



SWEET Call 1-2020: EDGE

Deliverable report

Deliverable n°	6.1
Deliverable name	La Stadera ¹ Technical Plan
Authors The authors bear the entire responsibility for the content of this report and for the conclusions drawn therefrom.	Michael, Lehning, EPFL, Michael.lehning@epfl.ch
Delivery date	10 2022

Table of contents

Summary	2
1 Introduction	3
2 Deliverable content	3
3 Conclusion	5
4 References	5
Appendix	5

¹ La Stadera replaces «Davos» since in Davos not enough progress has been made



Summary

This deliverable is related to a technical plan of a de-centralized renewable energy production plan for La Stadera, a mountain site, which would produce energy for a local consumer at Piz Scopi. The technical plan is provided as an alternative to the originally suggested plan “Davos”, which had been foreseen in the proposal. However, progress in Davos towards a technical plan was too slow, while a new opportunity at La Stadera has matured sufficiently. In a fruitful collaboration between Armasuisse, Planair and EDGE, a technical plan is put forward, which will lead to a pilot installation of a combined wind – solar PV system, a so-called wind flower. In a first installation in winter 2022/23, the performance of a static PV installation mimicking the wind flower installation is tested. For the next winter, a detailed plan has been made for a first prototype of the wind flower with turbine and moveable solar wings. The moveable solar wings should protect the solar panels from snow coverage and damage, e.g., through ice fall. Based on an in-depth wind analysis conducted by EPFL-C, a potential lay-out of the site with approximately 8 wind flower installations has been put forward.



1 Introduction

The leading idea of the EDGE project is to promote de-centralized installations of renewable energy sources such that specific landscape characteristics (Alps, Midlands, Cities) are optimally respected and such that local to regional demand is best served. Generally, in mountain regions, more energy is produced than consumed. However, the production does not (always) qualify as de-centralized production, at least not for big hydropower installations. Thus, the concept of producing renewable energy for local consumers still applies in the Alpine context. And in general, the combination of wind- and solar production has advantages with respect to stability of supply.

Following these considerations, EDGE has been a partner in the planning and realization of a de-centralized hybrid solar-wind demonstration and production installation at La Stadera (Medel, Lukmanier). There is a local consumer at Piz Scopi, who is interested in local and renewable production. Based on this, a technical implementation plan has been generated under the leadership of Planair, which is summarized here.

2 Deliverable content

The hybrid solar-PV with wind installation has two main goals:

- 1) Stable production of renewable energy with a combination of wind and solar sources in order to increase the fraction of locally produced electricity.
- 2) Demonstration of a new system (wind flower) that integrates wind and solar generation in one system and reuses old blades from a wind farm.

A plan has been worked out to install at least one and maybe more wind flowers at La Stadera. The project has a detailed implementation plan. In the first winter 2022/23, a test installation for the solar part has been planned. For this installation, two wind turbine blades are statically installed to test the solar part of the wind flower (Figure 1). If this first step is reasonably successful, a first wind flower prototype will be constructed for the winter of 2023/24. For this second phase, the detailed plan has the following steps:

- Request of quotes for a suitable wind turbine as a basis for the windflower
- Mechanical design and construction of the motorized support structure for the PV wings
- Request of building permission
- Preparation of foundation, electric infrastructure and inverters for the pilot installation
- Planning of multiplication of system; extension to 8 wind flowers on the La Stadera site
- Prediction of future electricity production based on experience with the test (2023) and pilot (2024) installations and modelling efforts

The time plan is ambitious but the first test installation (Figure 1) has been installed successfully and is operational. The specific contribution of EDGE has been on predicting wind potential at the site and by expert advice and suggestions on design variants.



Figure 1: Test installation of two wind turbine wings with solar panels at La Stadera. This is a first test to determine, whether the geometry of the solar part of the wind flow is fit for the purpose.



3 Conclusion

The technical plan “La Stadera” is an example of a hybrid solar-wind renewable energy installation suitable for high-alpine terrain. The distinguishing feature is the reuse of old wind turbine blades as a support structure for solar panels and the moveable mounting of these wings on the wind turbine mast such that they have a protected “rest” position in case of snow- or icefall. This is important to make sure that panels are not covered by snow (thus not producing) or damaged by ice or snow overload.

4 References

5 Appendix