

# DataWatt - Plateforme d'analyse énergétique

Design Project 2026

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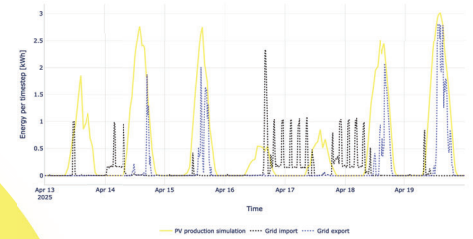
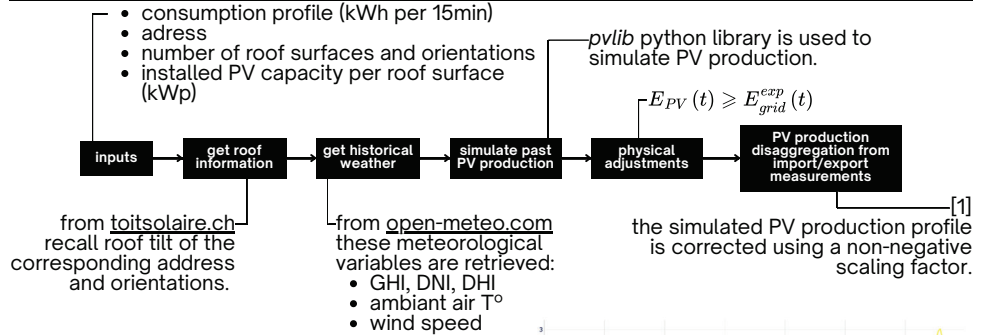
DEPOSEZ, VISUALISEZ, ANALYSEZ

2025 DP was focused on assessing **consumption** using appropriate indicators and communicate them efficiently.  
2026 DP is focused on assessing **self-consumption** using appropriate indicators and communicate them efficiently.

## 00 NOMENCLATURE

DP	design project
PV	photovoltaic
BESS	battery energy storage system
GHI	global horizontal irradiance
DNI	direct normal irradiance
DHI	diffuse horizontal irradiance
MAE	mean absolute error
RMSE	relative mean square error
MBE	mean bias error
nRMSE	normalised root mean square error
MAPE	mean absolute percentage error
KPI	key performance indicator
SCR	self-consumption ratio
SSR	self-sufficiency ratio
DCS	daylight consumption share
LCOS	levelised cost of storage

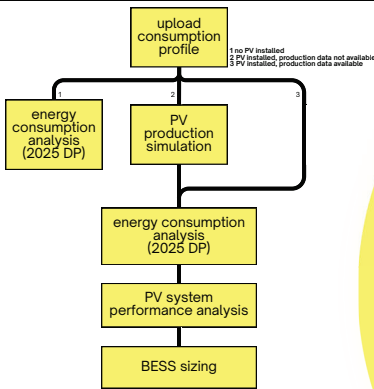
## 02 PV PRODUCTION SIMULATION



PV simulation performance:

MAE [kWh/day]	RMSE [kWh/day]	MBE [kWh/day]	nRMSE [%]	MAPE [%]
12.91	15.64	11.93	37.07	122.83

## 01 APP WORKFLOW



## 03 PV SYSTEM PERFORMANCE ANALYSIS

KPIs:

- $SCR = \frac{\sum_t (E_{PV}(t) - E_{grid}^{exp}(t))}{\sum_t E_{PV}(t)}$  **42.9%** **good**
- $SSR = 1 - \frac{\sum_t E_{grid}^{exp}(t)}{\sum_t E_{load}(t)}$  **58.9%** **excellent**
- $DCS = \frac{\sum_{t \in \tau_{day}} E_{load}(t)}{\sum_t E_{load}(t)}$  **75.4%** **excellent**

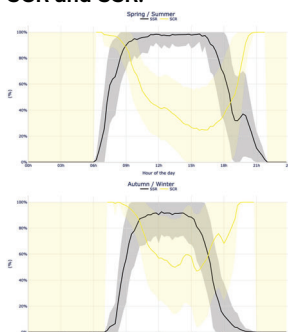
KPI thresholds:

Indicator	bad	good	excellent
SCR	<30%	30%-60%	>60%
SSR	<25%	25%-50%	>50%
DCR	<40%	40%-70%	>70%

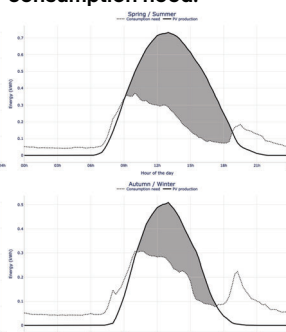
diagnostic: PV system and consumption profile are coherent.

recommendation: only some storage could help improve self-consumption.

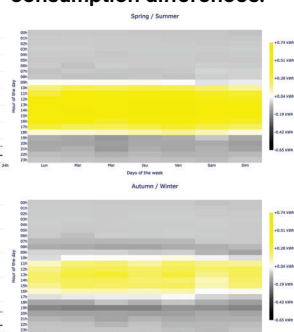
SCR and SSR:



PV production and consumption need:



heatmap of production / consumption differences:



## 04 BESS SIZING

fixed parameters for battery sizing:

parameter	value
battery capacities (C <sub>batt</sub> )	S = {0,3,5,7,10,15,20} kWh
optimization criterion	"total cost minimization"

for each candidate C<sub>batt</sub> ∈ S the BESS simulation is run.

user-adjustable parameters for BESS simulation:

parameter	unit
grid import price	CHF/kWh
grid export price	CHF/kWh

parameters for BESS economic model:

parameter	value
BESS lifetime (L)	30 years
BESS installation cost (C <sub>inst</sub> )	1'000 CHF
5 kWh BESS cost (C <sub>5</sub> )	600 CHF/kWh
50 kWh BESS cost (C <sub>50</sub> )	350 CHF/kWh
BESS maintenance cost (C <sub>maint</sub> )	0 CHF/year

- battery investment cost
- total annual cost: battery cost + electricity bill
- LCOS: cost per kWh of energy discharged

recommend C<sub>batt</sub> that minimizes total annual cost.

