CAESAR
Capacitating Energy Efficiency in Small Alpine Enterprises

EUSALP

Manual Audit Online-Tool

ARPAF II - CAESAR – WP6

Version: 2021-03-29

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Content

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Introduction

The EU-funded project CAESAR (Alpine Region Preparatory Action Fund) aims to improve awareness of energy efficiency in enterprises, providing a simple tool to be used by trained staff to assess energy consumption and analyze potentials for increased energy efficiency. The tool compiles all relevant data regarding energy (consumption of electricity, gas, oil, heat, CHP …) and transport, and it evaluates them according to predefined benchmarks.

The following areas are recorde within this tool:

- Information about the company, e.g. address, tax number etc.
- Information about the company's activity, e.g. products, materials etc.
- Information about the branch, e.g. employees, office space etc.
- Information about the electricity consumption, e.g. supplier, amount, etc.
- Information about the gas consumption, e.g. supplier, amount etc.
- Information about the oil consumption, e.g. supplier, amount etc.
- Information about district heating, e.g. supplier, amount etc.
- Information about water consumption, e.g. supplier, amount etc.
- Information about photovoltaic system, e.g. manufacturing, energy production etc.
- Information about combined heat and power, e.g. manufacturing, energy production etc.
- Information about heating system, e.g. manufacturer of boiler, energy consumption etc.
- Information about compressed air system, e.g. manufacturer of compressor, energy consumption etc.
- Information about suction system, e.g. manufacturer of system, volume flow etc.
- Information about cooling system, e.g. manufacturer of compressor, electric power consumption etc.
- Information about lighting system, e.g. type of used luminaire, operating hours, etc.
- Information about the vehicle fleet, e.g. type of car, drive type etc.

This short list is intended as a support so that the necessary documents/data for the audit can be prepared in advance.

Note:

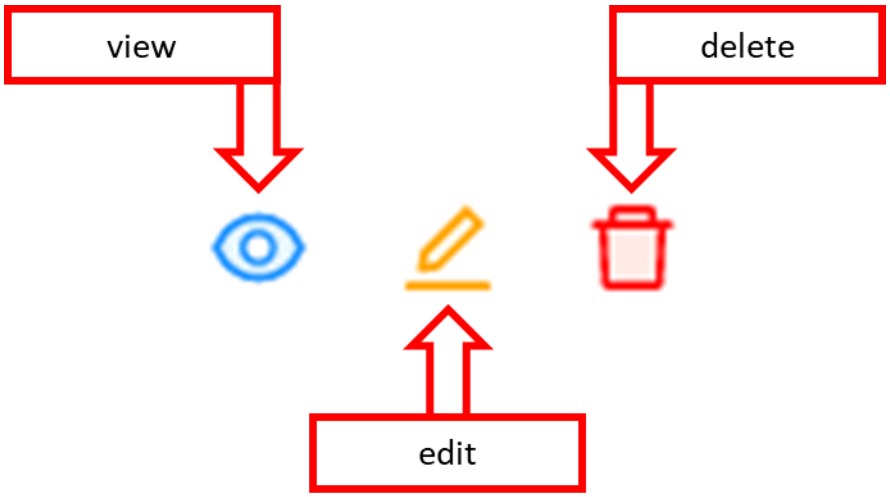
- It is important to take as many photos as possible. This means that various aspects of the audit can be traced afterwards.
- The costs are supposed to be stated as net costs.
- Decimal places **are** separate with a dot and not a comma.

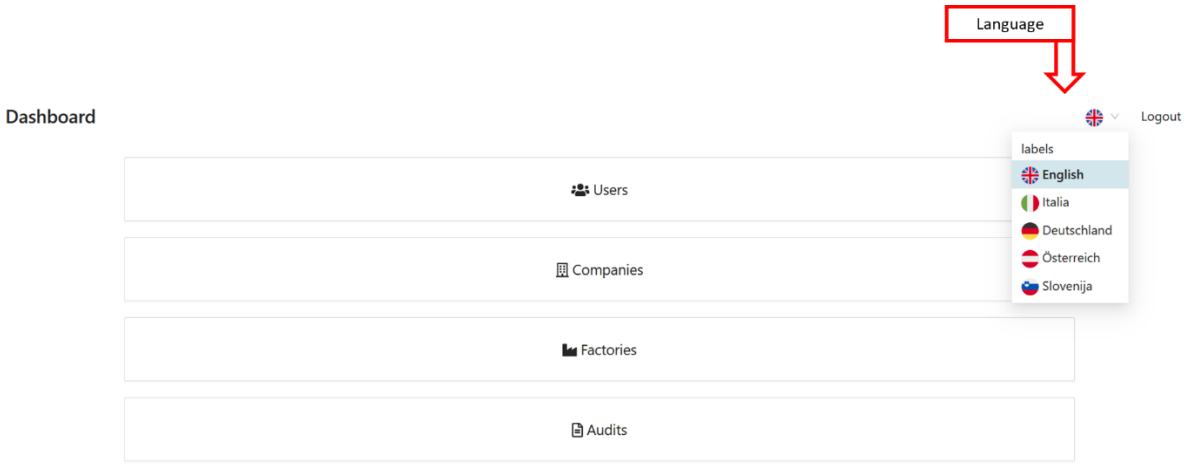
If you have any questions or suggestions about the online audit tool or the manual please send an email to the following address:

benjamin.auer@klimahausagentur.it

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Control panel





This project is co-financed by the European Union via the
Alpine Region Preparatory Action Fund (ARPAF)

Add user

- Press Button “Add User”
- Afterwards assign a username, role and password
- Role: available options are “management” and “date_entry”
- Management: The user can add other users and also define access rights/permissions
- Data_entry: The user can view or modify data from companies, factories and/or audits

Assign access rights/permissions to user

- Press the Button “view” next to the name of the user
- Afterwards assign access rights for the category company, factory and/or audit
- Available options for access rights are “modify” or “view”

Add a new company

- Press “Company” in the dashboard
- Afterwards press “Add company”

Add a new factory

- Press “Factories” in the dashboard
- Afterwards press “Add factory”

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Company

Term	Description	Example
Country	Location of the company (country)	Austria
Name	Company name	Company XY
Tax Number	Tax number of the company	AT123456789
Street	Company address	Street XX
City	Company city	Innsbruck
ZIP-Code	Company postal code	6020
Legal Representative (CEO)	CEO - Chief Executive Officer	Martina Musterfrau
E-Mail	Company e-mail address	musterfrau@email.at
Phone	Company phone number	0123/456789
Fax	Company fax number	0123/456789
PEC (certified Email)	Official certified email for institutional communication. This requires a specific IT-system	

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Factory (Branch)

Term	Description	Example
Company	The company's branch	Company XY
Street	Branch address	Mainstreet 2
ZIP	Branch postcode	5020
City	Branch city	Salzburg
Phone	Branch phone number	0123/56789
E-Mail	Branch e-mail address	beispiel@email.at
Trade Organization	The trade association of the Branch	Association of bakers Austria

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

General

Term	Description	Example
Factory	Choose branch	Factory A
Reference Year	Reference year of Audit	2019
Current Year	Current year	2020
Company contact person for the Audit	Contact person in the company for the data of the audit	Martina Musterfrau
Phone	Contact person's phone number for audit	0123/4567
E-Mail	Contact person's e-mail address for audit	beispiel@email.at
Start date	Beginning date of audit	01.01.2020
End date	Finishing date of audit	31.03.2020
Auditor	Auditor	Max Mustermann
National classification code	Classification of economic activity using the document **"Statistical classification of economic activities in the European Community (NACE Rev. 2)"**	2811
Type of company	Type of company: large company, KMU, energy-intensive company	Large Company
available Certifications	Existing certifications, e.g. ISO50001	ISO50001
Number of employees (reference year)	Number of employees at the branch incl. management level	60
Number of workers	Number of workers in the branch	30
Working hours (reference year)	Total working hours of all workers	57.600
Number of technicians	Number of technicians in the branch	20
Working hours (reference year)	Total working hours of all technicians	38.400
Number of staff in Administration	Number of employees in administration in the branch	10

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Working hours (reference year)	Total working hours of all employees in administration in the branch	19.200
Revenue (reference year)	Turnover of the branch	1.500.000 €
Balance sheet profit/loss	Balance sheet result in the reference year of the branch	500.000 €
Longitude	Longitude	47.264333868541776
Latitude	Latitude	11.39974427920321
Degree days (EN ISO 15927-6)	Can be found within the energy certificate	3.456 Kd
Photos	Photos of the branch	
Notes	Notes about the branch	The building is going to be extended within the next couple of years

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Location

Term	Description	Example
Total plant area	Total land area of the branch	3.000 m²
Total gross volume of the building	Total gross volume of the building	6.000 m³
Total heated net volume	Total net heated volume of the building	3.800 m³
Production area	Total area of the branch	500 m²
Volume of production area	Gross volume of the branch	4.200 m³
Warehouse area	Total area of the warehouse	300 m³
Warehouse volume	Gross volume of the warehouse	1.800 m³
Net office surface	Net office space	200 m²
Average net office height	Average net office height	2,5 m
Description of outer office shell	Structure of the outer shell, e.g. insulation, brick, etc.	38er Brick with 20 cm mineral insulation
Description of office windows and doors	Description of the quality of the office's windows and doors, e.g. triple glazing, wooden frames, age, etc.	3-way glazing with a wooden frame, 5 years old
Photos	Photos of the offices, windows, etc	
Average measured temperature (spot)	Average temperature of one room only (spot)	20 °C
Description of any encountered problems	e.g. mould, dampness	Condensation on the window glass
Description of heat contribution system	e.g. radiators, underfloor heating, etc.	underfloor heating everywhere
Photos	Photos of the heat delivery systems	
Hydraulic balancing of heat system	Has a hydraulic balancing been executed on the heating system?	yes/no
Average net factory hall heigth (heated)	Average hall height (heated)	10 meters
Factory hall outer shell description	Description of the outer shell of the hall, e.g. brick, insulation, etc.	38er brick with 5 cm mineral insulation

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Description of factory hall windows and doors	e.g. garage door	Rolling gate
Photos	Photos of the company halls, hall gates, etc.	
Average measured temperature (spot)	Average temperature of one room only (spot)	15 °C
Description of any encountered problems	e.g. mould, moisture	Rolling gate doesn't close precise
Description of heat contribution system	e.g. radiators, underfloor heating, etc.	Electric ceiling heating
Photos	Photos of the heat delivery system in the company halls	

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Activity

Term	Description	Example
Description of activity	Description of activity	Producing windows
Product		
Product	Type of product, e.g. photovoltaic module, wooden window frame	Wooden window frame
Quantity	Amount of products produced in the reference period	100
Units (SI)	e.g. kg, meter(m), piece, etc.	Pieces
Photos	Photos of the products or the production	
Material		
Material	Materials used for product, e.g. solar glass, wood	Wood
Quantity	Amount of used materials	50
Units (SI)	e.g. kg, meter(m), piece, etc.	kg
Photos	Photos of the raw materials	
Notes	Notes on the production	next year there will be a production of aluminium frames as well

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Acquisition of Electricity

Term	Description	Example
Supplier	Energy provider	TiWAG
Type of contract	e.g. high/low tariff, monthly billing, etc.	Monthly billing
Supply voltage	If the supply voltage is not known, the grid level can be used as an alternative	Grid level or 400 V
Contract grid usage power	Agreed extent of grid usage	150 kW
POD (Point of delivery)	Counter number, which is always assigned to the customer	AT.004120.06120.000000000012345
Photos	Photos of electricity meter	
Spending	Amount of the electricity bill in the reference period (net)	35.000 €
Delivery	Quantity of electricity supplied in the reference period	200.000 kWh
CO2		
Conventional emission factor	Conventional CO2 emission factor for electricity grid (national average, OIB-RL, etc.)	250 g/kWh
Specific emission factor	Specific CO2 emission factor for electricity from the grid of the electricity supplier	40 g/kWh
Notes	Notes on the purchase of electricity	switching to a green electricity supplier

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Acquisition of Gas

Term	Description	Example
Supplier	Gas supplier	TiGAS
Type of contract	e.g. monthly billing	Monthly billing
PCI	lower ***calorific/heating*** value of the gas (normally stated on the bill)	10 kWh/Sm³
PDR	Counter number which is always assigned to the customer	12345654321
Photos	Photos of gas meter	
Spending	Amount of the gas bill in the reference period (net)	500
Delivery	Volume of gas supplied in the reference period	1.000 Sm³
CO2		
Conventional emission factor	Conventional CO2 emission factor for gas	236 g/kWh
Specific emission factor	Specific CO2 emission factor for gas of the plant	0 g/kWh
Notes	Notes on gas delivery	It was switched to biogas delivery

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Acquisition of Oil

Term	Description	Example
Supplier	Oil supplier	Gutmann
Type of contract	e.g. monthly, yearly billing	Billing at delivery
Conversion factor	Density kg/l	0,9 kg/l
calorific value (lower)	lower ***calorific/heating*** value of the oil (normally stated on the statement)	10 kWh/kg
Tank volume	Tank volume	5.000 l
Photos	Photos of oil meter	
Spending	Amount of the oil bill in the reference period (net)	1.350 €
Delivery	Quantity of oil delivered in the reference period	1.000 kg
CO2		
Conventional emission factor	Conventional CO2 emission factor for oil	311 g/kWh
Specific emission factor	Specific CO2 emission factor for oil from the system	311 g/kWh
Notes	Notes on the purchase of oil	

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Acquisition of Heat

Term	Description	Example
Supplier	Heat supplier	Innsbrucker Kommunalbetriebe
Type of contract	e.g. monthly billing	annual billing
Inlet temperature	Flow temperature district heating at transfer station	80 °C
Outlet temperature	Return temperature district heating at transfer station	65 °C
Heat exchange power	the performance of the heat **exchanger/converter**	30 kW
meter number	Number of the heat meter	123456
Photos	Photos of heat meter	
Spending	Amount of heat bill in the reference period (net)	3.000 €
Delivery	Quantity of heat supplied in the reference period	20.000 kWh
CO2		
Conventional emission factor	Conventional CO2 emission factor for district heating (national average, OIB-RL, etc.)	291 g/kWh
Specific emission factor	Specific CO2 emission factor for heat of the plant	51 g/kWh
Notes	Notes on the purchase of heat	district heating from renewable energy

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Acquisition of Water

Term	Description	Example
Supplier	Water supplier	Municipal utilities
Application	e.g. drinking water, processes, etc.	Drinking water
Meter number	Water meter number (number which can be found at the water meter)	123456
Photos	Photos of water meter	
Spending	Amount on the water bill in the reference period (net)	100
Quantity	Volume of water supplied in the reference period	5.000 l
Notes	Notes on the purchase of water	

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Ren. PV (Renewable Energy Photovoltaic)

Term	Description	Example
System		
Year	Launch year	2015
Installer	Installer	Sonnenkraft GmbH
Panel Manufacturer	Module manufacturer	Kioto
Inverter Manufacturer	Inverter manufacturer	Fronius
Sum panel power	Total output of the modules in kilowatt peak kWp	30 kWp
Energy production	Annual electricity production (direct current)	30.000 kWh/a
Photos	Photos of photovoltaic system	
Maintenance costs	Annual maintenance costs	200 €
Amortisation costs	Annuity	100 €
Other costs	Annual costs e.g. insurance	50 €
Electricity sold		15.000 kWh
		2.250 €
Notes		increased feed-in-tariff is ending in 2 years. After that the tariff is 5 ct/kWh
CO2		
Conventional emission factor	Conventional CO2 emission factor for electricity from the grid	250 g/kWh
Specific emission factor	Specific CO2 emission factor for electricity of the plant	40 g/kWh
Notes	Notes on the PV system	System size will increase in the next few years

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Ren. CHP (Renewable Energy Combined Heat and Power)

Term	Description	Example
System		
Plant #1		
Year	Launch year (CHP)	2019
Packager	Manufacturer of the CHP	Jenbacher
Motor brand and model	Brand and model of the CHP	J208
Generator (brand and model)	Brand and model of the generator	Siemens
Electrical power	Electrical power of the generator	100 kW
Energy production	Amount of electricity generated by the generator	800.000 kWh
Thermal power	Thermal power of the generator	110 kW
Thermal energy production	Amount of heat generated by the generator	880.000 kWh
Photos	Photos of CHP	
Maintenance costs	Maintenance costs of the CHP	500 €
Amortisation costs	Annuity	1.500 €
Annual fuel consumption	Annual fuel consumption for CHP in the reference period	200 t
Spending for fuel	Fuel consumption costs in the reference period (net)	200.000 €
Other costs	e.g. insurance	100 €
Electricity sold	Electrical energy sold	700.000 kWh
		70.000 €
Thermal energy sold	Thermal energy sold	800.000 kWh
		80.000 €
internal heat consumption	Self-consumed thermal energy	0 kWh
CO2 electricity		
Conventional emission factor	Conventional CO2 emission factor for electricity from the grid	450 g/kWh
Specific emission factor	Specific CO2 emission factor of the plant	350 g/kWh

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Notes	Notes on the electricity production of the CHP (BHKW)	
CO2 thermal energy		
Conventional emission factor	conventional CO2 emission factor for heat from district heating, gas, etc.	500 g/kWh
Specific emission factor	Specific CO2 emission factor of the CHP	300 g/kWh
Notes	Notes on the heat production of the CHP	

This project is co-financed by the European Union via the
Alpine Region Preparatory Action Fund (ARPAF)

Heating systems

Term	Description	Example
Boiler		
Boiler #1		
Brand	Boiler manufacturer	Bertsch
Model	Boiler model	B100 BW
Year	Launch year	2000
Burner thermal power	Thermal output of the burner	100 kW
Inlet temperature	Inlet temperature of the heating system	40 °C
Outlet temperature	Outlet temperature of the heating system	30 °C
Performance	Boiler efficiency	90%
Burner (brand/model)	Burner manufacturer/model	BB 100
Modulation	Modulation of the boiler	yes
Photos	Photos of the boiler	
Thermal energy storages		
Thermal energy storages #1		
Brand	Manufacturer of the thermal energy storage	Email
Model	Model of the thermal energy storage	P500L
Year	Launch year of the thermal energy storage	2000
Volume	Storage capacity	500 Liter
Average temperature	Average temperature of the thermal energy storage	60 °C
Electrical heater	Use of an electrical heating element/heating register	ja
Quantity	Number of thermal energy storage units of this model	1
Photos	Photos of the thermal storage tank	

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Notes	Notes on the thermal storage tank and the boiler	will be replace with a 300 liter boiler
Pumps		
Number of pumps	Number of heating- /circulation pumps in the system	3
Maximum electrical power	Maximum electrical power of all pumps	150 W
Minimum electrical power	Minimum electrical power of all pumps	60 W
Ratio of new pumps	how common are new pumps (< 5 years)	many
Ratio of pumps equipped with inverters	Ratio of speed-controlled pumps	only when necessary
Maintenance is carried out regularly	Frequency of carried out maintenance carried	on average
The piping plan is detailed	Detail degree of piping plan	many
Photos	Photos of the pumps	
Notes	Notes for pumps	All pumps will be replaced by highly efficient pumps over the next 5 years

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Compr. Air

Term	Description	Example
Compressor		
Compressor		
Brand	Manufacturer of the compressor	Philips
Model	Compressor model	A34
Year	Launch year of the compressor	2017
Electrical power	Electrical power consumption of the compressor	100 kW
Maximum pressure	Maximum pressure of the compressor	7 bar
Working pressure	Working pressure of the compressor	6 bar
Volume flow	Volume flow	10 m³/h
Inverter	The compressor is speed-controlled	yes
Hours of no-load operation	No-load operation hours	44 h
Full load hours	Full load hours	55 h
Electricity consumption	Compressor power consumption	10.000 kWh
Photos	Photos of the compressor	
Dryer		
Brand	Dryer manufacturer	Philips
Model	Dryer model	T20
Year	Launch year of the dryer	2017
Electrical power	Electrical power consumption of the dryer in the reference period	10 kW
Electricity consumption	Electricity consumption of the dryer in the reference period	1.000 kWh
Photos	Photos of the dryer	
Possibility to close individual circuits	Possibility to close individual compressed air circuits	yes
Presence of heat exchangers	Existing heat exchanger	no
Notes	Notes on the compressed air system	

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Air suction

Term	Description	Example
Suction systems		
Suction systems		
Brand	Manufacturer of the suction system	AirG
Model	Model of the suction system	3B-6
Year	Launch year of the suction system	2017
Electrical power	Electrical power consumption of the suction system	100 kW
Volume flow	Amount of air that flows through a suction pipe in a certain time	200 m³/h
Inverter	speed-controlled suction system	ja
Quantity	Number of suction units	2
Automatic activation	Automatic activation of suction system	yes
Shut-off valves (e.g. gate valves)	Available shut-off valves	no
Electricity consumption	Power consumption of the suction system in the reference period	1.000 kWh
Photos	Photos of the extraction system	
Notes	Notes on the extraction system	

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Chiller

Term	Description	Example
Compressor		
Compressor		
Brand	Compressor manufacturer	Daikin
Model	Compressor model	K200
Year	Launch year of the compressor	2010
Quantity	Number of compressors	1
Electrical power	Electrical power consumption of the system	200 kW
Cooling power	Cooling capacity of the plant	300 kW
Refrigerant gas	Type of refrigerant gas	R134a
Electrical energy consumption	Power consumption of the system	30.000 kWh
Photos	Photos of the cooling system	
Notes	Notes on cooling system	

This project is co-financed by the European Union via the
Alpine Region Preparatory Action Fund (ARPAF)

Lighting

Term	Description	Example
Presence of a lightning plan	Is a lighting plan available?	yes
Lighting system		
Lighting system		
Type	Type of used luminaire	LED
Quantity	Number of lamps with the specified typology	All
Operating hours	Annual operating hours of this typology	2.500 h
Photos	Photos of the lighting system	
Automatization on/off	Available automation e.g. motion detector, daylight measurement	yes
Automatic control	Type of automatic control	Presence
Presence	Frequency of automatic control	Most of the rooms
Illuminance (spot measurement)	Measured illuminance	300 Lux
Incidence	Incidence of this type of luminaire	Most of the rooms
Photos	Photos from the spot measurement	
Notes	Notes on the lighting system	

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)

Mobility

Term	Description	Example
Vehicles		
Vehicles		
Brand	Manufacturer of the vehicle	Renault
Model	Model of the vehicle	ZOE
Year	Year of registration of the vehicle	2018
Typology	Type of vehicle e.g. car, truck, etc.	PKW
Use	Private or mixed use of vehicle	Mixed use of vehicle (company and private)
Percentage of use as company vehicle	Percentage use of the vehicle for business activities	80%
Type of drive	Type of drive e.g. electricity, diesel	Electricity
Power	Vehicle power	80 kW
Annuel consumption	Fuel consumption in the reference period	2.000 kWh
Annuel Mileage	Distance travelled in the reference period	12.000 km
Fuel cost per year	Fuel costs in the reference period	300 €
Specific emission factor	Specific CO2 emission factor for one kilometer driven by the vehicle	0 g/kWh
Quantity of vehicles of this type	Number of vehicles of this type	1
Photos	Photos of the vehicle	
Notes	Notes on the vehicle fleet	Purchase another Renault ZOE in 2022

This project is co-financed by the European Union via the Alpine Region Preparatory Action Fund (ARPAF)