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Transforming Energy Sectors Globally

LEVERAGED PARTNERSHIPS

Electric Vehicle Charging Regulation

A Snapshot of International Experiences and a Case Study from the Dominican Republic

Electric vehicles (EVs), especially when combined with renewable energy, have great potential to decarbonise the transportation sector. Global political support has led to a strong increase in EV sales, resulting in electricity network integration challenges. However, electrification of transport still remains a global challenge, and requires financial incentives as well as policies and regulations to provide clarity and guidance to all stakeholders.

In the specific case of EV charging, appropriate regulation should support user-friendly and grid compliance in an investment-friendly environment, while restricting charging opportunities as little as possible, hence fostering the development of public charging infrastructure that alleviates range anxiety. Such regulation has already been established in some countries, for example in Norway, China, and the Netherlands.

Complete regulation of EV charging should cover at least the **grid code, authorisations, and legal aspects**, although not necessarily in a single document. While the exact scheme depends on the structure of the country-specific electricity system, regulated inputs are displayed in the following graphic.

GOBIERNO DE LA REPÚBLICA DOMINICANA
ENERGÍA Y MINAS

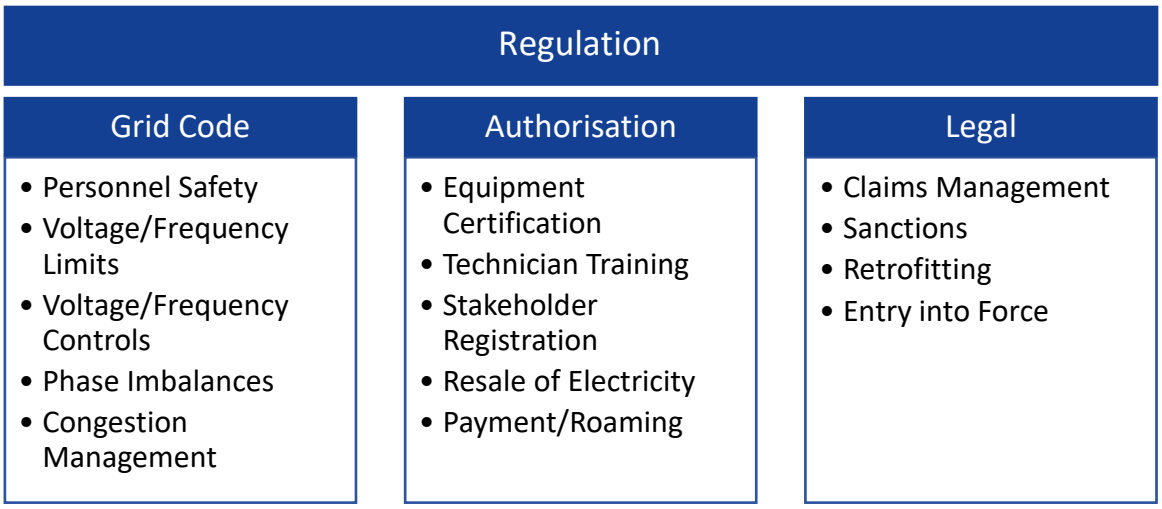
Proyecto Transición Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Fomentado por:
Ministerio Federal de Economía y Protección del Clima
en virtud de una decisión del Bundestag alemán

IKI INTERNATIONAL CLIMATE INITIATIVE

GENERAL REGULATORY DESIGN



In bundled power systems, one entity is responsible for generation, distribution, transmission and sometimes also the sale of electricity. Regulatory development is mostly guided by this same entity. Typically, only one document is established, and public stakeholders are only involved at the end of its development, which may result in rapid regulatory development provided there is a willingness to break with existing routines. To this end, capacity building of critical stakeholders on the need and benefits of regulation is crucial early in the process in order to establish support throughout the regulation development process. Trusted external partners can provide a neutral perspective to increase political support.

In unbundled power systems, each regulatory aspect is usually developed individually in working groups with industry and regulatory stakeholders. The goal is to keep the competitive environment intact as much as possible, while setting needed operation standards. Regardless of the electrical system structure, its regulation must consider the specific aspects of each country, while remaining as close as possible to international standards to facilitate the integration of equipment.

GRID CODE ASPECTS

Electricity grid aspects cover all technical characteristics for grid reliability and safety, in a context of increasing EV infrastructure needs. International standards define the necessary design parameters quite well, but sometimes require country-specific adjustments. For example, internationally standardised temperature ratings of charging stations had to be increased for the specific conditions of India in order to accommodate the extreme summer temperatures found in some parts of the country.

Grid code aspects can be further divided into personal safety and grid safety aspects. Personal safety aspects ensure that the person charging the EV will not be at risk of electrocution during operation. Measures include charging cables that are voltage-free until securely plugged into the vehicle and ingress protection for charging stations. Exact safety definitions are available in international standards, followed by all professional charging station manufacturers, installers, and grid operators.

Grid safety aspects, on the other hand, depend on the country in question. Limits need to be adjusted to the specific power system. Measures include voltage and frequency limits, voltage and frequency control, and phase imbalances. Furthermore, grid congestion management should be included in EV regulations. Installation of a charging station should require grid operator approval if a certain capacity is available at a specific location. The exception is the connection to the low-voltage grid. In this case, the user is not required to obtain capacity approval from the grid operator, in case charging power is below a certain limit, typically in the range of 2.3-11 kW. Also, the regulation of EV charging may define the right of the grid operator to request smart charging prior to granting grid connection.

AUTHORISATION ASPECTS

Charging point operation should require certain certification steps to ensure that technical and commercial standards are met. Charge point operators (CPOs) should only use certified equipment and installation must be carried out by a certified technician. Depending on the country and the charging power in question, additional registration would be required, as well as an inspection and maintenance plan. In the case of commercial operation, the CPO will usually need to register as a business. For public charging, all stations should be incorporated into a national public charging station register in order to give users an overview about the available public charging stations. Information should at least include the name of the CPO, location, the type of outlet, the available charging power, and the operating hours.

In addition, most countries currently define charging stations as end consumers of electricity, which prevents charging point operators from qualifying as electricity resellers. Consequently, charging is defined as a service, which may be billed on an energy-charged basis, although there are legislative differences between countries, depending on the energy law design. In countries that allow energy-based billing, energy metering must follow the calibration laws to ensure user confidence in correct billing. In addition, the source of electricity is usually regulated. Often, charging stations built with public funding must operate with renewable energy. Finally, most countries leave it up to the CPO whether the charging network is open to external vendors or not. So-called roaming can attract more customers, but there is an additional cost for connecting to a roaming provider. Normally, charging stations built with public funding must offer at least one ad-hoc payment method that does not require any contract with a CPO. Typically, at least in Europe, payment via pay-pal is offered, as it does not require the installation of an additional credit card terminal.

LEGAL ASPECTS

Finally, any regulation must cover legal aspects, either directly or linked to a broader legal framework. The main issues to include are claims management, sanctions, retrofitting and entry into force. Since charge point operators that do not receive operation approval could object to the resolution, proper claims management should hence highlight the necessary steps and deadlines to oppose a ruling. In case of non-compliance, the regulatory authority should have the right to intervene and eventually withdraw operating rights.

In case the EV charging regulation is developed late or receives a major update, the question of retrofitting arises. In principle, legacy equipment operation should remain possible so as to provide investment security. Smaller changes, such as registration in a national charging station registry, may remain mandatory. In case high-cost changes become unavoidable due to system security issues (refer to the 50.2 Hz problem in Germany), these should be accompanied by monetary support, considering that the regulator likely did not plan sufficiently. This ensures that stakeholders can design business models on the existing regulation without the risk of unforeseen expenses through regulatory changes. Finally, sufficient time must be granted until the new regulation comes into force, which is usually half a year.

The following short case study from the Dominican Republic highlights many of the concepts above, covering structure, grid, authorisation, and legal aspects of EV charging.

EV CHARGING REGULATION CASE STUDY FROM THE DOMINICAN REPUBLIC

Challenge: In recent years, Evergo, a private charging infrastructure manager (GIR, by its acronym in Spanish)[1] in the Dominican Republic, has started installing public EV charging infrastructure on a large scale in order to stay ahead of the market, even though there were no regulations or incentives in place. The lack of regulation meant that it was not possible to charge consumers for electricity, as only grid operators were allowed to do so. To overcome this obstacle, Evergo had been offering a parking service fee for the duration of time the client chooses to charge their vehicle and not selling the electricity consumed for charging. This has resulted in a quasi-monopolistic structure in public EV charging.

Solution: As a result, the Dominican regulator, the Superintendency of Electricity (SIE), partnered with GET.transform through the Energy Transition Project of GIZ in the Dominican Republic (funded by the Federal German Ministry for Economic Affairs and Climate Action) to develop an effective EV charging regulation with the publication of a report about electromobility. The objective was to provide a single regulation that covers all technical and tariff aspects of EV charging and provides equal charging access to all stakeholders. In order to get a widespread acceptance of the regulation and promotion in the electric mobility sector, the following organisations participated in the process and the trainings: the Superintendency of Electricity, the Ministry of Energy and Mines, the National Energy Commission, the National Institute of Transit and Transportation (INTRANT, by its acronym in Spanish) and distribution companies.

SIE's main expectations were to obtain better control and monitoring over the charging station deployment process, including establishment of a GIR authorisation scheme. SIE will ask GIRs to meet a number of requirements to be followed up with appropriate certifications. For example, *EV Roaming*, maximum demand and mitigation of network congestion ha become a requirement for all GIRs. They must also obtain an operation permit prior to installation of charging stations.

The main expectations of GIRs included continuous operation of existing charging stations and the possibility of billing recharging processes on an energy basis. Before to the current regulation, the only option of time-based billing limits business cases for EV charging. Consequently, and in line with international best practices, the report suggested defining EV charging as a service and the charging station as the end consumer of electricity.

[1] Recharge Infrastructure Manager (in Spanish "Gestor de Infraestructura de Recarga, GIR"), is the name received in the technical regulation of the Dominican Republic, and is the role internationally known as Charge Point Operator (CPO).

For EV drivers, competition among charging providers is desired to ensure the lowest charging prices. Regulation will therefore aim to ensure equal access to all stakeholders.

Results: Measures related to the safety of the Dominican Republic's electrical grid have been recommended as close as possible to international standards. Since the topology of the grid is similar to that of the United States, efforts have been made to establish the necessary limits accordingly.

SIE expects GIRs to comply with some retrofitting, including registration in the newly designed national registry of EV charging stations, an option to provide energy-based billing to EV drivers, and connection to at least one roaming hub provider. The suggested regulation was presented in a public audience to the stakeholders on 28 October 2022 and has been in force since 22 December 2022. The regulation (SIE-137-2022-REG) can be found in SIE website[2] and is very much based on the report[3] with recommendations and the proposal of GET.transform, Energynautics and the Energy Transition Project of GIZ. Therefore, the regulation also mentions the support provided by GIZ.

[2] The SIE regulation: SIE-137-2022-REG-Regl.-Tecnico-Est.-Recarga-Veh.-Electrico-ANEXO.pdf
[3] The full report (in Spanish language) can be downloaded here: GIZ_DomRep_REGULACIONES-Y-CONSIDERACIONES-TECNICAS_-ELECTROMOVILIDAD

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