A building energy simulation platform to scale up the zero-emission H&C market in Europe

EHPA webinar: Digitalisation in the H&C industry

EU Industry Week 2021 – March 9th from 10:00 to 12:00 CET
POLYSUN DETAILED INSIGHT
INCL. API AND TECHNOLOGY MODELS
VELA SOLARIS IS THE MARKET LEADER IN THE FIELD OF ENERGY SYSTEMS SIMULATION

• Location Winterthur (Switzerland)
• Worldwide distribution of Polysun software range with customers in over 40 countries
• Offer of consulting services in the field of energy system simulation
• Over 1,000 corporate customers use Polysun: Renowned engineering companies, manufacturers and distributors of energy system components, energy service providers and universities.
ENERGY SYSTEMS ARE PLANNED HOLISTICALLY

• Simulation based planning
• Smart combination of thermal and electrical energy generation as well as e-mobility
• Review of various system dimensioning and control strategies
• Output of comprehensive key figures (e.g. own consumption or energy yield)
DIGITAL SALES OF ENERGY SYSTEMS IN THE CLOUD

• Polysun API supports your digital sales processes. Customers or partners inform themselves online about your energy systems.

• On the basis of just a few inputs, you receive simulated suitable proposals from Polysun. The high informative value increases the closing probability.

• If a contract is awarded for an energy system, Polysun provides data for seamless integration into order processing and detailed planning.
REFERENCE EXAMPLE: VAILLANT (POLYSUN API)

Online tool for detailed planning of heating systems

Heat pump sizing tool (not public, for partner platform, fully linked to backend)
REFERENCE EXAMPLE: SMA (POLYSUN API)

Online tool for detailed planning of building energy systems as a tool for SMA customers

Polysun API as design and simulation backend

- PV + battery
- Heat pumps
- Building model

Beispielansicht: SMA SUNNY DESIGN PRO
https://www.sunnydesignweb.com/sdweb/
SIMULATION IN THE CLOUD: POLYSUN API

Polysun computational core can be accessed directly via HTTP calls or with a client-side library.

Based on Java Spring Framework and MySQL database technology.

Hosted on AWS and arbitrarily scalable.

Client libraries available in Java, C#, ...

Developed and maintained by Vela Solaris

Operated by Customer

Developed and maintained by Partners

Operated by Vela Solaris
OUR CLIENTS

Planners and project developers:

- TK BAUPARTNER
- gruner
- neukom
- Hoval
- halter
- Timo Leukefeld
- AMSTEIN + WALTHER

Energy providers:

- WIEN ENERGIE
- Stadtwerke Düsseldorf
- EnBW
- badenova
- BKW
- AEW
- sig
- energie360°
- EKZ

Higher education:

- Albert-Ludwigs-Universität Freiburg
- Technische Universität Dresden
- FH Technikum Wien
- Dalarna University

Manufacturers and resellers:

- Vaillant
- BayWa
- Viessmann
- DUALSUN
- meier tobler
- SMA
- RIELLO
MANY THANKS FOR YOUR TRUST
The SunPeople Project

David Bourguignon
Interreg FCE SunPeople project manager
ALOEN (local energy/climate agency Southern Brittany)
Lorient FR

EHPA webinar – March 9th 2021
Datasheet: Interreg FCE SunPeople

- **Partners**
  - ALOEN (FR) – Lead partner :: energy agency
  - Plymouth City Council (UK) :: local authority
  - Plymouth Energy Community (UK) :: social business
  - Aezeo (FR) :: SME (DIY training center)

- **Funding**
  - Budget 499,266€ (80% ERDF)
  - Over 24 + 3 months since 1\textsuperscript{st} August 2019

- **Goals**
  - Design and implement next-generation heat energy services on existing sites in Lorient and Plymouth
  - Demonstrate relevance of “new solar” system/business/impact cases
  - Involve all stakeholders, in particular the supply chain, in order to help the demand/offer market grow/mature in Europe
SunPeople site data pipeline

Techno-economic simulation of the energy SCHEME
(provided by an engineering studio, etc.)

Techno-economic simulation of the energy SERVICE
(provided by an ESCo, etc.)

SUNPEOPLE SITE DATA PIPELINE

Check it online
Datasheet: Solar Kafe Lorient

- **Innovative event format: 3-step online engagement**
  - Large-scale procurement exercise/soft market testing
  - Target: building owners with individual homes relying on oil boilers
  - Event #1: system/impact case (energy, CO₂)
  - Event #2: business case
  - Event #3: energy service

- **Participants: individual building owners**
  - Between 2 and 4 occupants
  - Between 48 and 180 m² surface area
  - Total heat requirement of more than 50,000 kWh
  - 13 participating dwellings (first iteration, target: 17.5k)
    - A very well insulated new house (unders 2012 thermal regs)
    - A single-family house with an old gas system
    - A new flat (under 2012 thermal regs)
    - A single-family house with a recent oil boiler
    - An all-electric house (heaters, cylinder, car)
Comparing energy systems with Polysun Designer
Energy harvested onsite

- Energy bought and imported

Useful heat

180-m² dwelling well insulated
In this Solar Kafe #1, the winning energy system is **heat pump + solar th. combisystem + solar PV** with an overall COP > 4.5
In this Solar Kafe #1, only the energy system *heat pump + solar th. combisystem + solar PV* is compatible with the Paris Agreement (to stay under +1.5°C requires −74% GHGe in H&C energy systems before 2030 for France)

### GHG emissions avoided (scopes 1&2)

<table>
<thead>
<tr>
<th>Energy System</th>
<th>CO2 Saved (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaud. Gaz + SSC</td>
<td>27% économisé</td>
</tr>
<tr>
<td>PAC Air/Eau</td>
<td>38% économisé</td>
</tr>
<tr>
<td>PAC Air/Eau + PV</td>
<td>67% économisé</td>
</tr>
<tr>
<td>PAC Air/eau + CESI</td>
<td>46% économisé</td>
</tr>
<tr>
<td>PAC Air/Eau + SSC</td>
<td>57% économisé</td>
</tr>
<tr>
<td>PAC + SSC + PV</td>
<td>80% économisé</td>
</tr>
</tbody>
</table>

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[Diagram showing CO2 emissions avoided for different energy systems]
Benefits of reference simulation (I)

Comparison of
- system
- business
- impact
cases either intra or inter sites

Data provided by the supply chain + scientific validation

Better informed decisions through forecasting during design and O&M phases

Optimised CAPEX + OPEX

Support complex decision-making for building owners, engineering studios, procurement
Benefits of reference simulation (II)

"Code is law": from a norm-based to a simulation-based approach to sustainability

1. Reference simulation platform (code + data)
2. Bring science into procurement + level the playing field for innovative solutions challenging the status quo
3. Fix dysfunctional market
4. Scale up healthy market

Scale up the sustainable H&C market for truly efficient and innovative solutions
Datasheet: reference simulation within data-infrastructure.eu

- GAIA-X federated data infrastructure
  - New dataspaces through the interconnection of data
  - Cooperating autonomous components
  - Models for common concepts/behaviors + interfaces
  - Advanced smart services for an open/fair digital future

- Future of reference simulation platforms
  - Meet large-scale sustainability challenges at the EU-level
  - Help innovative solutions enter the market (eg. harvest, store, distribute more efficiently the Sun’s radiative energy)

SunPeople site data pipeline (and more) will be open sourced in July 2021
Thank you!

Projet management:

**davidbourguignon@aloen.fr**

Interested? Register on: