

EV Charging Infrastructure in Lebanon

Market dynamics, decentralized energy grids, and critical safety challenges.

Agenda

- F EV public Infrastructure timeline in Lebanon
- F Challenges
- F Opportunities
- F Recommendations

EV public Infrastructure timeline in Lebanon

The development of electric vehicle infrastructure in Lebanon since 2019 is unique globally: it was not driven by state planning or utility incentives, but rather by the collapse of the national electricity grid (EDL), severe fuel shortages, and a subsequent massive boom in private, decentralized solar energy.

Early Adoption & The Catalyst of Crisis 2019-2020

Following early pilot chargers introduced by MEDCO and Navitas Technology in late 2018, EV adoption remained minimal (fewer than 800 vehicles nationwide). However, the onset of the severe financial crisis, coupled with the beginning of chronic gasoline shortages and hyperinflation of fuel prices, began shifting consumer interest toward alternative mobility.

The Decentralized Solar Revolution 2021 – 2022

As the state grid collapsed to providing only 1-2 hours of electricity a day, Lebanon experienced an unprecedented boom in private solar PV installations (adding an estimated 500 MW in 2022 alone). This decentralized energy matrix suddenly made home EV charging highly viable and cost-effective, effectively solving the "fuel" problem for private homeowners.

Professional Expansion in Private Charging 2022

Recognizing the critical need for safe, engineered charging solutions against unstable local microgrids, engineering firms stepped in. Navitas Technology officially expanded its operations into the EV sector, scaling up the deployment of smart, load-balanced private chargers across residential and commercial properties.

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First Off-Grid Fast Charging Station July 2022

Recognizing that public charging could no longer rely on the national grid, IPT launched Lebanon's first fully solar-powered DC fast charger at its Amchit Sustainable Station. Using a 50kW charger backed by a dedicated solar microgrid, it proved that high-power public EV infrastructure could bypass EDL entirely.

Semi-Public Urban Hubs (ESCWA)

2023

As the need for daytime commuter charging grew in urban centers, Navitas Technology successfully installed dedicated semi-public EV charging infrastructure in the underground parking facilities of the UN ESCWA headquarters in Downtown Beirut, setting a precedent for institutional EV integration.

Electric Public Transit Debut

May 2026

Infrastructure deployment expanded beyond private vehicles with the launch of Lebanon's first public intercity electric bus service connecting Jbeil and Beirut, marking a new phase for the public transportation sector.

Challenges to EV Chargers home adoption

1. The Overnight Residential Demand Spike

Because the public charging network is limited and the national grid (EDL) is practically non-existent, every single buyer of an exempted EV instantly required a home charging setup. The tax breaks transformed EVs from a luxury niche into a mass-market economic choice for the middle class seeking to escape exorbitant gasoline prices. This overnight surge created massive, desperate demand for Electric Vehicle Supply Equipment (EVSE).

2. The Regulatory Blind Spot at the Port

While the government heavily incentivized the *vehicles*, the customs and standards authorities (like LIBNOR) failed to establish parallel regulations for the *charging hardware*. Customs agents processed EV chargers as generic electronic accessories rather than critical, high-power electrical infrastructure. Because there was no requirement to prove CE, UL, or IEC 61851 compliance at the border, the floodgates opened for unregulated hardware.

Challenges to EV Chargers home adoption

3. The Dealership "Freebie" and the Gray Market

- F To capitalize on the EV boom and close sales rapidly, many independent car dealerships and gray-market importers began purchasing unbranded, ultra-cheap Level 2 AC chargers from overseas to bundle as "free" add-ons with the vehicles.
- F To achieve a rock-bottom price point, the manufacturers of these generic chargers deliberately stripped out critical internal safety components:
- F **No DC Leakage Detection:** They omitted the integrated 6mA DC protection, meaning these chargers absolutely require an expensive Type B RCD on the home's panel—which users almost never install.
- F **No Thermal Monitoring:** They removed internal temperature sensors that would normally throttle the charge if the terminal blocks begin to overheat during a 10-hour cycle.

Challenges to EV Chargers home adoption

4. The Race to the Bottom in Installations

- F This flood of cheap, unprotected hardware met an installation market eager to capitalize on the boom. Cost-conscious consumers, having just spent their budget on the car, frequently bypassed specialized EV integration firms and hired general, uncertified electricians.
- F Instead of deploying a proper smart energy management ecosystem, these installers treated the EVSE like a standard water heater. They simply mounted the cheap wall boxes, wired them into standard Type AC breakers without surge protection, and completely ignored continuous load derating, introducing massive fire and shock hazards into Lebanese residential buildings.

PUBLIC INFRASTRUCTURE

Private Fuel Providers Lead the Transition

-  Corporate Operators: MEDCO and IPT deploy national fast-charging networks.
-  Geographic Bias: High concentration in Greater Beirut and coastal highways.
-  Off-Grid Sites: Direct integration with commercial solar canopies to bypass EDL.





THE TRUE BACKBONE

Decentralized Private Charging

The vast majority of EV charging occurs behind-the-meter, driven by the residential solar boom.

Solar Integration

Direct charging from hybrid inverters during daylight PV production.

The Private Generator Dilemma



Hard Amperage Caps

Strict 5A/10A limits. Standard chargers instantly trip ATS breakers.



High Distortion (THD)

Dirty generator power causes EV rectifiers to reject the charge.



Load Balancing

Mandatory smart throttling to keep total load under thresholds.



Challenges

Unregulated hardware and unqualified technicians driving systemic risk.

The Market Divide: Hardware Quality

Substandard Imports

- ✗ No DC fault detection (Blinds AC RCDs).
- ✗ Missing internal surge protection.
- ✗ Inadequate thermal design for continuous load.

Certified Ecosystems

- ✓ Integrated Type B RCD / 6mA DC detection.
- ✓ Robust voltage spike isolation.
- ✓ IEC 61851 compliant components.

Uncertified Installation Risks



The Appliance Misconception

Treating a 10-hour continuous load like a simple water heater leads to thermal runaway and melted terminals.



Sensor & Network Errors

Reversed CT clamps or incorrect Modbus wiring completely disables dynamic load balancing.



Bypassed Protections

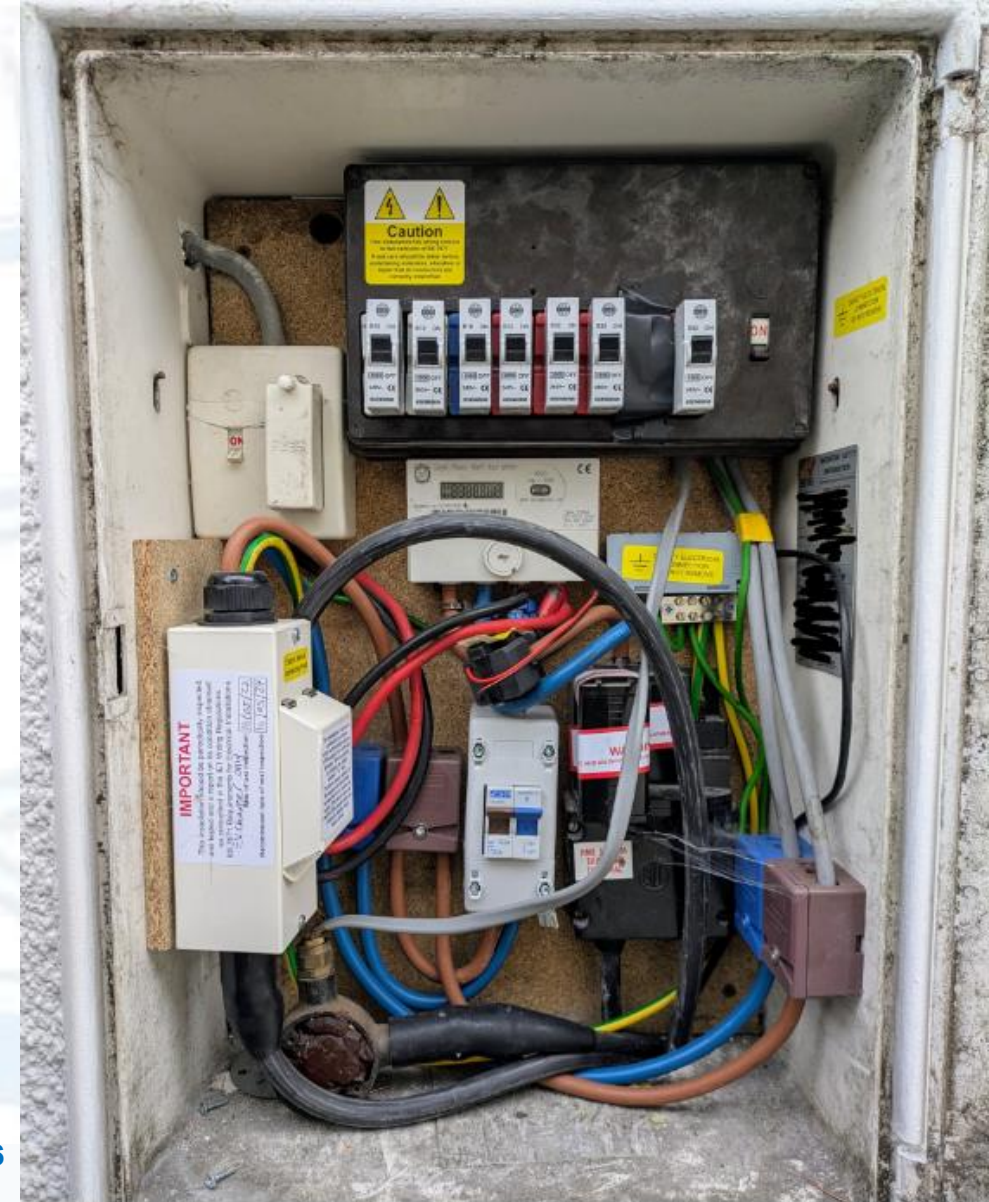
Technicians frequently disable internal ground-presence checks to force chargers to work on ungrounded sites.

CRITICAL RESIDENTIAL RISK

Missing Earthing Infrastructure

A large portion of residential buildings lack a proper earthing pit, creating severe shock hazards.

- Smart chargers detect missing grounds and lock out.
- Amateur installers bypass this safety mechanism.
- Leaves the vehicle chassis lethally exposed.



The Path Forward

Sustainable EV adoption requires strict hardware certification and mandatory dynamic load integration.

QUESTIONS & DISCUSSION

Opportunities ahead

1. The Retrofit and Safety Audit Aftermarket

- F Because of the massive influx of cheap, uncertified chargers following the 2024 customs exemptions, failure rates are inevitably going to spike.
- F **The Opportunity:** There is a massive emerging aftermarket for professional engineering firms to conduct safety audits, replace melted "dumb" chargers, and upgrade residential setups with smart, load-balancing ecosystems (Modbus meters, CT clamps, and proper Type B RCDs).

2. Commercial Charging Hubs via the New DRE Law

- F In late 2023, Lebanon ratified the **Distributed Renewable Energy (DRE) Law (Law No. 318/2023)**, which officially allows decentralized renewable energy production and peer-to-peer energy trading for private sector projects up to 10 MW.
- F **The Opportunity:** Investors and engineering firms can now legally build independent, 100% solar-powered EV fast-charging hubs and sell the electricity directly to consumers or neighboring businesses, entirely bypassing Electricité du Liban (EDL).

Opportunities ahead

3. Vehicle-to-Home (V2H) as the Ultimate Backup

- F Lebanon has installed roughly 1,000 MW of private solar panels over the last few years, but nighttime energy storage (home lithium batteries) remains prohibitively expensive. An electric vehicle is essentially a massive, rolling battery.
- F **The Opportunity:** As bidirectional charging (V2H) becomes standard on new EVs, Lebanese homeowners will be able to charge their cars at work (like the ESCWA parking) or via daytime solar, and then plug the car into their house at night to power their home appliances, effectively eliminating the need for a private generator (*eshtirak*) subscription.

Opportunities ahead

4. Institutional and Fleet Electrification

- F The success of institutional deployments—like Navitas Technology's project at the UN ESCWA headquarters and the UNDP-backed electric public buses in Jbeil—proves that large organizations are ready to transition.
- F **The Opportunity:** Delivery companies, universities, and corporate fleets are currently bleeding money on diesel for their vehicles and generators. Designing comprehensive B2B microgrids (Solar Canopy + Commercial EV Fleet Chargers + Energy Management Software) offers the highest Return on Investment (ROI) in the current market.

THANK YOU

