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PKT GDYNIA



DEVELOPMENT OF ENVIRONMENTALLY FRIENDLY PUBLIC TRANSPORT - TROLLEYBUSES IN GDYNIA

Sector: Sustainable transport

Timeframe: 2005 – 2013

Location: Gdynia, Poland



Photo: Marcin Czapnik

PROJECT BACKGROUND

Gdynia (approx. 247 800 inhabitants) is located in the northern part of Poland, in the Pomeranian Voivodeship. In 2011 the city signed the Covenant of Mayors and established cooperation with the Association of Municipalities Polish Network "Energie Cités" - official Covenant Supporter. In 2012 Gdynia adopted Sustainable Energy Action Plan until 2020 and in 2015 it adopted Low-Emission Development Programme. Gdynia is one of the three Polish cities with trolleybus systems. Its trolleybus network is considered the biggest and the most modern in the country and extends to two neighbouring municipalities - Gdynia and Sopot. The network comprises of 12 permanent lines and 1 seasonal line. The low-floor vehicles carry over 25 million passengers per year, travelling 5 million vehicle-kilometres. In the period 2010-2013 the city implemented a project called Trolley, which aimed at promotion of trolleybuses as the cleanest and most economical form of transport for sustainable cities and regions in Central Europe. In December 2012 the Trolleybus Communication Enterprise Sp. z o.o. in Gdynia (Przedsiębiorstwo Komunikacji Trolejbusowej Sp. z o.o. w Gdyni) signed contract concerning implementation of the EU research & innovation project named CIVITAS DYN@MO (carried out by a consortium of 28 partners), while in June 2015 it joined the ELIPTIC project co-financed from HORIZON 2020 programme (carried out by a consortium of 34 partners).

PROJECT DESCRIPTION

In the period 2005-2007 the Trolleybus Communication Enterprise Sp. z o.o. (TCE) implemented the EU-funded project entitled "Development of environmentally friendly public transport in Gdynia", which consisted in the construction of a new trolleybus depot in Gdynia, new trolleybus loop in Kacze Buki quarter and new trolleybus lines with the total length of 10.6 km, as well as the purchase of 10 new low-floor trolleybuses. In the period 2010-2013 TCE implemented another environmental project entitled "Development of environmentally friendly public transport in the Tri-City". Project activities included reconstruction of the traction network along the Zwycięstwa str. in Gdynia and Niepodległości str. in Sopot (together with a trolleybus loop in Reja str.), construction of 4 new and reconstruction of 5 existing traction substations, construction of the Substation Remote Control Centre with remote controlled disconnectors and purchase of 28 new low-floor trolleybuses.

The CIVITAS DYN@MO project, implemented within the CIVITAS II PLUS initiative and co-financed from FP7, included purchase of 2 new Solaris trolleybuses with an alternative power source - a lithium-ion battery, choice of a trolleybus line to be served by new hybrid trolleybuses, further expansion of the trolleybus network to cover areas, which couldn't be reached with traditional trolleybuses (due to the lack



of the traction network), and enhancing the overall reliability of the trolleybus transport services in Gdynia.

Enrichment of the fleet by purchasing new hybrid trolleybuses was a breakthrough moment for the trolleybus transportation system in Gdynia as the vehicles equipped with lithium-ion batteries can move also on the roads without the traction network. The previous alternative power source - nickel-cadmium batteries - weren't as efficient as the new ones and didn't bring such vast opportunities. The trolleybuses are also equipped with automatic pantographs enabling automatic raising and lowering of the current collector. Asynchronous drive with the energy recuperation system allows for collecting energy during moving and giving it back during breaking. Another task envisaged within the CIVITAS DYN@MO project was the reduction of the electric power demand of the trolleybus system through the installation of supercapacitor, as well as enhancing energy efficiency of trolleybuses and existing infrastructure. Installation and startup of the supercapacitor took place in April 2014. The supercapacitor bank was located in the area of Wielkopolska Substation, which is a hilly terrain, therefore there is higher frequency of trolleybuses braking and giving recuperative energy back to the traction network. The bank "catches" this energy and stores it for later use by other trolleybuses. Reduction of energy consumption of the network section, where the supercapacitor is installed, comes to 12-20%.

Another important undertaking implemented by TCE is the ELIPTIC project, which aims at reducing energy consumption of public transport and related costs by optimising the use of existing infrastructure and electric vehicles fleet. Project partners will also investigate opportunities for further electrification of public transport in their cities (the project ends in May 2018). Using remote control and data acquisition software purchased within the project (costing approx. 25 000 EUR), TCE will re-configure 2 network sections from one-sided to two-sided power supply. This will help to increase efficiency of energy

recovery from trolleybuses braking and thus reduce network electricity consumption. Thanks to the two-sided power supply the network will be also more energy stable (optimisation of energy balance and energy management). TCE is also planning the development - in cooperation with the University of Gdańsk - of two feasibility studies concerning further electrification of public transport system in Gdynia:

- "Possibilities of recharging electric vehicles connecting Tri-City agglomeration based on trolleybus infrastructure".
- "Replacement of diesel bus lines by extension of trolleybus network based on hybrid trolleybuses using batteries as the alternative power source (based on CIVITAS DYN@MO experience)".



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FINANCING SCHEME

The EU project entitled "Development of environmentally friendly public transport in Gdynia" had the value of approx. 54 Mio PLN (approx. 12.5 Mio EUR) and was co-financed from the European Regional Development Fund within the Regional Operational Programme for the Pomeranian Voivodeship for 2004-2006 (with the co-financing rate of 50%). The project entitled "Development of environmentally friendly public transport in the Tri-City" had the value of approx. 100 Mio PLN (approx. 23.25 Mio EUR) and was also co-financed from the ERDF within the ROP for the Pomeranian Voivodeship (with the co-financing rate of 70%).

PROJECT RESULTS

The share of the environmentally friendly trolleybus transport system in the Gdynia's overall public transport system comes up to 25%. Implementation of energy efficient vehicles contributed to the reduction of electricity consumption by more than 20%, as well as to the improvement of the passengers comfort. Both new and rebuilt trolleybuses are autonomous, i.e. they don't need traction electricity at a 5-kilometer distance. In 2010 (before the investments co-financed from the EU) annual consumption of traction electricity amounted to 13 GWh and accompanying CO₂ emission came to 11.7 Gg. After implementation of the project entitled "Development of environmentally friendly public transport in the Tri-City" in 2013 annual consumption of traction electricity decreased to 10.5 GWh, while accompanying CO₂ emission decreased to 9.45 Gg. It can be thus calculated that annual electricity savings come up to 2.5 GWh (20%), while annual reduction of CO₂ consumption comes up 2250 tonnes.

In December 2012 the European Commission honoured Gdynia within the Access City Award contest for the transport system, which is friendly for people with disabilities. In 2013 the International Union of Public Transport (UITP, Union Internationale des Transports Publics) recognised Gdynia's transportation system as the best one in Central and Eastern

Europe. Another award - Leader of Regional Development - was granted by the Polish Agency for Enterprise Development during the II Polish Entrepreneurship Congress in Katowice in October 2014. Also in 2014 the European Commission honoured Gdynia with the prestigious Regiostars 2014 award for the project "Development of environmentally friendly public transport in the Tri-City". The project won in the category „CityStar – investments in urban public transport compliant with sustainable growth principle".



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MORE INFORMATION

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