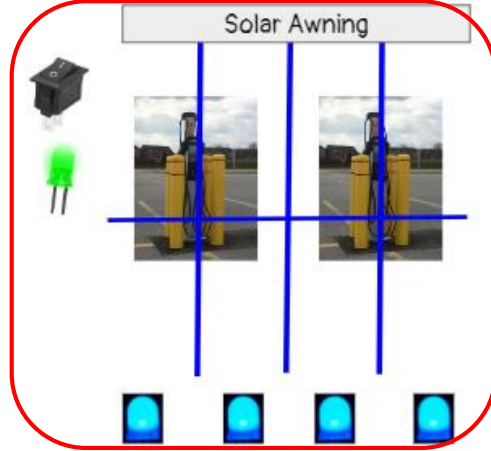


Model Design #3:

Upper Canada Mall with Final Components



4 retrofit phases to choose from! All provide GREEN energy!



Month of Year (1-12)



Model kill switch



Choose month to get monthly average wind and sun intensities.



Cost Analysis of Upper Canada Mall Model Site

17600 Yonge St, Newmarket, ON L3Y 4Z1

On our cost analysis, we have our 4 retrofit phases.

Retrofit Phase	Details	Initial Installation Costs**	Annual Green Energy Provided	Annual GHG Emissions Savings	Annual Energy Savings
	Cost Analysis Expert: Michael Scott RESCo Energy Inc.	\$0.33/W for solar on rooftop \$0.66/W for solar on awning and lamppost retrofit	Sum of monthly power averages	Ontario: 40 g CO2/kWh 0.17 metric tons : 1000 km	Ontario: 13 cents/kWh
Phase 1: Mall rooftop solar panels	Solar panels on mall roof 12 642 m ² of rooftop covered (Google Map estimation - setback and roof furniture reductions)	Solar Panel Cost: \$1.8 million Installation Cost: \$792 685 Total Cost: \$2.6 million	Solar Energy: 3.06 GWh	Total GHG Offset: 122.4 metric tons Equivalent km driven by the average car: 720 000 km	Cost Savings: \$397 796 Payback Period: 6.5 years
Phase 2: Construction of solar awning above charging stations	Solar awning to over 8 parking spaces 11.2 m x 10.4 m of rooftop available (116.48 m ²)	Solar Panel Cost: \$16 388 Installation Cost: \$14 421 Total Cost: \$30 809	Solar Energy: 28.2 MWh	Total GHG Offset: 1.1 metric tons Equivalent km driven by the average car: 6 471 km	Cost Savings: \$3 665 Payback Period: 8.4 years
Phase 3: Retrofit of tall lamp posts with wind turbine and 2 solar panels + annual maintenance	46 tall lamp posts Height before retrofit: 12.3 m Height after retrofit: 15.8 m	Total Solar Cost: \$35 077 Total Turbine Cost: \$113 620 Total Cost: \$148 697	Solar Panels: 22.3 MWh Wind Turbine: 59.1 MWh Total Energy: 81.4 MWh	Total GHG Offset: 3.24 metric tons Equivalent km driven by the average car: 19 059 km	Cost Savings: \$10 531 Payback Period: 14.1 years
Phase 4: Retrofit of small lamp posts with wind turbine and 2 solar panels + annual maintenance	32 shorter lamp posts Height before retrofit: 6.4 m Height after retrofit: 8.9 m	Total Solar Cost: \$24 401 Total Turbine Cost: \$43 488 Total Cost: \$67 889	Solar Panels: 15.5 MWh Wind Turbine: 15.5 MWh Total Energy: 31 MWh	Total GHG Offset: 1.23 metric tons Equivalent km driven by the average car: 7 235 km	Cost Savings: \$3 991 Payback Period: 17 years

** Installation costs determined by working backwards from actual installation costs of Upper Canada Mall quote from RESCo Energy Inc.



They validated our cost analysis!

giga	G	1000000000	10 ⁹
mega	M	1000000	10 ⁶
kilo	k	1000	10 ³

Upper Canada Mall, Google Maps TOP VIEW
 Area calculations for rooftop solar panel installation



RESCo
 RESCo Energy Inc

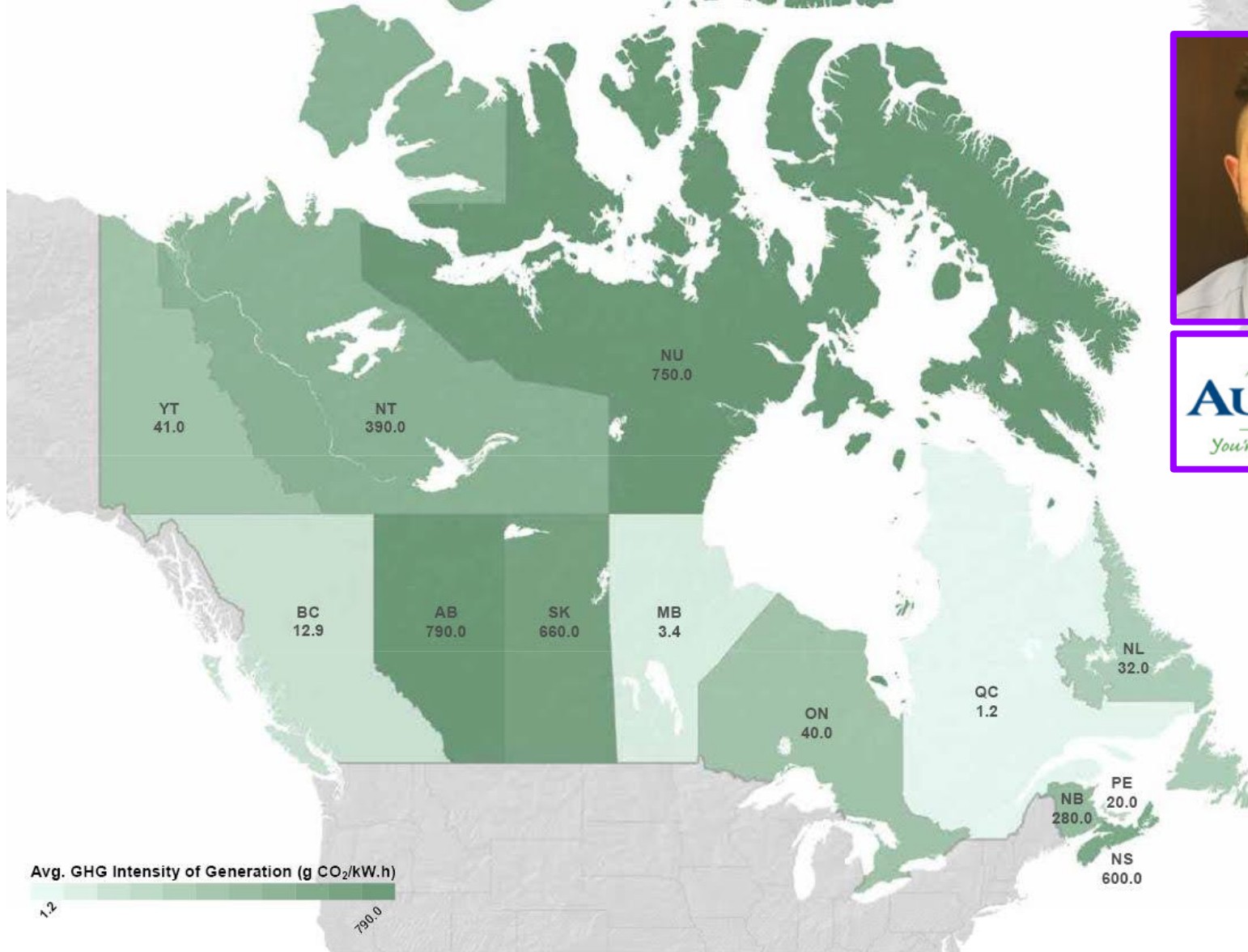
$$\text{Total cm}^2 = 7,13 + 3,9 + 3,6 + 5,28 + 5,05 + 9 + 7$$

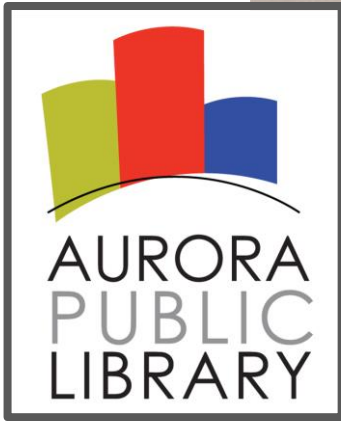
$$= 40,96 \text{ cm}^2$$

$$\text{Total m}^2 \text{ actual} = 40,96 \text{ cm}^2 \left(\frac{2777,8 \text{ cm}}{1 \text{ cm}} \right) \left(\frac{2777,8 \text{ cm}}{1 \text{ cm}} \right) = \boxed{316054439,5 \text{ cm}^2}$$

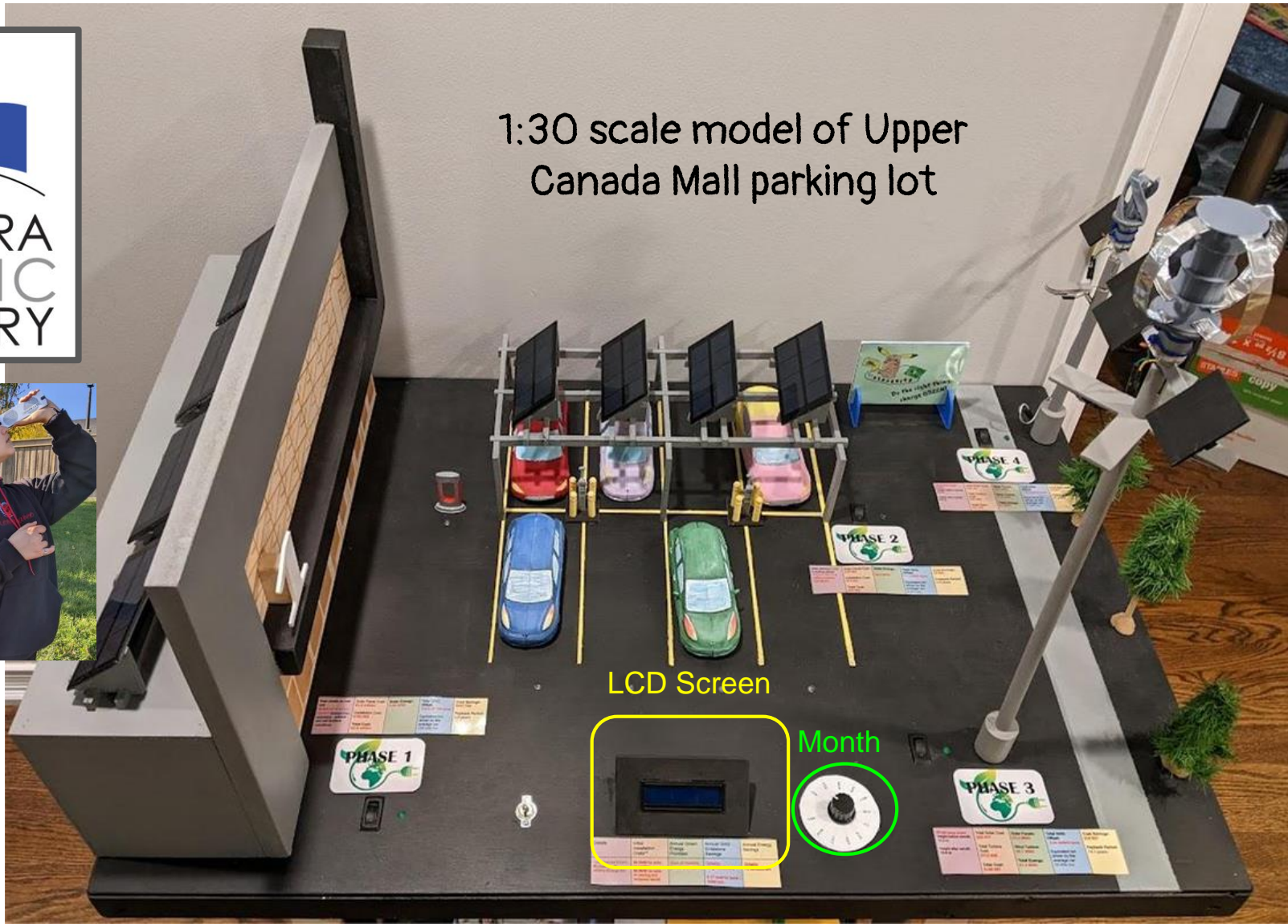
$$= \boxed{31605,4 \text{ m}^2}$$

50 m : 1,8 cm
 5000 cm : 1,8 cm
 2777,8 cm : 1 cm map
 actual map





1:30 scale model of Upper
Canada Mall parking lot



Proposed Green Energy Retrofits

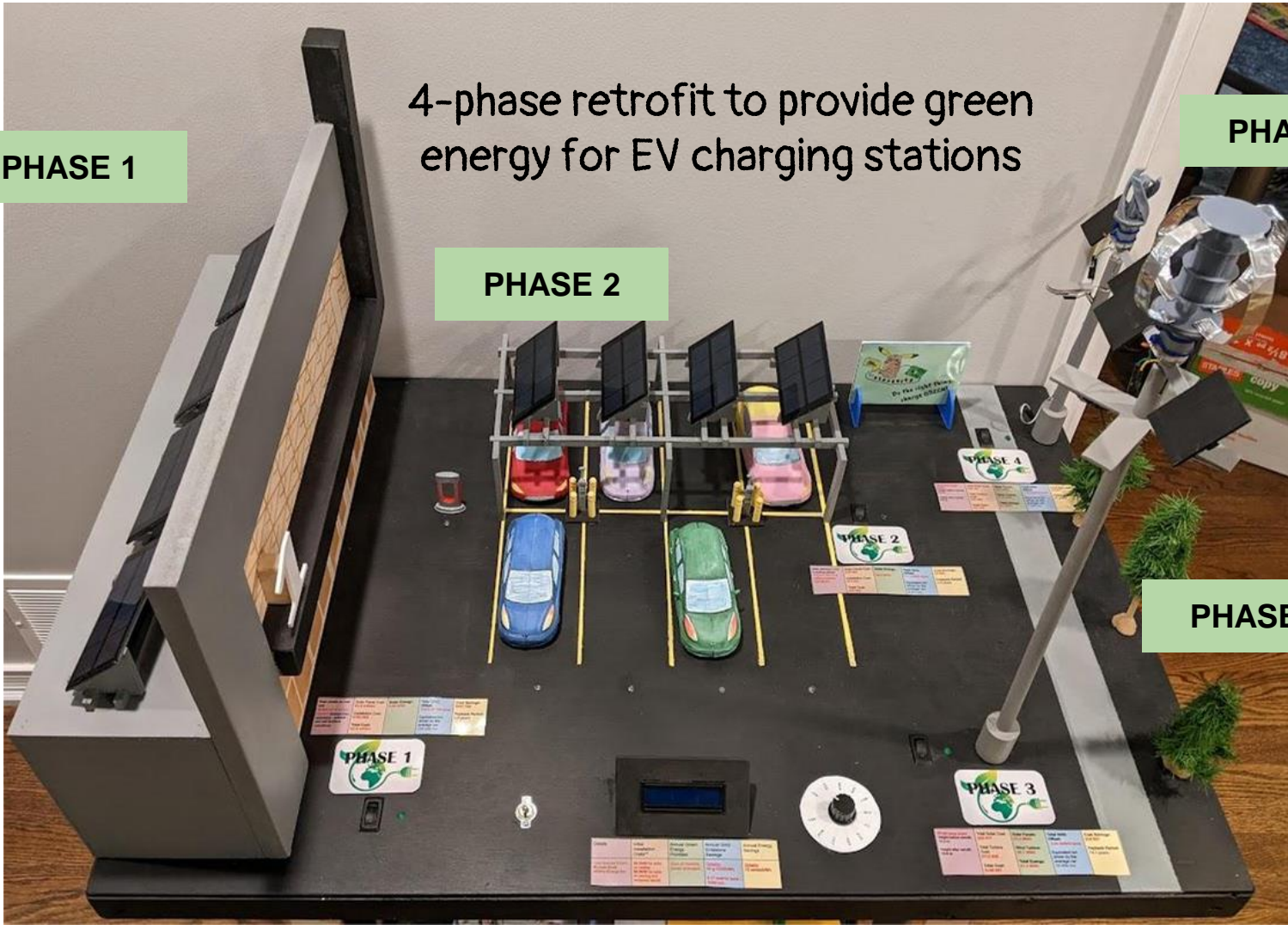
4-phase retrofit to provide green energy for EV charging stations

PHASE 1

PHASE 2

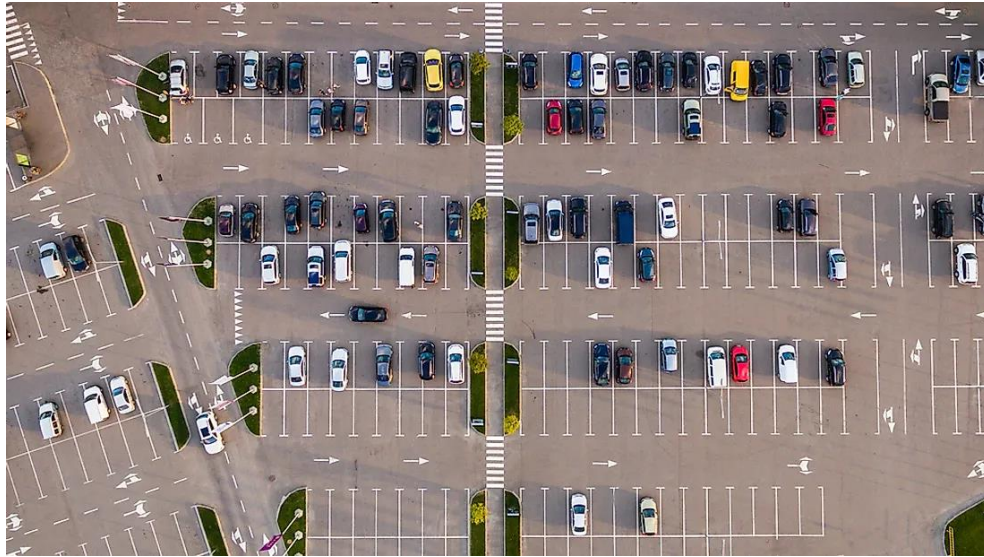
PHASE 4

PHASE 3



Seeing is believing!

Our switch to electric vehicles is only as green as the power used to charge them!

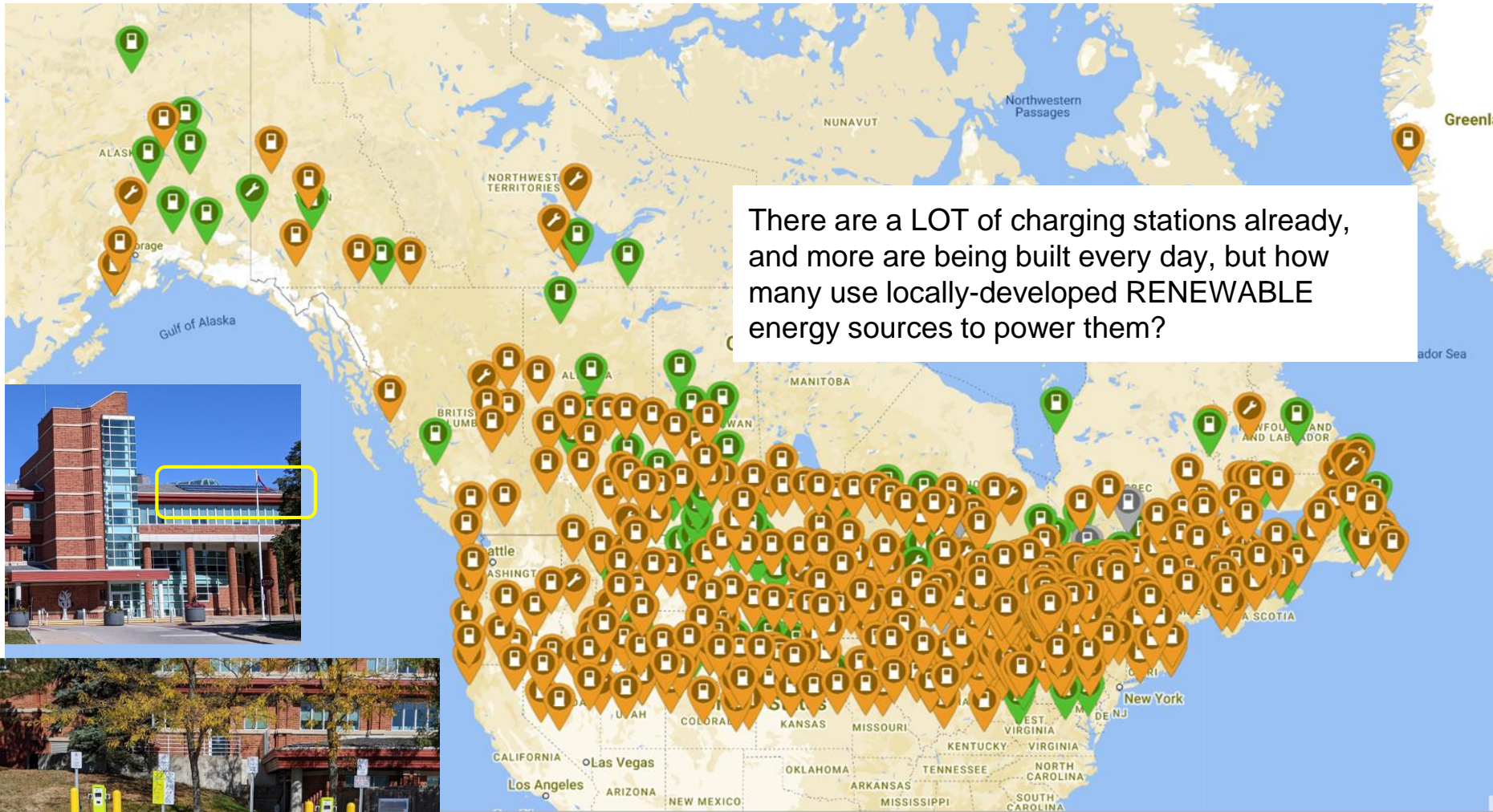


OXFORD



Oxford Properties is going to look into implementing our solutions at UCM and their other properties all over the globe!

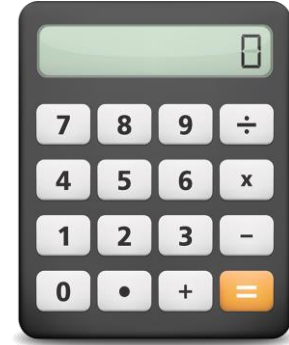




Teamwork Makes the Dream Work!



Green energy retrofit calculator



Would the Town of Aurora be interested in collaborating with us on this next step of our innovation project?



Spot the Robot

5 Runs (410 pts) ... *Perfect game!!*





FIRST LEGO LEAGUE RAZORBACK®

OPEN INVITATIONAL

May 18-21, 2023 • University of Arkansas • Fayetteville, Arkansas

10 robotics workshops offered
to **2** local elementary schools!



← **80** champion teams
from **12** different countries!

SPONSOR BENEFITS



Merci de la part de toute l'équipe!
Thank you for supporting our FLL team.

<p>Platinum Sponsor</p> <p>\$2000 +</p>	<p>Media coverage: Your company publicly thanked as a major sponsor Pit banner (displayed during competitions): Large logo of business Team flag: Large logo of business Team T-shirt: Large logo of business Team flyer: Large logo of business Other: Optional photo of sponsor with team members</p> <p>Listed in our team binders and on our team website, and thanked with a personalized thank you card at the end of our FLL season.</p>
<p>Gold Sponsor</p> <p>\$1000 - \$1999</p>	<p>Pit banner (displayed during competitions): Medium logo of business Team flag: Medium logo of business Team T-shirt: Medium logo of business Team flyer: Medium logo of business</p> <p>Listed in our team binders and on our team website, and thanked with a personalized thank you card at the end of our FLL season.</p>
<p>Silver Sponsor</p> <p>\$250 - \$999</p>	<p>Pit banner: Small logo of business Team flag: Small logo of business Team T-shirt: Small logo of business Team flyer: Small logo of business</p> <p>Listed in our team binders and on our team website, and thanked with a personalized thank you card at the end of our FLL season.</p>
<p>Bronze Sponsor</p> <p>\$100 - \$249</p>	<p>Team flyer: Small logo of business</p> <p>Listed in our team binders and on our team website, and thanked with a personalized thank you card at the end of our FLL season.</p>
<p>Team Supporters</p> <p>< \$100</p>	<p>We will include your name in our list of team supporters. Thank you!</p>

For more information about Équipe Francobotique, visit:
<https://sites.google.com/view/equipefrancobotique>

For more information about the FIRST LEGO LEAGUE Challenge program, visit:
<https://www.firstroboticscanada.org/fll/challenge/>

FLL Champions!!!!



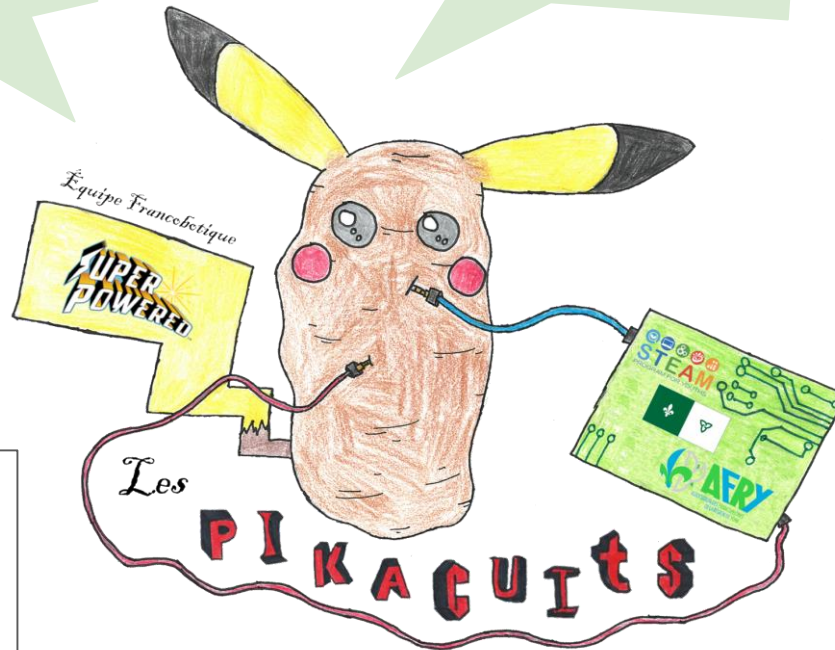
Les Pikacuits de l'Équipe Francobotique



Any feedback for us?

Any questions or suggestions?

Thank you for your time and your support.



Equipe.Francobotique@gmail.com

<https://sites.google.com/view/equipefrancobotique/>