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D4.1 – Consolidated microgrid data

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Deliverable 4.1 – Consolidated data

TwInSolar

(Improving Research and Innovation to achieve a massive integration of Solar renewables)

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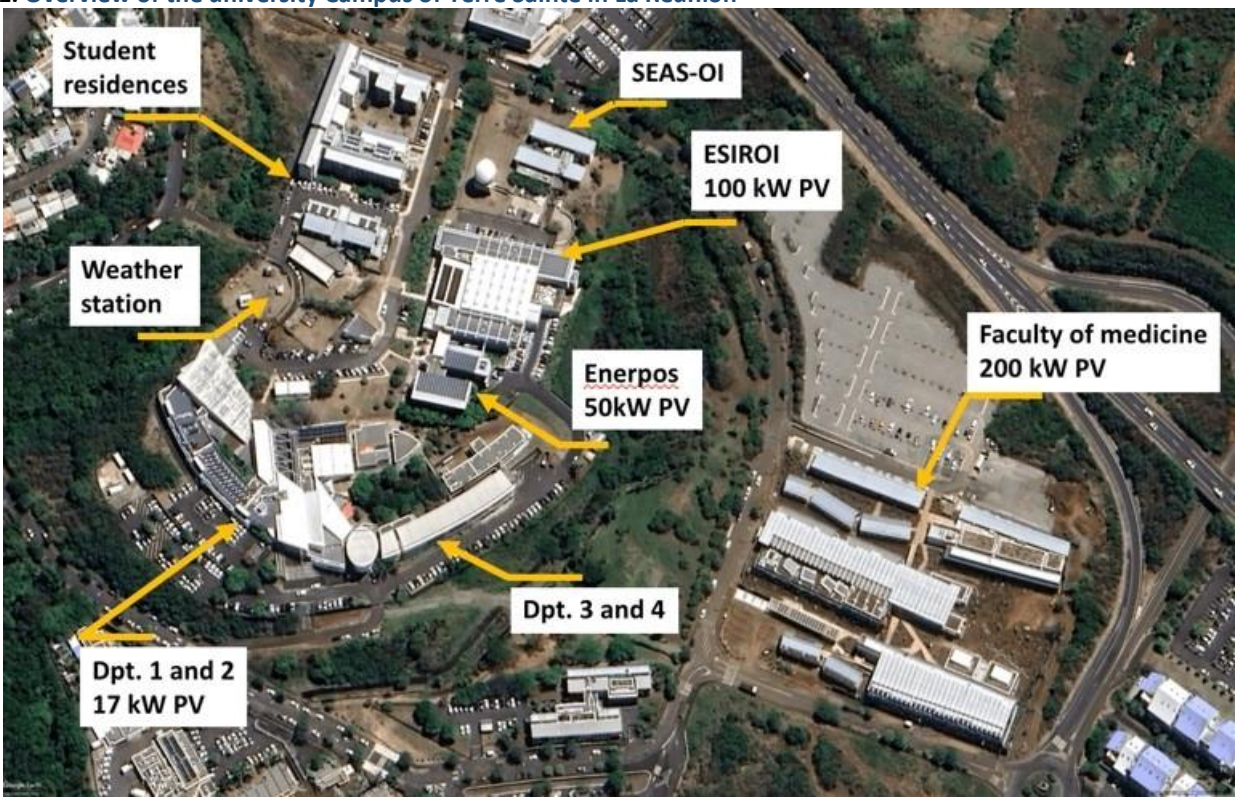
Revision

Version	Date	Author	Description of changes
V1	22/09/2023	Mathieu David	Weather data consolidation
V2	20/10/2023	Josselin Le Gal La salle	Load data consolidation
V2	31/10/2023	Mathieu David	PV production data and files formatting
V4	31/10/2023	Josselin Le Gal La salle	Final review

Executive summary

The university Campus of Terre Sainte can be considered a grid-connected microgrid. The campus is located in Saint-Pierre (21°20'S, 55°29'E, 75m, GMT/UTC+4h), on the southern coastal part of the island. The climate is hot and humid during the wet season (Nov. to Apr.) and cooler with trade winds during the dry season (Apr. to Nov.). The annual solar potential of the site reaches 2000 kWh.m^{-2} on a horizontal surface, making it an ideal location for using solar renewables. The campus hosts approximately 12,500 m^2 of floor area for the university building, a student residence with 260 rooms, and a restaurant. Figure 1 gives an overview of the campus and installed PV capacity. Already equipped with 160 kWp of PV (the additional 200 kWp of the faculty of medicine will come soon) and solar Domestic Hot Water (DWH), this microgrid has a self-sufficiency of nearly 15%. The last generation of university buildings built on the campus (Enerpos and ESIROI) are NetZero Energy Buildings. Their annual energy demand is balanced by the Building Integrated PV installed on their roofs. With approximately 50% of the area being air-conditioned, cooling is the main load of the microgrid.

1. Overview of the university Campus of Terre Sainte in La Reunion



The campus is fully instrumented to monitor weather and electrical parameters with at least a 10-min time step. First, the university maintains its own complete weather station equipped with advanced solar irradiation sensors (global, diffuse, and direct irradiance on a solar tracker) onsite. Second, the electricity demand is recorded for each building separately and for the most recent

constructions, the main types of loads (i.e., cooling, lights, ceiling fans, etc.) are also monitored. Finally, the production of the different PV plants is also recorded. A set of consolidated data with a 10-min granularity for two consecutive years, 2021 and 2022, is proposed in this deliverable. Tabe 1 below in the next page gives a summary of the data and associated files. "Readme.txt" files, containing details on the measurements and postprocessing, are also provided along the data. Note that the "Electricity demand HVAC systems ESIROI" begins in June 2021, as the ESIROI building was commissionned at this moment only.

2. List of the consolidated data and associated files with a10-min time step

	Provider	*Location*	*Short description*	*Period*	*File name*
Electricity demand	EDF-SEI (DSO)	Distribution transformer P9729	Aggregated electricity demand Dpt. 1, 2, 3, 4 and Enerpos	01/01/2021 - 31/12/2022	IUT_load.txt (column 5)
		Distribution transformer P9856	Aggregated electricity demand ESIROI and SEAS-OI	01/01/2021 - 31/12/2022	ESIROI_SEASOI.txt
		Distribution transformer P9539	Electricity demand student residences and restaurant	01/01/2021 - 31/12/2022	CROUS_load.txt
	UR	General low-voltage switchboard Dpt. 1, 2, 3, 4 and Enerpos	Electricity demand Dpt. 1 and 2	01/01/2021 - 31/12/2022	IUT_load.txt (column 2)
			Electricity demand Dpt. 3 and 4	01/01/2021 - 31/12/2022	IUT_load.txt (column 3)
			Electricity demand Enerpos	01/01/2021 - 31/12/2022	IUT_load.txt (column 4)
		Low-voltage distribution panels	Electricity demand HVAC systems ESIROI (included in electricity demand ESIROI)	16/06/2021 - 31/12/2022	ESIROI_IUT2_GF.txt
PV production	UR	Distribution transformer P9856	Estimated electricity production PV plant 17kWp Dpt. 1 and 2	01/01/2021 - 31/12/2022	Dpt_1_2_PV.txt
		Distribution transformer P9856	Estimated electricity production PV plant 46kWp Enerpos	01/01/2021 - 31/12/2022	ENERPOS_PV.txt
		Distribution transformer P9856	Estimated electricity production PV plant 100kWp ESIROI	05/04/2022 - 31/12/2022	ESIROI_PV.txt
Meteo	UR	Weather station and solar tracker	WMO wetaher station with 10m tower (GHI, DBT, RH, wind, rain, pressure) and Advanced solar irradiance monitoring on a solar tracker (GHI, BNI, DiffHI)	01/01/2021 - 31/12/2022	Meteo_Terre_Sainte.txt

The data listed above will serve as a basis for the tasks WP4.2 ("Design of a microgrid") and WP4.3 ("Management of a microgrid"). Concerning WP4.2, the load files will be used to split the consumption into movable loads and non-movable loads. This will allow to use demand-side

management techniques when relevant. The meteorological files will be needed to simulate the power supply of more production assets. Regarding WP4.3, forecasting techniques will be constructed using past recorded load data and meteorological data, and the HVAC files will be crucial to design operational management process.