



Excelway® **Madvac®**

2 Brands, ONE Great Company

exprolink

VEV

LN50 | LR50
all-terrain electric
litter vacuums



► Why care about city litter?



► Because it impacts everyone



Many independent studies have shown that overall direct and indirect cost of litter is much greater than what most of us imagine or suspect.

EXAMPLE: Keep America Beautiful 2020 study | <https://kab.org/>





City litter is ...



- Uncomfortable and unpleasant
- Can transmit bacteria and virus
- Lowers property value

- A safety hazard
- Turns away tourists
- Harmful for pets
- Pollutes natural resources

- Clogs drains and sewer channels
- Deteriorates city infrastructure
- Attracts insects and pests





Traditional litter removal methods



(excluding street sweepers)



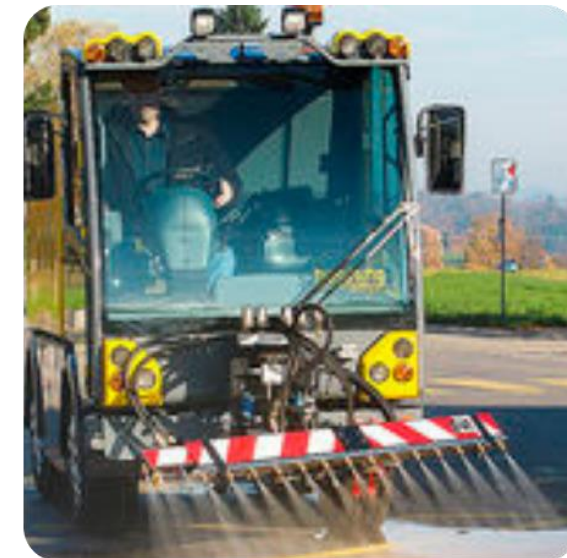
Manual picking
(demeaning work, slow,
inefficient, not safe,
need to find/manage
workers)



Walk-behind
vacuums (slow,
operator on his feet
all day, limited litter
capacity)



Blowing litter onto the
curb (slow, inefficient,
noisy, dust impact on
air quality, unpleasant
for pedestrians)



Water pressure (not
environmentally
friendly, increases
pollution in the
waterways, constant
need to replenish
water tanks)

► Why consider VEV⁺



Our unique Vocational Electric Vehicles (VEV) are specifically designed to remove litter and debris in areas that big street sweepers and other equipment are unable to access or manage.

Parking lots	Sidewalks & curbs	Parks	Bus shelters
Bike trails	Pathways	Alleys	Pedestrian lanes
Public markets	Plazas	Alongside buildings	Fence lines



► About LN50 | LR50 VEV⁺

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- All units built in Montreal
- Easy to operate, no CDL required
- Designed to handle poor climate conditions including rain
- Can vacuum litter that is dry, humid, or wet
- Equipped with dust control elements that preserve air quality
- Have a multitude of operator safety features





In 2021, Exprolink launched its 2nd generation of electric LN | LR50 all-terrain litter vacuums. These truly unique VEV's are the only 48-inch wide, ride-on litter vacs in the world. No similar model exists on the market. Both LN | LR50 can effectively **replace 6 to 8 manual litter pickers**. (identical volume of litter removed within same work-shift)

LN50



LR50





LN50 vs. LR50



LN50 and LR50 is the **same machine** with the following differences: LN50 has a small overhead sunshield, LR50 a full rooftop, front windshield, and vinyl side doors. Because of the closed cabin, LR50 is **104"** tall (2641 mm) compared to **92"** (2337 mm) with LN50. LR50 can be equipped with an optional small fan to keep operator cool during hot weather and a rear-view camera. (not LN50)





LN50 vs. LR50



LN50 has a hydraulic assist up/down for the suction boom – some physical effort is required to displace the boom from side to side. LR50 has a **6-positon robotic joystick** - operator can easily move the boom in any direction with **no physical effort required**. LR50 has better reach with max. boom distance away from the machine at 72" (1829 mm) versus 50" (1270 mm) with LN50. Bottom of suction hose max. lift above ground is 52" (1321 mm) with LR50 compared to 26" (660 mm) with LN50.





Battery pack



LN | LR50 is powered using **Lithium-Ion NMC batteries**. The batteries are secured underneath the operator seat (2 batteries | **104 volts nominal**) The battery pack powers two, 3-phase motors: for the **vacuum fan**, and **propulsion system**. (DC 104V to AC using inverter) LN | LR50 units are rear-wheel drive vehicles.





Operator safety VEV⁺



All cabin electronics, controls, movement of the hydraulic vacuum arm, optional front vacuum head, and other machine components operate on a **12-volt circuit** – safe for the operator. (104V batteries to 12V using DC to DC converter)





	Acid	LiFe Po	Li NMC *
Energy avail (kwh)	24	24.5	28.8
Weight (lbs)	1620	661	353
Energy (wh/lb)	15	37	82
Energy (wh/cu.in.)	1.31	2.13	5.74

3 times better “energy per weight and volume” ratio in the industry



14.4 KWh



ZERO VEV⁺
MOTORCYCLES[®]

Exprolink is a OEM partner with Zero Motorcycles USA – the “*Tesla of the electric motorcycle*” and integrates their technology and components (Battery: NMC* lithium nickel manganese cobalt)








ZERO components in LN | LR50: Battery pack, on-board charger, vacuum fan and propulsion motors, DC-DC converter, DC-AC inverter





Industry ranking



	Model	Tehnology	Energy avail (KwH)	Weight (kg)	Energy (WH/kg)
	LN50	Li NMC	28,8	1140	25,26
	LS125	Li NMC	72	2538	28,37
	5 eSeries	LiFe PO4	100	6500	15,38
	D.zero2	LiFe PO4	76,8	3650	21,04
	500 ZE	Li-ion	29,5	1970	14,97
	Electra 1.0	Pb-acid	29,8	1800	16,56
	Electra 2.0	Pb-acid	48	3100	15,48
BUCHER	Citycat V20e	LiFe	54,4	2700	20,15
BUCHER	Citycat VS20e	LiFe	45	2500	18,00





If used 20 hours per week (1000 hrs/yr.), each electric LN | LR50 will reduce Co2 emissions by approximately **17 tons / year**. For cities that have several machines, the long-term environmental impact is undeniable and significant.



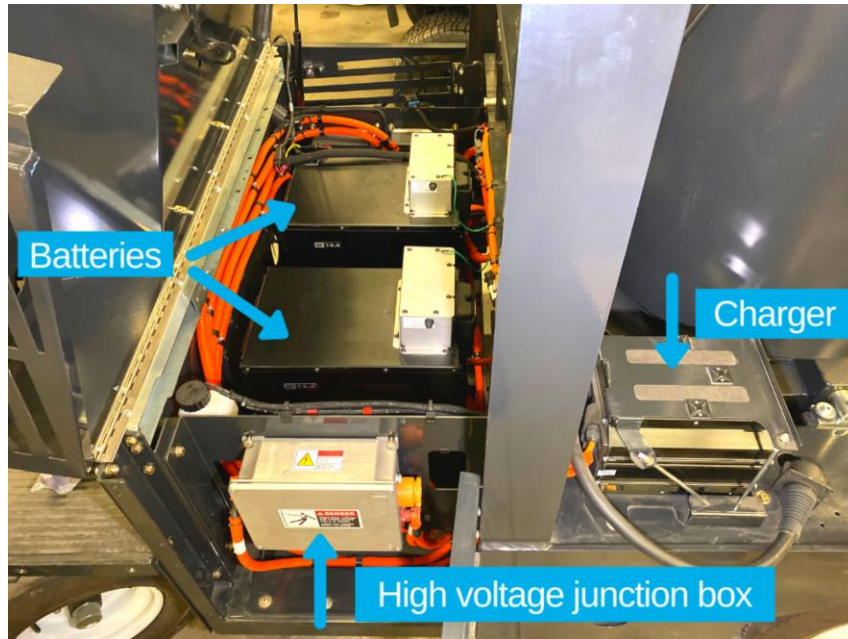


NMC batteries are reliable and long-lasting: Their drop in efficiency is slow and occurs over a long period of time. Regardless of usage, approximate lifespan of LN | LR50 units is **8 to 10 years** – the batteries **will never need replacement**.





LN | LR50 have an **on-board charger**, **high voltage junction box**, and **battery pack**. The junction box acts as a distribution panel receiving and transmitting electric power from the machine's different components (both 104V batteries and 12-V circuit). The charger, junction box, and battery pack are linked and communicate with one another using a CAN bus integrated network.





Charging **VEV**



LN | LR50 can be charged by plugging to a **120-volt wall socket** or using a **level 2 (240V/24A) electric car standard plug SAE J1772**. Regardless of the method used, the on-board charger / high voltage junction box maximum feed to the battery pack is **6 KWh**.



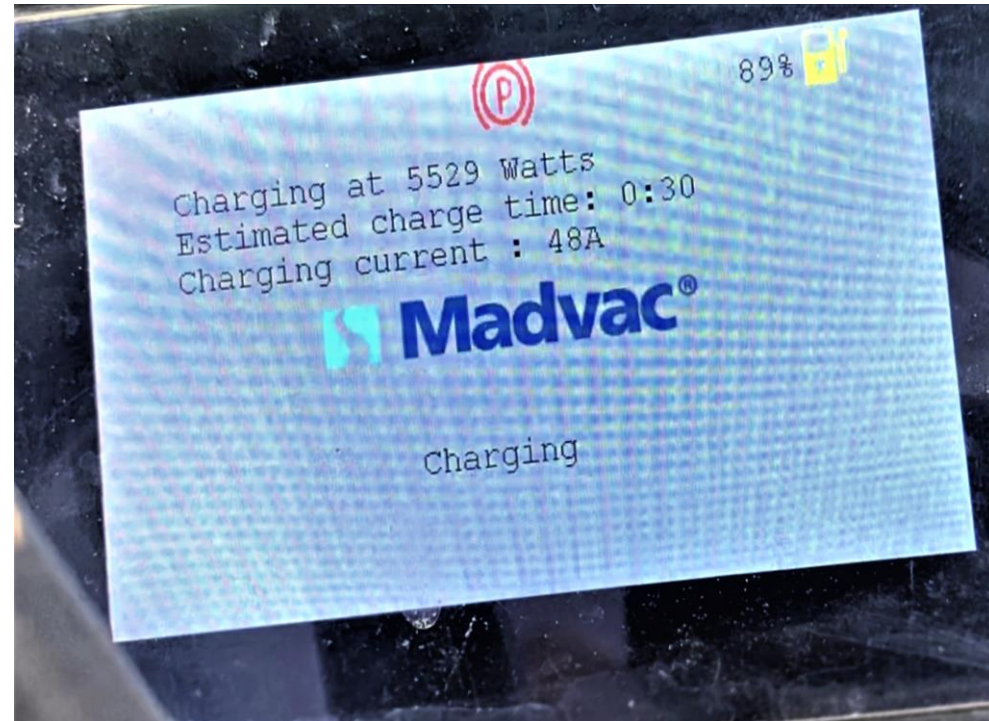


If end-user charging stations do not use J1772 plugs, **adapter plugs can be purchased and installed for J1772 compatibility** with LN | LR50. (Note: Exprolink does not provide these adapters and is not liable should the adapters fail and damage the machine)



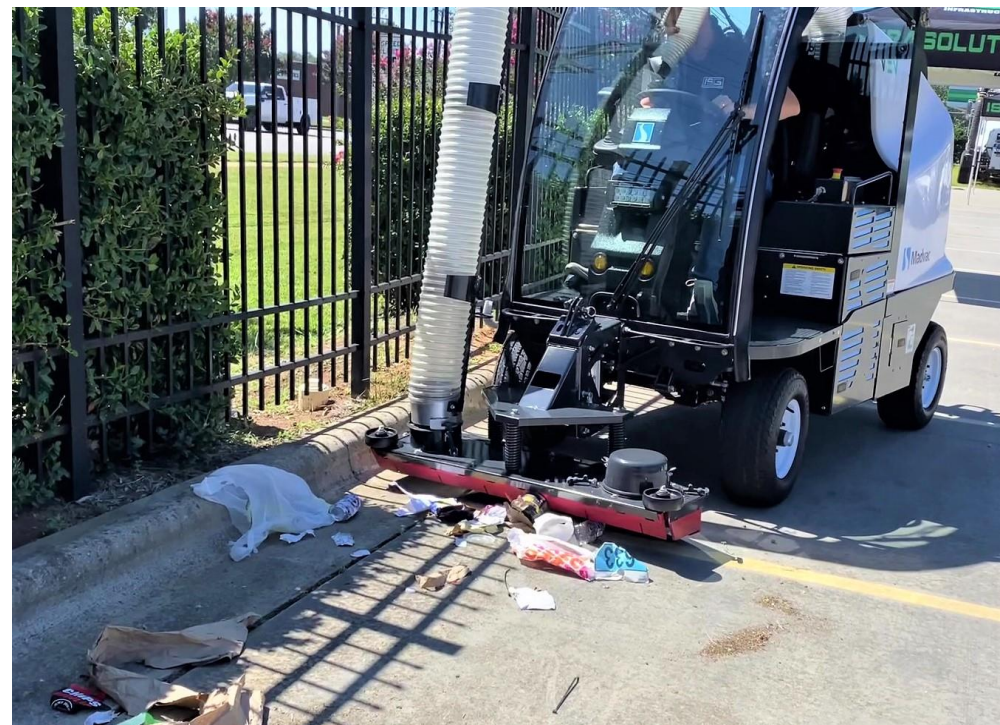


Since the battery pack is 28.8 KW and maximum charging is 6 KWh, a fully depleted battery pack will charge to capacity in approximately **5 hours**. If charging is done using a 120-volt wall socket, approximate charge time will be **15 to 18 hours**.





Though several variables may impact autonomy, if operator has the vacuum fan ON roughly 60 to 75% of the time during work shift, a fully-charged battery pack will provide sufficient power for **up to 9 hours of autonomy**.





Vacuum power VEV⁺

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Excessive vacuum power to collect light litter is a waste of energy and drains the batteries. For this reason, LN | LR50 standard suction power is **1300 CFM** (3000 RPM). If more vacuum is needed, **both models have a boost mode** that increases power to **1800 CFM** (4000 RPM). Operator can press and hold down boost mode button for max. 30 sec. operation. Once released, boost mode can be reactivated within max 30 sec.

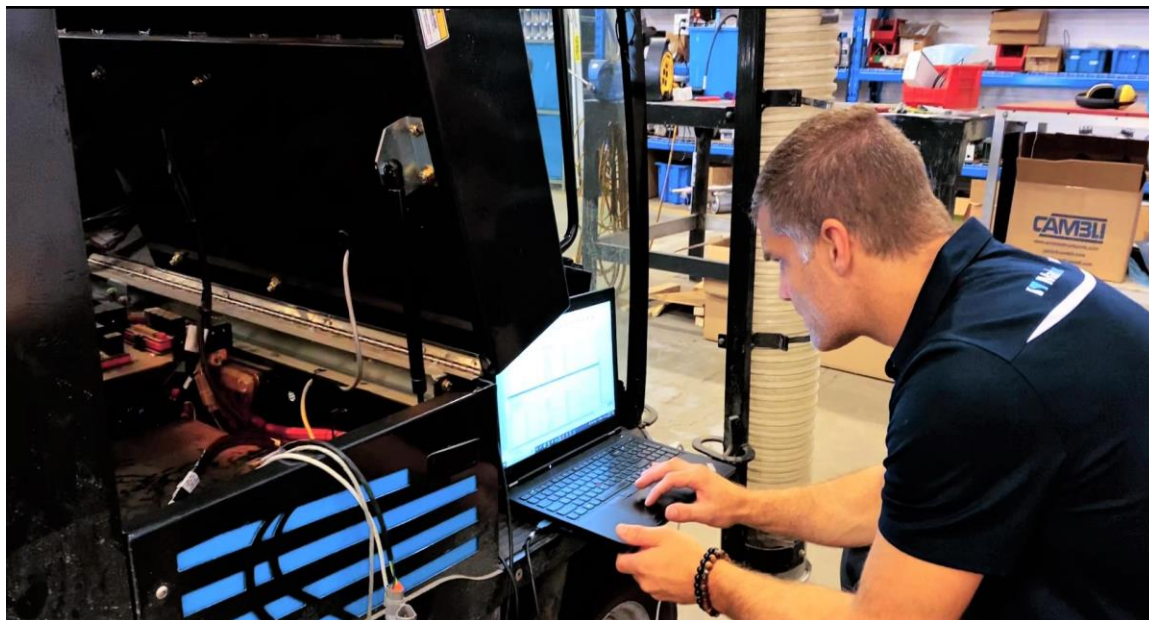




Troubleshooting VEV



Our certified technicians can easily connect to LN | LR50 units out in the field. Diagnostic cables are provided by Exprolink which end user uses to connect his/her laptop to the machine. Using Team Viewer (or similar software), technician takes control of the lap-top, then links to the machine's CAN bus system to retrieve critical info and potential error codes.



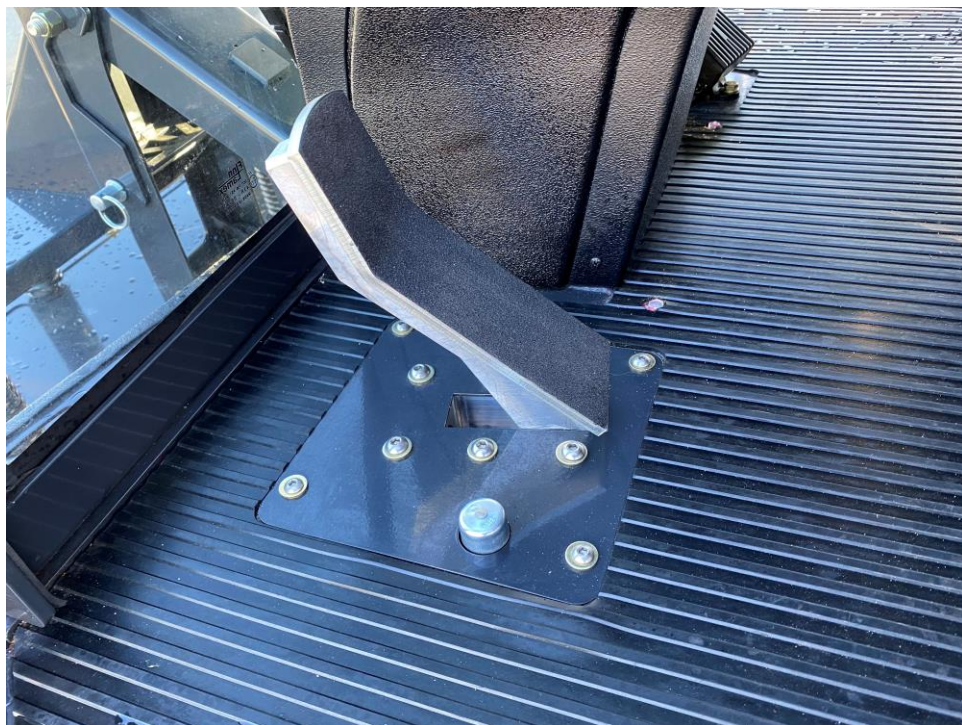


Easy to use VEV⁺

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Operating LN | LR50 is easy - a **CDL is not required**. Once inside the cabin, turn the ignition key, press down the brake pedal, turn OFF dashboard parking brake switch, press the drive button FORWARD or REVERSE, release brake pedal – and off you go!





LN | LR50 have **many built-in safety features** to keep operators and near-by pedestrians safe. For example, if the operator suddenly needs to get off his seat while working, the vacuum fan will automatically turn OFF.





Key benefits VEV⁺



- GHG reduction 17T of CO₂ per year (based on 20 hours of run time per week)
- Battery pack offers up to **9hr autonomy** (based on vacuum fan ON 60 to 75% of the time during work shift)
- Ability to **charge using standard wall socket** (no charging infrastructure required)
- Battery life span 1500 cycles or **8 to 10 years**, retaining 80% of charge





Key benefits VEV⁺

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- Battery pack **99% recyclable** instead of being disposed at landfill
- dB rating **15% lower** than diesel model for greater operator comfort
- Vacuum boost mode offers **better suction power** than diesel model
- Higher torque / **more available power for inclined surfaces** than diesel model
- **Can be used indoors** for applications not suited for fuel engine machines





Taking into account key variables such as:

- Price difference between electric LN | LR50 versus diesel version
- Parts & maintenance
- Labor rates
- Rising fuel prices, etc.

ROI electric versus diesel is approx. **3 years** (based on 1000 hours of usage per year or 20 hours/week)





- 🌀 Litter capacity: 75 gal. (284L)
- 🌀 Approx. 15% lower dB than LN50 diesel
- 🌀 Overhead sunshield
- 🌀 Boom up/down hydraulic assist
- 🌀 Litter collection in bags or Kevlar bin
- 🌀 Optional 15-foot retractable wander hose for hard-to-reach areas
- 🌀 Optional 48-inch-wide vacuum head – simply drive over litter



Watch LN50 - **Electric** video





- ⚡ Litter capacity: 75 gal. (284L)
- ⚡ Approx. 15% lower dB than LR50 diesel
- ⚡ Full rooftop, front windshield, vinyl side doors
- ⚡ Boom 6-position robotic joystick – effortless displacement
- ⚡ Litter collection in bags or Kevlar bin
- ⚡ Optional 15-foot retractable wander hose for hard-to-reach areas
- ⚡ Optional 48-inch-wide vacuum head – simply drive over litter



Watch LR50 - **Electric** video



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For additional information on LN | LR50 and other Madvac models
visit [Madvac.com](https://www.madvac.com)

 **Excelway**®

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maintenance vehicles [Excelwayusa.com](https://www.excelwayusa.com)