# Validation report

City Charge BV

13.04.2024

Validation ID: JW0062



Impact Insights & additionality

# Contents

Details of the validation process	2
Colofon	2
Introduction to CIF Validation	3
Problem solved	3
Definitions of key terminology	3
The CIF Validation result consists of three independent outcomes	4
City Charge BV CIF Validation	5
Impact story	6
New technology combines e-car charging with street lighting	6
How does this make a positive climate impact? Compared to which baseline?	6
How much of a climate impact, and what does the impact depend on?	6
Validity	6
Co-benefits	6
Climate Impact Forecast and Validation result	7
Sources and assumptions	9
Extraction	9
Production	9
Transport	9
Waste	9



# Details of the validation process

#### Timestamps and results:

The validation documented in this report was delivered with the following time stamps and results:

City Charge	Validation request	First review	Feedback call	Hand-in revisions	Final review	Wrap-up call
Date	16/01/24 08h21	19/01/24 18h19	15/02/24 16h30	08/04/2024 12h13	13/04/2024 10h07	
Result	Invalid, uncl	ear and margir	nal	Valid, positive and significant		

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# Colofon

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# Introduction to CIF Validation

To determine the validity of self-assessed climate impact forecasts we provide CIF Validation, which is a third party verification of the calculation of the climate and environmental impact of an innovation, in order to conclude if the Climate Impact Forecast is valid, positive and significant.

### Problem solved

There are areas of LCA expertise that can not be covered in the Climate Impact Forecast workshops or CIF Training, for example where domain knowledge and experience are required. With self-assessments there is also a risk of optimism bias. Validation assures that forecasts do not contain gaps, scoping errors, unsupported assumptions or inappropriate data sources. CIF Validations are made on the request of the project team, and possibly commissioned by an impact organisation. The results are used by teams and organisations to compare and communicate the climate impact of projects.

A validation process performed by an impartial impact expert, who has read about the innovation, seen the forecast and used a checklist to assess its validity. The validator provides detailed written feedback and offers the opportunity for a revision. The goal of this process is twofold: increase the quality of a forecast and to conclude if the forecast is suitable to draw conclusions about the positive climate impact of the innovation. This Validation report documents the results of that process.

## Definitions of key terminology

Climate Impact Forecast (CIF)	A Climate Impact Forecast or CIF is an LCA based calculation of the GHG reduction or climate adaptation potential of a project. Using our CIF tool, the project team found the net climate impact of the key differences between business as usual and their innovative solution.
CIF Validation process	A review process delivered by a validator and guided by a structured check of the information entered into a CIF, a sensitivity analysis and the write-up of an Impact story. This process usually takes two weeks and includes a first review, a first feedback call between the team and validator, time for revisions if needed, a final review and a final results call.
Validator	Validations are delivered by Validators; CIF trainers with LCA expertise who are trained to perform this process in a uniform and objective way. Other than providing this service, Validators have no relationship with or obligations to the company or supporting organisation requesting the validation, assuring an impartial third party review.
Validation result	The CIF Validation result consists of three independent outcomes, which in the best case are valid, positive and significant. These qualifications and the alternative outcomes are explained on the next page.

## The CIF Validation result consists of three independent outcomes

#### A CIF is valid if it is representative of the project, using appropriate Validity of the data and well-justified assumptions. Therefore, the CIF and its results forecast are representative of the potential for the project to mitigate, enable or adapt to climate change. Detailed requirements for validity are specified on www.impact-forecast.com/ CIF-validations. A CIF can be: Valid Improbable Invalid A CIF is positive when it shows that the project has a lower climate Reduction impact than business as usual, or improved climate resilience in the potential case of adaptation. A positive mitigation or enabler CIF file shows the avoided GHG emissions in -tCO<sub>2</sub>eq. This outcome depends on a sensitivity assessment. CIF results can be: Positive Positive Negative A CIF is significant when the project has a climate impact (positive or Impact negative) greater than 5 tonnes of $CO_2$ eq per year. This is roughly the threshold global average annual CO<sub>2</sub> emissions per person and the mass of a male African Elephant. The threshold for significant impact can be set to a higher amount for a particular organisation or occasion. The result can be:

Significant Marginal	Significant	Marginal
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# City Charge BV CIF Validation

## This validation consists of the following sections

Impact story	An impact story is a summary of how a project makes a positive climate impact. It is written by the validating impact expert and contains the key impact data from the Climate Impact Forecast.
Climate Impact Forecast and Validation result	The Climate Impact Forecast shows the scope and parameters of the impact calculation. This includes the resources used and saved by the innovation, their amount and climate impact, the climate impact per unit of user, and the total climate and environmental impact for all units or users in the timeframe. Validator feedback is included on strong and weak points of the forecast as a whole, as well as the conclusion from the sensitivity assessment and the approval status of individual parameters. The conclusion of the validation process is noted in the Validation result.
Sources and assumptions	The differences (resources used and reduced by the innovation, compared to the baseline solution) and quantities (of materials, energy etc.) in the forecast are based on sources and assumptions specified in this section.



#### Impact story

# New technology combines e-car charging with street lighting

Charging infrastructure is key for the future of electric vehicles and the mobility transformation. City Charge BV has developed a charging technology that is combined with street lighting.

How does this make a positive climate impact? Compared to which baseline?

The City Charge BV technology combines e-vehicle charging and street lighting. Therefore, this innovative product can be compared with a common charging station and a lamppost.

The functional unit of comparing those two different ways of lightning and charging has been defined as one charging space for 40 years. Which is reasonable because applicable to both the innovative and baseline solution.



# How much of a climate impact, and what does the impact depend on?

The main driver of the positive impact of City Charge BV is the material that can be saved because not two products have to be produced but only one.

The second main driver of the positive impact is the recycling of the aluminium end of life, with the assumption that in 40 years, the virgin part is still 87,5%. This seems to me overoptimistic but as this is the emission factor available in Climate Impact Forecast, still accepted.

There are further factors with minor positive impact on the result such as avoided transport and production processes which have also been considered in this Climate Impact Forecast.

The climate impact results in  $331,7 \text{ kg CO}_2\text{eq}$  per charging space for 40 years. This would bring 663 t CO<sub>2</sub>eq climate impact for 2000 charging spaces installed. The recycling phase excluded, the impact would still be 58% of the positive impact.

#### Validity

The forecast is valid, positive and significant.

#### Co-benefits

Smart charging infrastructure is key for the future of e-mobility in cities. This impact cannot be shown in this Climate Impact Forecast, and is still important to acknowledge.



## Climate Impact Forecast and Validation result

CityCharge BV provides EV-Charging out of an existing lamppost location with CityCharger EV-charging lamppost instead of Regular separate EV -Charging street unit. The difference in impact is calculated per year and the total impact of CityCharge BV per year is calculated for 2000 times One charging space for 40 years.

Validation By: Julia Weber, Started: Sat Apr 13 2024 09:06:21 GMT+0200 (Mitteleuropäische Sommerzeit), Completed: Sat Apr 13 2024 10:07:29 GMT+0200 (Mitteleuropäische Sommerzeit)							
Strong points	Well chosen functional unit and assumptions presented transparently.						
Weak points	points The recycling of aluminum in 40% seems overoptimistic.						
Sensitivity	ivity Even with the recycling phase excluded, the impact is still significantly positive but reduces by 58%. Fir achieving the positive impact, the usage of secondary aluminum is key.						e positive
Extraction							
- <b>&amp;</b> GS	S-22Mo4	1.112 per kg	75	kg	$\odot$	-83.38	
- <b>&amp;</b> GS	S-22Mo4	1.112 per kg	120	kg	$\bigcirc$	-133.4	
+ 🔂 Alu	uminium (secondary)	2.858 per kg	25	kg	$\bigcirc$		71.46
Production							
- <b>()</b>	owder coating steel	4.071 per m2	3	m2	$\odot$	-12.21	
<b>−ੴ</b> ₽○	owder coating steel	4.071 per m2	6	m2	$\bigcirc$	-24.43	
- <b>&amp;</b> wa	ater based paint, white	3.204 per kg	2,1	kg	$\bigcirc$	-6.729	
- <b>&amp;</b> wa	ater based paint, white	3.204 per kg	0,6	kg	$\bigcirc$	-1.923	
Transport							
	uck+container, 28 tons net (min weight/v	0.07758 per tkm	14625	kgkr		-1.135	
	uck+container, 28 tons net (min weight/v	0.07758 per tkm	1875	kgkr			0.1455
Waste							
+ II Alu	uminium, recycling credit closed loop (87	-6.848 per kg	25	kg	$\odot$	-171.2	
- II St	eel, recycling credit closed loop (56% vir	-0.1597 per kg	75	kg	$\odot$		11.98
- II St	eel, recycling credit closed loop (56% vir	-0.1597 per kg	120	kg	$\bigcirc$		19.17

CityCharge B	/'s total impact per year			Carbon footprint COæq.	
eco-costs of human health euro-7113eco-costs of eco-toxicity euro-27502		Impact per One charging space for 40 years		-331.7 kg	
eco-costs of resource depletion-109495eco-costs of carbon footprint-84563		Impact of 2000 times One charging space for 40 years		-663t	
Validation ID: JW0062 Date:	City Charge BV Mitigation project		Validity of th	ne forecast Valid	
17-04-2024	Impact reduction potential	-663 tCO2eq./year	Impact three	shold Significant	



### Sources and assumptions

The differences and quantities in the forecast are based on the following sources and assumptions:

#### Extraction

The comparison: producing either an EV-charging pole separately or a combined light pole including an EV-charger = CityChargeR product. In stead of producing 2 separte products, now only 1 product is produced, service as well the functionaly public lighting but als EV charging for EV vehicles. In the future the CityCharge pole can even service IoT sensors, 5G antennas, surveillance cameras, etc. Please note: the regular steel lamppost will not be refurbished. No, this lamppost stays within the municipality as a replacement for for future damaged regular lampposts in the city. As 0,5% of the installed base of lampposts are damaged every year, the municipality saves ordering new steel lampposts by using the second grade replaced lampposts. Steel regular lamppost weighs 75 kg - these lampposts (that last 40 years) will be avoided; we supply aluminium poles instead. Steel regular charging pole weighs 30 kg - these charging poles (that last 10 years; we will need 4 per 40 years) will be avoided; we supply an aluminium pole that does both jobs. (4\*30kg = 120kg) Aluminum CityChargeR combined column weighs 25 kg (that last 40 years) - this is our alternative lampposts. GS-22Mo4 is the alloy used on light posts [VDL masten BV, light post manufacturer, conversation] Both devices (baseline and innovation) contain a charging device with the same specifications. It is assumed that all materials and production processes for both chargers are the same, as is their lifetime, so these materials drop from the equation.

#### Production

Powder coating on a metal lamppost = 3 square meters (4m high \* ~12cm diameter (1.65 and 0.8 at the top)) Every 5 years the posts need recoating which is done in-situ; in 40 years, 7 paint layers are applied; 3\*7 = 21 m2 paint Powder coating of a separate charging pole = 6 square meters (1.6m high \* ~60cm diameter) Recoating applied after 5 years = also 6m2 Paint efficiency varies between sources, around 10 m2/L [https://www.resene.co.nz/homeown/problem-solver/paint-calculator.htm, https://www.bing.com/ck/a?!&&p=308aa165c9cdfbffJmltdHM9MTcxMjUzNDQwMCZpZ3VpZD0xN2UzMmJIY i1lYjJjLTZkYmYtMGRmYy0zYjM1ZWFh0DZjYmYmaW5zaWQ9NTlxNQ&ptn=3&ver=2&hsh=3&fclid=17e32beb-eb

2c-6dbf-0dfc-3b35eaa86cbf&psq=paint+m2+per+kg&u=a1aHR0cHM6Ly93d3cub21uaWNhbGN1bGF0b3lu Y29tL2NvbnN0cnVjdGlvbi9wYWludA&ntb=1] and becasue 10m2 is an approximation, we will approximate that pains has a density of 1; 21m2/10 = 2.1kg and 6m2/10=0.6kg.

#### Transport

In stead of 2 products to be transported over 75 kilometers [manufacturer insights; manufacturer locate3d in Utrecht reprts average trip length of 60km, they have a 50% market share. Other manufacturers are less centrally located in the netherlands so we rounded 60 up to 75] per product (weight total 75 + 30\*4 kg), just 1 object is being transported to the site over 75 kilometers (weight 25 kg). (avoided: (75+30\*4)\*75km = 14625 kgkm) (needed: 25\*75km = 1875 kgkm).

#### Waste

When we install a pole while an existing pole is in place which has a significant lifetime still, we transport the reusable pole to a depot for reuse; when poles are damaged they can be replaced from this depot rather than manufacturing a new pole. The replaced steel lamppost will be stored within the municipality depot to be reused at a location of a damaged lamppost. In this case no materials get wasted or refurbished in a too early stage in the lifetime employment proces of the installed base of the



municipality. In this way, we are not shortening the lifetime of the original pole, so no additional impact needs to be accounted to express the loss of a still usable pole. At the end of the life time of a lamppost or a sole chargepoint, there will be a waste product that needs to be refurbished and recycled. But instead of a steel lamppost + a sole chargepoint, only a CityCharge column need to be recycled. The refurbishment of the electronic equipment is the same between innovation and baseline chargers.



### More information

For more information about this validation, and Climate Impact Forecast Validation in general, reach out to Impact Forecast.

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