

INVESTMENT FACT SHEET

O.I1.1 - Implementing a metro-station integrated PV-system to power building auxiliaries with RES

Version 2

Project index number and acronym	CE_1537 EfficienCE
Responsible partner (PP name and number)	PP2 - Wiener Linien (WL)
Linked to pilot action (number and title)	Pilot action 1: PV integration at metro station (Wien)
Project website	www.interreg-central.eu/efficiency
Delivery date	March 2022

Description and technical characteristics of the investment

In the pilot project of Wiener Linien GmbH & Co KG (Deliverable D.T3.1.2 - Pilot implementation), a new type of photovoltaic system was tested at the Ottakring metro station. For the first time, PV foils were bonded to the roof of a subway station. These PV foils are five times lighter than conventional PV systems. This feature made the project possible at the first place, since these metro stations were not built to withhold the additional weight of a conventional PV system. Another special feature is that a DC (Direct Current) railway system and PV power generation should be in operation together. Therefore, the chosen PV modules had to meet special technical requirements, although they are more expensive than conventional standard products.

Investment I1 in a snapshot

- Foil-based PV-System on the roof of a Metro Station
- Without metal frame, much lighter than conventional PV
 - No effects to statics of the building
 - No negative effects to metros grounding system
- Feed in directly to the stations' energy consumption
- PV-system generation is monitored
- PV-generation is used to power metro stations auxiliaries
- Start of PV-system operation on 14th January 2020
- Opening Event with local authorities November 2019

Overview PV system

nominal Power PV- System	60	kWp
maximal power achieved	50	kWp
expected yearly energy output	58.550	kWh/a
yearly energy generation	58.377	kWh/a
CO₂-savings	7.874	kg/a
full load hours	973	h/a
energy demand of metro-station	1.029.665	kWh/a
PV-energy share of metro-station	5,7%	

Results

- The PV-system with a nominal power of 60 kWp generated 58.377 kWh green energy in the first year of operation
- 5,7 % of stations yearly energy consumption (1.000 MWh)
- Up to 10 % monthly energy share of metro-stations energy demand
- On a daily basis we can supply up to 50 % of the stations energy need by the PV-System

As the photos in the Annex illustrate, the PV modules are merely glued to the roof and the cables are fixed in duct.

As the tender was implemented in form of an in-house award, guidelines and procedures were simplified. Installation started end of October 2019, right after the contract has been awarded to Wien Energie GmbH, our sister company. At the end of 2019 the entire installation was completed, and a test run implemented. Ever since end of February, we monitor the operating PV power plant as stated above.

Resources needed

Since we could use the existing collectors, only little extra costs occurred regarding consumption measurements. The already mentioned adaptations concerning cable routing were as expected.

Regulatory requirements

As mentioned, we were able to simplify the regulatory requirements tremendously by tendering the pilot as an in-house allocation. Besides, we had to prepare a traffic negotiation with the Austrian Railway ÖBB-Personenverkehr AG, since we had to cross their overhead lines in order to deliver the panels to their designated installation spot

Although the current Austrian energy tax releases us from any duties, a discussed regulation draft might follow that could change reporting obligations in the future - a precise supervision is crucial.

Stakeholders involved in the implementation phase

Even though urban policy was not involved in the project, delegates joined the opening event on November 28th and generated supplementary medial sensation. The public interest therefore not only promoted our subcontractors work, but also clarified the active consideration in sustainability once more. Regarding the technical implementation, all subcontractors were able to execute their work as stated in the preparation phase report. Our implementing company, Wien Energie GmbH, could report some learning concerning usage of foil modules when working with temperatures below 5 °C. Although Wien Energie GmbH develops PV systems on a daily basis, setting up cable trays made out of glass fibre reinforced plastic was a novelty for them too and might come in handy more often soon.

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

The full amount of investment costs is situated in BL5 (Equipment).

Investment costs (BL5-equipment): EUR 112.138, -
Investment costs ERDF co-financing (BL5): EUR 89.710, -

Break-down of investment costs

Investment costs PV-panels: EUR 76.500, -
Investment costs power inverter: EUR 7.550, -
Investment costs supporting system: EUR 21.588, -
Investment costs solar cables: EUR 6.500, -

Investment location

NUTS 3	Address (Street, house number, postal code, city, country)	GPS coordinates
AT130, Wien	Ottakring metro station	48.211933423506395, 16.310958678735442

Duration and process of investment implementation

Start date	End date
April 2019	December 2019

Major milestones of investment implementation

The following table provides an overview of the investment milestones:

Milestone	Date
Project started	01/04/2019
In-house allocation carried out	28/08/2019
Contract awarded	30/09/2019
Start of construction	11/11/2019
Plant built	30/12/2019
Energy yield monitoring set up	30/12/2019
Energy consumption data analysed and optimisation measures derived	31/12/2021
PV project completed	31/12/2021

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

The basis of this investment lays in the key objectives stated in the “Smart City Wien Framework Strategy 2019-2050”, which are:

1. Quality of life
2. Resource conservation
3. Innovation

Specifically, the strategy states that the city of Vienna must reduce its carbon footprint by 85 % by 2050. Through this investment, WL is supporting the two latter objectives. Over the next two years, the data obtained from the PV foils will be monitored and analysed in detail. At the end of 2022, recommendations will be formulated to reduce emissions from European public transport. The photovoltaic plant has a size of 360 sqm and an annual output of 60,3 kilowatt peak. This saves more than 21 tons of CO2 every year. It is expected that the investment will save more than 21 tons of CO2 every year.

The investment is owned by Wiener Linien GmbH & Co KG. Therefore, the WL are responsible for the operational management, maintenance, servicing and repair of the PV system. Regarding the feasibility, our investment overcame all obstacles (e.g. weight, electrical earthing) that other potential locations of mobility providers equally struggle with. Therefore, we do not see any technical, but sure some economical barriers. Due to the excellent experience at this metro station, Wiener Linien is currently checking other metro-stations for the possibility of installing a similar PV system. The goal is to install PV systems at as many stations as possible, to use as much green energy as possible for powering the auxiliary of the station. But with a view to the financial aspect, Wiener Linien will use conventional PV-Systems where it is possible.

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.3.1.2 - Report on pilot action 1 implementation phase for PP Vienna (PV integration at metro station)



Figure 1: Photovoltaic foils bonded to the ground (01-2020), Copyright Wiener Linien GmbH & Co KG



Figure 2: Aerial picture of Photovoltaic system (05-2020), Copyright Wien Energie GmbH

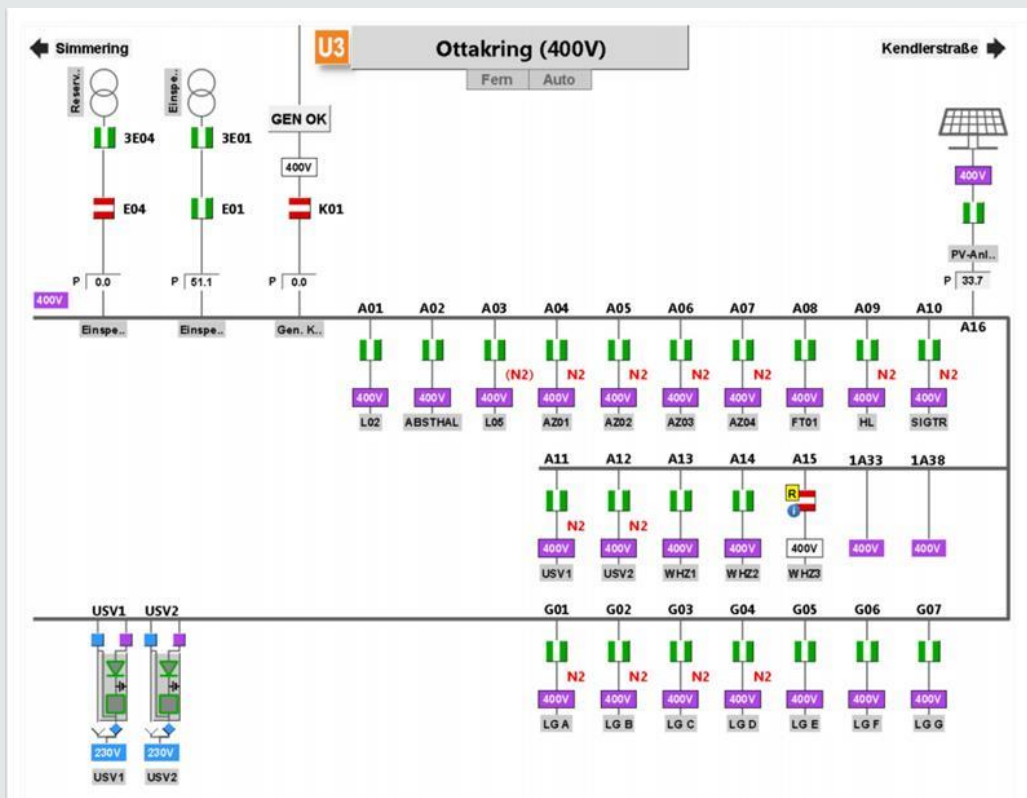


Figure 3: Electrical wiring scheme (05-2020), Copyright Wiener Linien GmbH & Co KG



**Figure 4: Branding of the PV-System on the metro stations public platform,
 Copyright Wiener Linien GmbH & Co KG**