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Planning of Emobility Transition Must be Dynamic!

Methodology for continuous planning of charging infrastructure in the face of uncertainty and change

Need and Impact

Charging infrastructure is the backbone of electromobility. Due to new charging behaviors and power distribution constraints, the ***energy demand and supply patterns of electromobility*** and the locations of ***current refueling infrastructure are misaligned***.

Infrastructure developers (CPOs, fleet operators, grid operators) ***need new methodologies and tools*** that help ***reduce*** *the* ***cost*** *and* ***risk*** of investments under the ***deep uncertainties of Transport Electrification (TE)***: access to grid capacity and real-estate and the effects of competition.

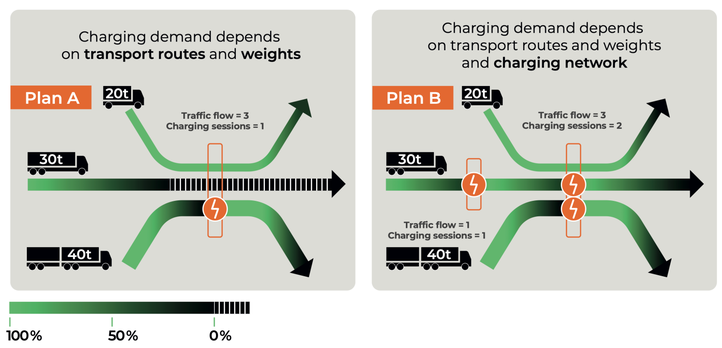
This will speed up charging infrastructure rollout, EV adoption and the green transition of the transport sector.

Approach

D*ynamic* ***A****daptive (****S****cenario)* ***P****lanning* in a ***S****patial* ***D****ecision* ***S****upport* ***S****ystem* with a ***D****igital* ***T****win* of an ***E****lectrified* ***R****oad* ***T****ransport* ***S****ystem*.

DT-ERTS and SDSS Components

- Route centric network design



- TE scenario = EV-, energy consumption-, charging (behavior) model + own or competing existing or planned stations
- Harmonized European datasets
- Multi-criteria evaluation & optimization

Past and Future Uses of Results

Result: SaaS platform to support the planning of public fast charging networks for freight and long-distance private car trips in 26 European countries.

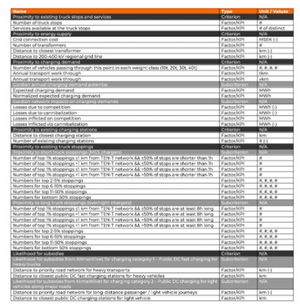
Past: In a competitive setting, used to plan the HDV charging network of a Nordic CPO. In a collaborative setting, used to evaluate the transport electrification impact of strategic charging network subsidies.

Future: Include in AFIR Observatory + extend with network resilience- and spatial sensitivity analysis functionality.

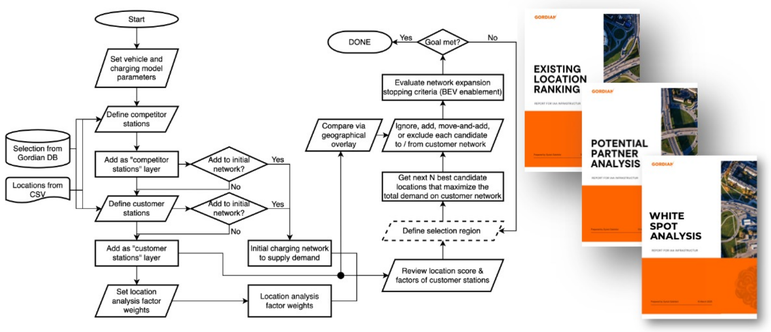
The study is titled "*Methodology for continuous planning of charging infrastructure in the face of uncertainty and change*" and is accepted for presentation and publication at TRA 2024.
Authors: Ehsan Saqib and Gyözö Gidofalvi

Harmonized, up-to-date datasets and site and network KPIs across Europe

Data	Sweden sources	Europe
Existing charging stations	Charge Finder	Charge Finder
Truck stops with services	TransPark	TransPark
Transport work	Trafikverket	Synthetic European Freight Flows and Routes based on ETIS Plus
Transport routes	Trafikverket - Swedish National Freight Model SAMGODS	Synthetic European Freight Flows and Routes based on ETIS Plus
Road network	Trafikverket	ETIS Plus / OSM
ACEA: Long Truck Stoppings	ACEA	ACEA
ACEA: Short Truck Stoppings	ACEA	ACEA
Country boundaries	OSM	OSM
Grid connection cost	Swedish Land Survey (Lantmateriet)	In progress
Transformers	Swedish Land Survey (Lantmateriet)	In progress
Grid 200 - 400 V	Swedish Land Survey (Lantmateriet)	In progress
Grid 25 - 200 V	Swedish Land Survey (Lantmateriet)	In progress
CC1: Priority road network for heavy transport	KlimatKlivet incentive	In progress
CC1: Public DC fast charging stations for heavy vehicles	KlimatKlivet incentive	In progress
CC1: Non searchable areas due to existing public DC fast charging stations for heavy vehicles	KlimatKlivet incentive	In progress
CC2: Priority road network for long-distance passenger journeys	KlimatKlivet incentive	In progress
CC2: Public DC charging stations for light vehicle	KlimatKlivet incentive	In progress
CC2: Non searchable areas due to existing public DC charging stations for light vehicle service areas	KlimatKlivet incentive	In progress
CC3: Urban areas - searchable areas for public DC charging for light vehicles within urban areas	KlimatKlivet incentive	In progress
CC3: Non searchable areas for public DC charging for light vehicles within urban areas	KlimatKlivet incentive	In progress
CC4: Non searchable areas for public AC charging for light vehicles within urban areas	KlimatKlivet incentive	In progress
CC4: Searchable areas for public AC charging for light vehicles within urban areas	KlimatKlivet incentive	In progress



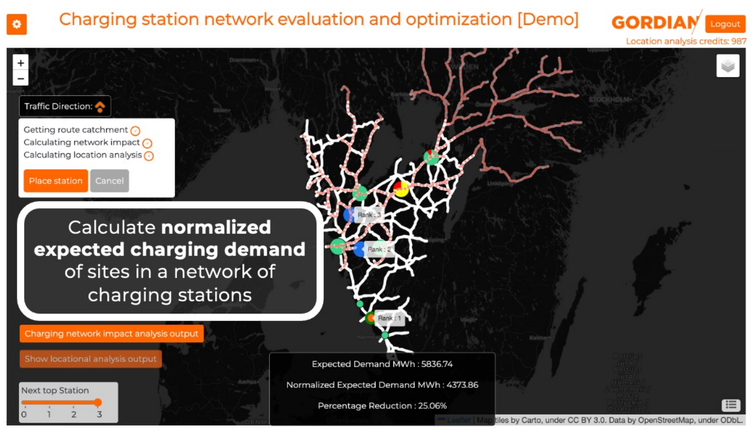
Simple interactive planning process for multiple scenario analysis types



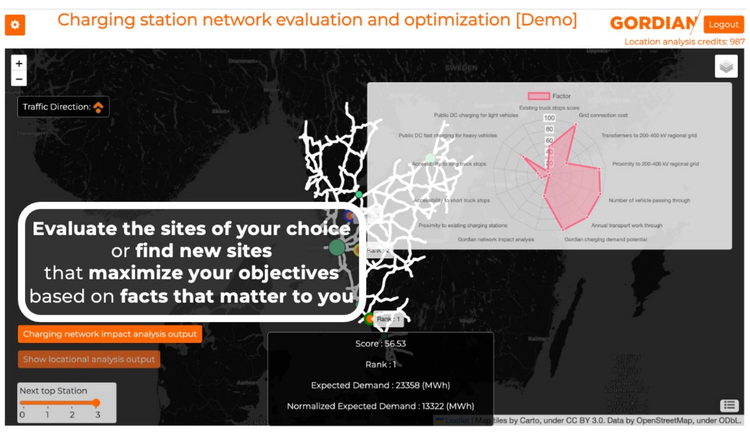
Features

- Manage and share multiple scenarios and plans for them
- Available for freight- and long-distance private car trips for all countries in Europe
- Extendable to other regions
- Target specific transport missions: regional vs international, medium vs heavy duty, freight vs private car
- Plan with official transport statistics and synthetic routes or bring your own data
- SaaS subscription plans by region and analytic capabilities

Charging network impact analysis



Multi-criteria network evaluation & optimization



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