

The logo for Elaadnl, featuring the company name in a blue sans-serif font with a yellow lightning bolt graphic under the 'l'.A photograph of two men in a laboratory setting. One man, wearing a white lab coat, is smiling and looking at a laptop held by the other man, who is wearing a dark suit jacket. The background is filled with various pieces of scientific equipment, including a large blue machine with 'helio' and 'FLEXIONW' visible on it, and another machine with 'erpuls' on it. The entire image has a green and blue color overlay.

**WELCOME TO THE ELAAD
TESTLAB, WHERE EV CHARGING
TECHNOLOGIES MEET!**

Who are we?



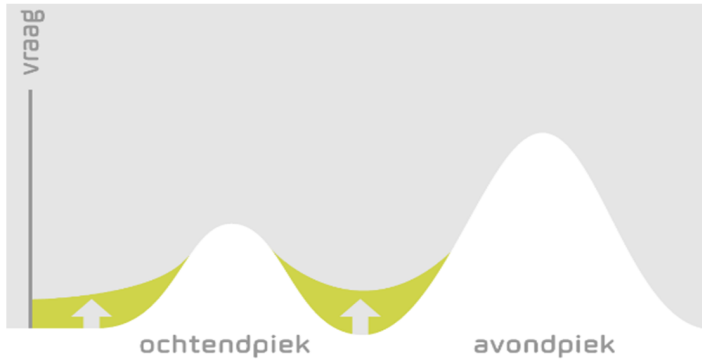
- Knowledge and innovation centre in the field of Smart Charging infrastructure in the Netherlands.
- Founded in 2009 by the Dutch grid operators.
- About 50 FTEs.
- EU largest testing site for Smart Charging.
- Promoting open innovation & open protocols.
- Pre-certification and pre -normative testing



Why do we test



Capacity of the grid

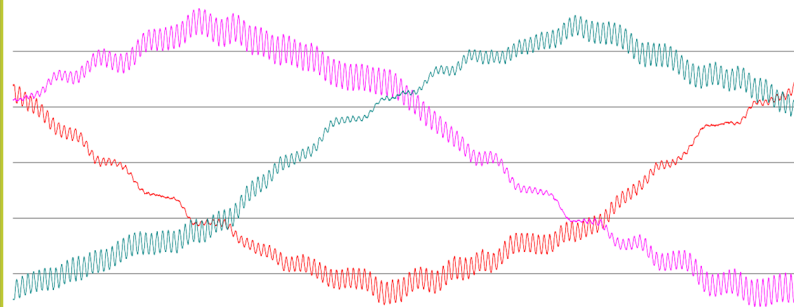


Interoperabiliteit

SMART CHARGING GUIDE

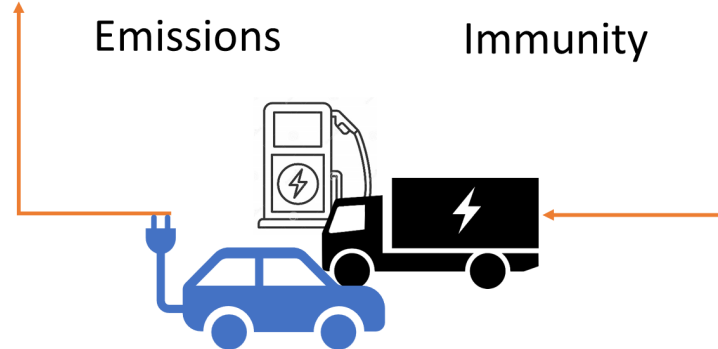
CYBER SECURITY

Quality of the grid



Emissions

Immunity



Pre-normative

Gaps in standards

Frequentiebereik					
Harmonische	Laagfrequent bereik	Radiofrequenties door geleiding	Radiofrequenties door geleiding	Radiofrequenties door straling	Radiofrequenties door straling
50Hz - 2/2.5kHz 60Hz - 2.4/3kHz	2/2.5Hz - 9kHz 2.4/3kHz - 9kHz	9kHz - 150kHz	150kHz - 30MHz	30MHz - 1/2/3GHz	Boven 3GHz



Test proces/certification does not include everything



EU-typegoedkeuring

Our six tests

Available in AC/DC Normal, fast and heavy duty charging



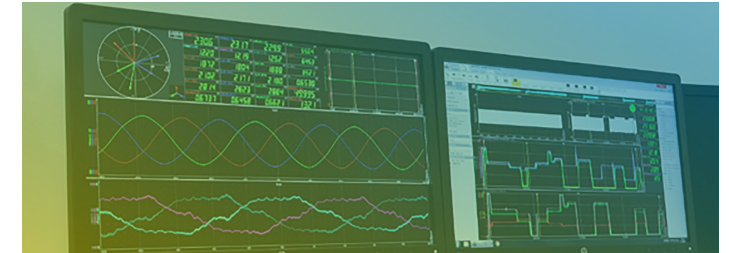
Interoperability Test

Testing interoperability between vehicles and charging infrastructure



Smart Charging Test

How does the electric vehicle deal with smart charging control signals?



Power Quality Test

Does the charging cause power quality disturbances and how does the vehicle deal with disturbances on the grid?



Cyber Security Test

Testing the cyber security of connected charging infrastructure



Grid Operator Test

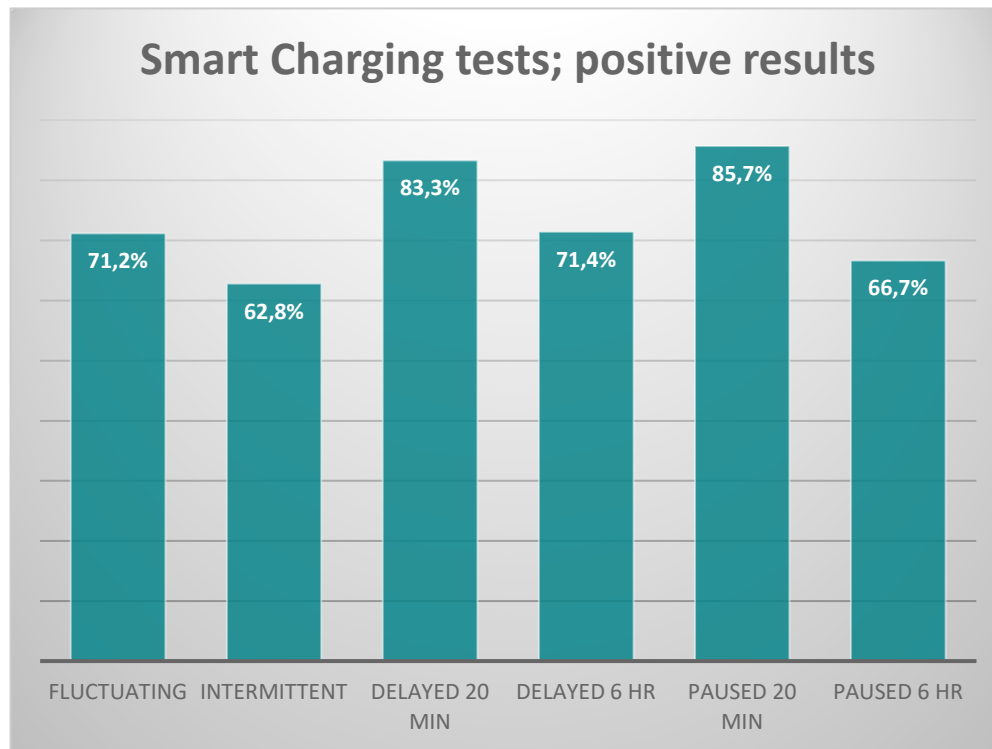
Official Approval Test for public charging stations connection to the Dutch power grid by the Joint Dutch Grid Operators



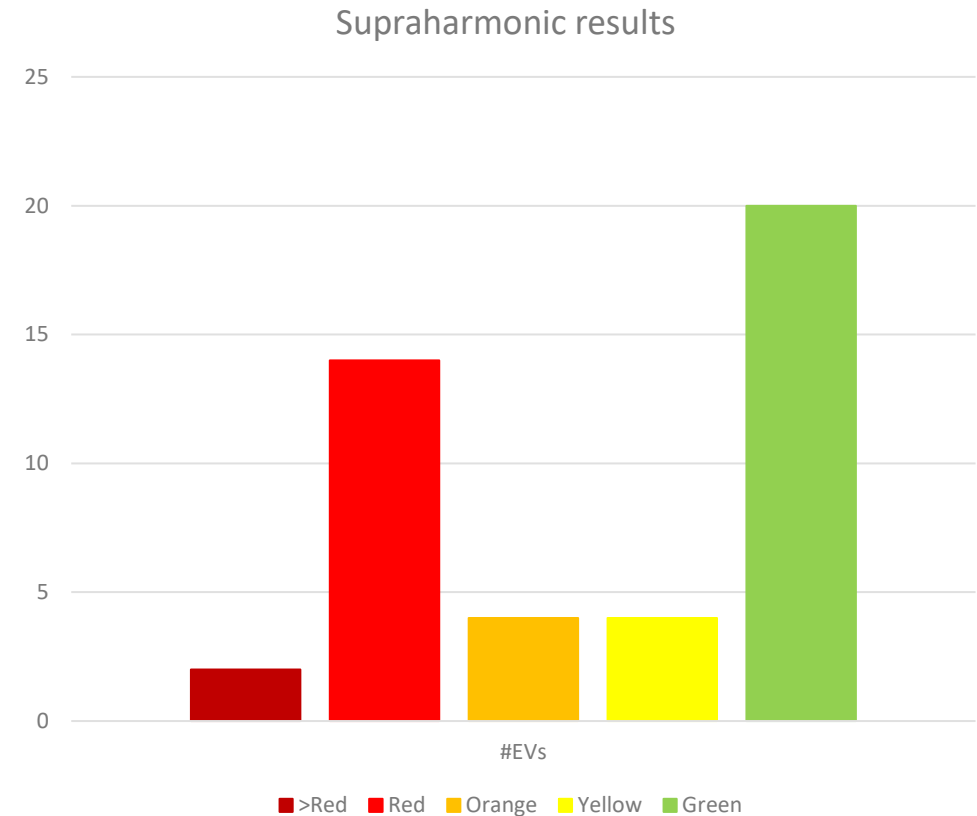
ICT Chain Test

ICT communication and integration throughout the whole EV charging ecosystem

Some results



Smart charging



Supraharmonic emissions

The Elaad Testlab

- A 900 m2 indoor test location and outdoor charging plaza
- Suitable for all kinds of electric vehicles including busses and trucks
- All kind of types of public AC chargers and home chargers
- DC chargers (also heavy duty charging)
- Multiple high power testing spots
- Highly accurate measurement equipment
- 360 kW test system Keysight
 - 360 kW of grid emulation power for Power Quality tests
 - A charging station and electric vehicle communication emulator, including 15118-20
 - 360 kW of bidirectional DC power emulating DC charging.



Testing system



Grid emulator



Communication testing



DC load



ACgrid emulator (4x 90 kW)



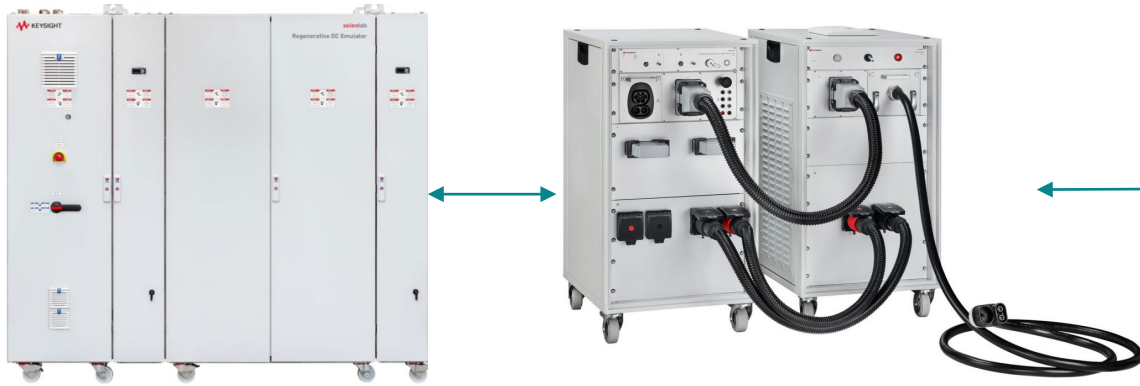
DC Emulator

2x 180 kW



360 kW Test setup

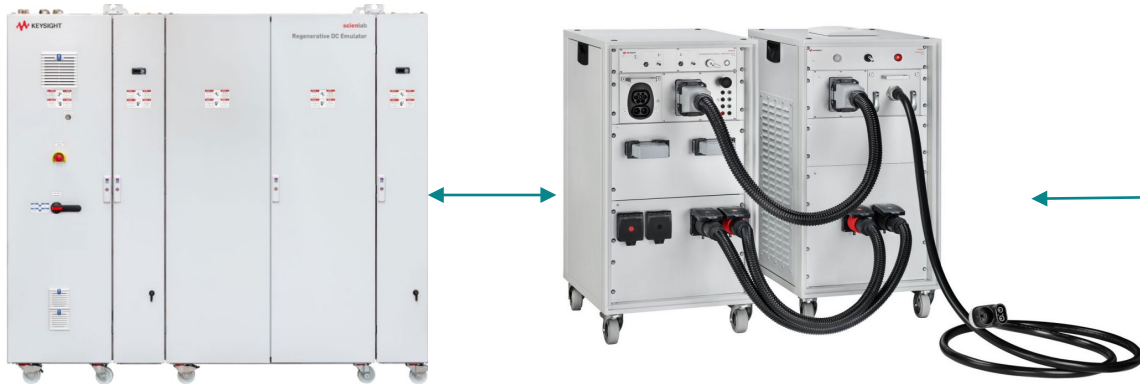
DC EV emulation



Grid emulation



DC EVSE emulation



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Elaadnl

And now....

**We are adding
V2G!**

The Elaadnl logo is printed on the back of a dark-colored shirt worn by a person in the foreground. The logo consists of the name 'Elaadnl' in white with a stylized lightning bolt graphic below it.

Elaadnl

Testing V2G



- Gaining experience with 15118&20 testing using the Keysight high power charge discovery system.
- Pre-normative testing vehicles and chargers on their 15118 -20 implementation and V2G possibilities
- Adding discharging to our interoperability, smart charging and power quality emission and immunity tests
- Adding generator grid code compliance / RfG requirements to the tests.
- Expanding the ICT chain and cyber security tests with new systems and new messages
- And more..?



Contact us

- For more detailed information about the tests.
- To add your (V2G ready) charging station to the permanent Elaad Testlab test base.
- To get your charger or EV model fully tested on bidirectional interoperability, smart charging and power quality.

Testing is free of charge!
Our only limitation is time,
schedule your test today!

info@elaad.nl | www.elaad.nl/en | +31 26 312 02 23
visit us: Westervoortsedijk 73, Arnhem, The Netherlands

Test Lab Agreement



General TLA

ANNEX 4 LOAN AGREEMENT

LOAN AGREEMENT Ref: Reference number
Date:

This loan agreement is made by and between:
..... (company number) with its registered office at
..... (hereinafter referred to as the 'Lessor');

And

Stichting ElaadNL (company number 61211516) with its registered office at
Industriepark Kleefse Waard IPKW, Westervoortsedijk 73, 6827 AV Arnhem, the
Netherlands

(hereinafter referred to as the 'Lessee').

Lessor and Lessee agree as follows:

1. General information

Loan Agreement

Our partners

The new Elaad Testlab is possible thanks to funding from:



Ministry of Infrastructure and Water Management



The Province of Gelderland



The joint Dutch grid operators



Elaadnl



The background image features a white electric car parked in a field of yellow flowers. A wind turbine is visible in the background against a clear blue sky. The entire scene is overlaid with a semi-transparent teal filter. A large white circle is centered over the logo, and a smaller white circle is located in the lower-left area of the image.