



OPPORTUNITY (RE)  
CHARGING OF EBUSES  
CONNECTING TRI-CITY  
AGGLOMERATION  
BASED ON TROLLEYBUS  
INFRASTRUCTURE



REPLACING OF  
DIESEL BUS LINES  
BY EXTENDING  
TROLLEYBUS  
NETWORK WITH  
TROLLEY-HYBRIDS



OPTIMISED BRAKING  
ENERGY RECOVERY  
IN TROLLEYBUS  
NETWORK

## Q USE CASE DESCRIPTION

The main objective of ELIPTIC project use cases in the city of Gdynia was to explore the possibilities of further public transport electrification in the city of Gdynia and neighbouring Sopot. These were jointly implemented by trolleybus transport operator PKT and the University of Gdansk. The use cases were based on the concept of in-motion charging of battery trolley hybrids from the trolleybus grid and extending existing trolleybus lines without having to build new wired infrastructure. As well as extending the existing lines off-wire, potentially replacing current diesel bus lines with battery trolley hybrids was also analysed. These would be charged in-motion from a trolleybus infrastructure, going off wire to cover former diesel bus routes. Within the project, PKT has also explored the benefits of installing a dual-power supply system. This software is placed at two spots of the trolleybus network, joining two pairs of substations and improving grid operation.

## ✓ RESULTS AND LESSONS LEARNT

Following the analysis of the trolleybus lines best suited to off-wire extensions served by battery trolley hybrids (batteries on lithium cells), other trolleybus lines are now being considered to be extended (the first extension was a 2km extension of the line 21 launched in 2015 within the ELIPTIC forerunner project – CIVITAS DYN@MO). A trolleybus line extension successfully implemented within ELIPTIC was line 29 which began its extra 5km off-wire operation in December 2016 servicing the quiet residential Gdynia district of Fikakowo (the residents clearly expressed a wish to have a low noise and emission public transport service in place). There are a number of lines currently under consideration for the potential extension or replacement of diesel buses with battery trolley hybrids. In addition, installation of the dual-power supply system on the trolleybus network produced tangible results, increasing braking energy recovery, reducing overall energy consumption by 2-5%, levelling of voltage drops and stabilising the network.





## FUTURE PLANS

The city of Gdynia is currently in the process of purchasing a fleet of 30 new trolley battery hybrids including 16 articulated models (the contract with the producer was signed in April 2018). In addition, it will exchange the old types of batteries in 21 trolleys currently in operation allowing them to be upgraded to trolley battery hybrids. In the near future, the city will be equipped with a substantial fleet of state-of-the-art battery trolleys hybrids able to cover many more off-wire courses, offering considerable potential for the wider electrification of public transport in Gdynia.



“ **ELIPTIC project opened up new possibilities for greater public transport electrification in the city of Gdynia based on the currently operating trolleybus transport and latest technological innovations implemented as part of the project.** ”

Tomasz Labuda, Vice President of the Board, PKT GDYNIA



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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 636012.

