

INVESTMENT FACT SHEET

Version 2

PV integration and energy storage at trolley bus depot (Work Package I2 / OUTPUT O.I2.1)

Project index number and acronym	CE_1537 EfficienCE
Responsible partner (PP name and number)	PP 5 - Gdynia Trolleybus Transport Company
Linked to pilot action (number and title)	PV integration and energy storage at trolley bus depot - O.I2.1
Project website	www.interreg-central.eu/efficiency
Delivery date	June 2021

Description and technical characteristics of the investment

In their operation PKT, trolleybus transport operator from the city of Gdynia (the north of Poland, one of the 1 million Tricity agglomeration cities) has continuously been striving to implement solutions aiming at the energy usage optimization, frequently with substantial help from EU funds. In their undertakings within the EfficienCE project PKT attempts to limit existing energy losses within the trolleybus traction network by making use of recovered unused braking energy. If not used directly by the braking vehicle's auxiliary units (e.g. a vehicle's on board battery) or other nearby vehicles on the network, braking energy is otherwise dissipated in the form of heat in the braking resistors placed on the grid and thus irreversibly lost. Thanks to the pilot investment implemented by PKT within EfficienCE project the recovered braking energy will be used to power the building of the trolleybus depot or will it can also be directed to e-cars charger placed on PKT depot. This will be realised by deploying an innovative energy inverter allowing to feed the otherwise wasted energy directly into the building's energy system or to the charger. For this, it is necessary to have a specifically designed DC/AC inverter placed in the depot for connecting the DC traction grid and the building's AC grid. The DC/AC inverter will allow to recover unused braking energy and feed it into the depot building. The device will also control the level of energy consumption in the traction network, detect unused energy appearance and thoroughly control the energy consumption of the depot building. It will control the voltage of the DC network and the load of the building's system from the AC public grid. In the future, when PV power plant will be installed in PKT depot (PKT now is trying to find funds to finance the investment) this can also be linked to Efficiency inverter and storage device. This way energy generated by the PV plant could be either fed directly to the trolleybus grid through the inverter in order to power trolleybuses or it could be stored in the storage system for later use.

The DC/AC inverter has the following technical parameters: DC input voltage 400 - 800 V (nominal 600 V), AC output voltage 3x400 V, power 50 kW, galvanic insulation between input and output. The system is also equipped with energy storage in the form of a used trolleybus battery (second life of the battery), which will accumulate energy of recuperation when there is no load on AC output. For this purpose PKT will use one used battery module of traction battery from a trolleybus.

An energy inverter also can be used as external, portable source of energy supply.

Investment costs (EUR) including a break-down of main cost items

325 000 PLN net = ca. 75 500 EUR (one invoice from the supplier)

Investment location

NUTS 3	Address (Street, house number, postal code, city, country): ul. Zakret do Oksywia 1, 81-244 Gdynia, POLAND	GPS coordinates: 54°32'0"N 18°29'34"E

Duration and process of investment implementation

Start date

End date

07.2019

06.2021

Major milestones of investment implementation

- The tender for the purchase of the inverter was organised in December 2019 and was realised according to Polish procedures.
- There were obtained two bids for the tender, one of which was accepted.
- The contract with a selected producer was signed in February 2020.
- The device was delivered with a delay; The delay was caused by two challenges which had a direct influence on the timeline of the investment implementation: 1. the Covid situation (impossibility to meet in person, staff absences, closing of hotels) 2. a problem in completing documentation for the second hand battery from a trolleybus. Adequate annexes were bilaterally signed, which duly postponed the delivery of the device to PKT depot.
- After being delivered to the PKT Gdynia depot in May 2021, the device was connected to the trolleybus overhead line. It is now being tested as a power source for electric car charging station. In the first stages of the tests, the cooperation of a charging station with inverter device was being checked in various conditions, times of the day and different types of e-car. Subsequently, the operation of the charging station is also being tested with high intensity of car charging. This will allow the verification of design assumptions and the determination of practical application possibilities of an inverter system.
- Pilot local Launch Event took place in June 2021.
- The amount of braking energy recovered from the grid, availability of charging power and output values of AC voltage are now being measured and data is being collected for the Investment Evaluation Report.

Ownership and durability of the investment (e.g. maintenance, financing)

PKT, the trolleybus operator and a 100% municipality owned public limited company, has been in charge of the implementation of this investment. PKT owns the site where the investment is located and will maintain it after the end of the project. This will be executed by means of the company's own financial resources.

References to related pilot action (output fact sheet) and relevant deliverables (e.g. pilot action report, studies) and web-links.

If applicable, additional documentation, pictures or images to be provided as annex

DELIVERABLE D.T.3.2.2 - Report on pilot action 2 implementation phase for PP Gdynia (PV integration and energy storage at trolley bus depot)

OUTPUT O.I2.1 - Pilot investment implementation of recuperated braking energy & RES integration to power a PT depot

Activity A.I2.1 - Investment implementation

PHOTO DOCUMENTATION OF PKT PILOT INVESTMENT



