



Scilab Cloud Sanofi Success Story



Scilab – Highlights

- Scilab® is an **open-source** software for numerical computing
- Scilab has a **1M+ user** community worldwide
- **Scilab Cloud** enables the deployment of scientific applications
- The Scilab Team is part of **ESI Group**

Scilab – ESI Offering

- **Professional services**

Development of applications leveraging Scilab, Scilab training, Scilab support

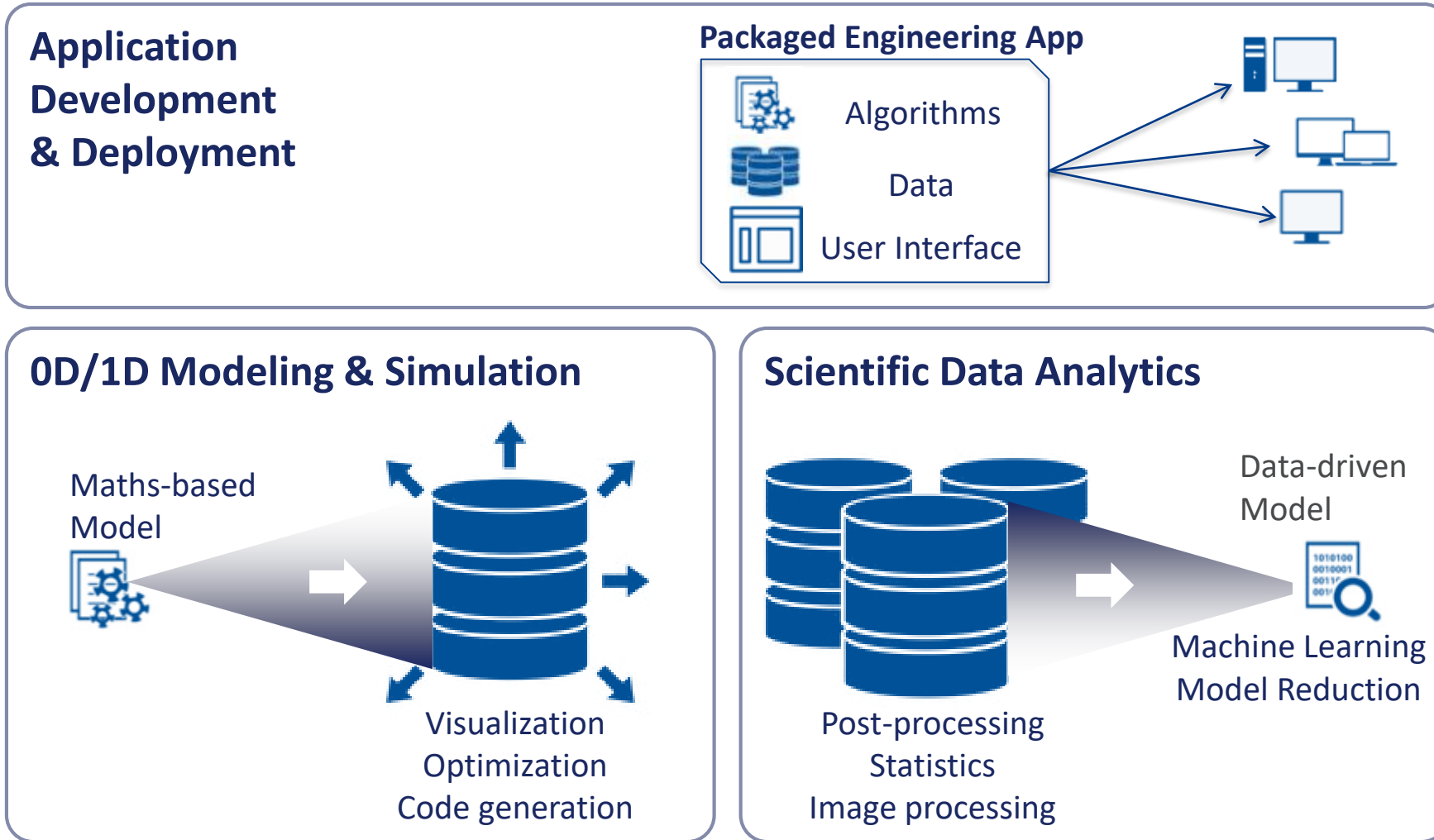
- **Cloud services**

Scilab Cloud for the deployment of applications (on-premises/private or public cloud)

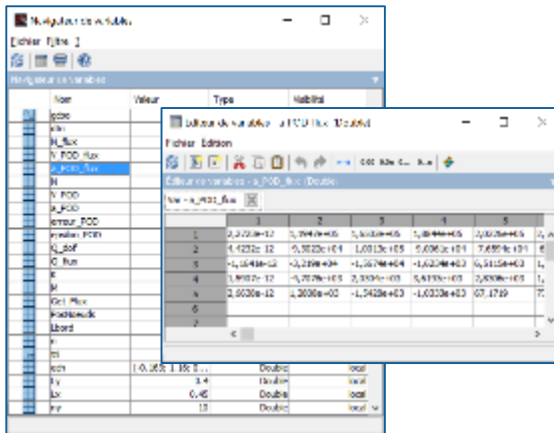
- **Software solutions**

Offerings which extend the power of existing ESI software with Scilab & Scilab Cloud (Pre/post-processing, coupling with third-party simulation codes, simple apps..)

Scilab functional overview



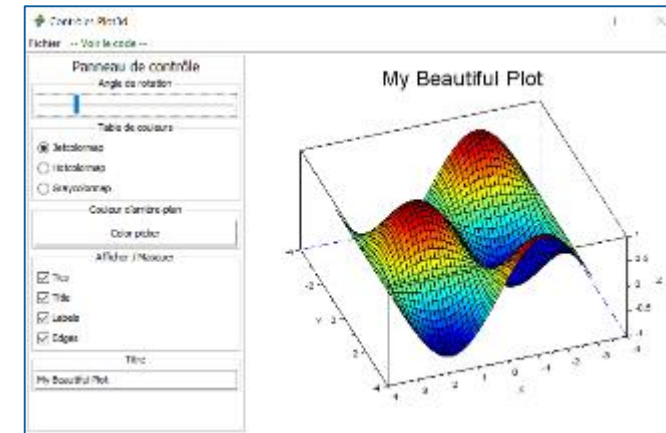
Application development



Data

```
1 // fonction de calcul de l'énergie cinétique
2 // fonction de calcul de l'énergie potentielle
3
4 // fonction de calcul de l'énergie totale
5
6 // fonction de calcul de l'énergie cinétique
7 // fonction de calcul de l'énergie potentielle
8 // fonction de calcul de l'énergie totale
9
10 // fonction de calcul de l'énergie cinétique
11 // fonction de calcul de l'énergie potentielle
12 // fonction de calcul de l'énergie totale
13
14 // fonction de calcul de l'énergie cinétique
15 // fonction de calcul de l'énergie potentielle
16 // fonction de calcul de l'énergie totale
17
18 // fonction de calcul de l'énergie cinétique
19 // fonction de calcul de l'énergie potentielle
20 // fonction de calcul de l'énergie totale
```

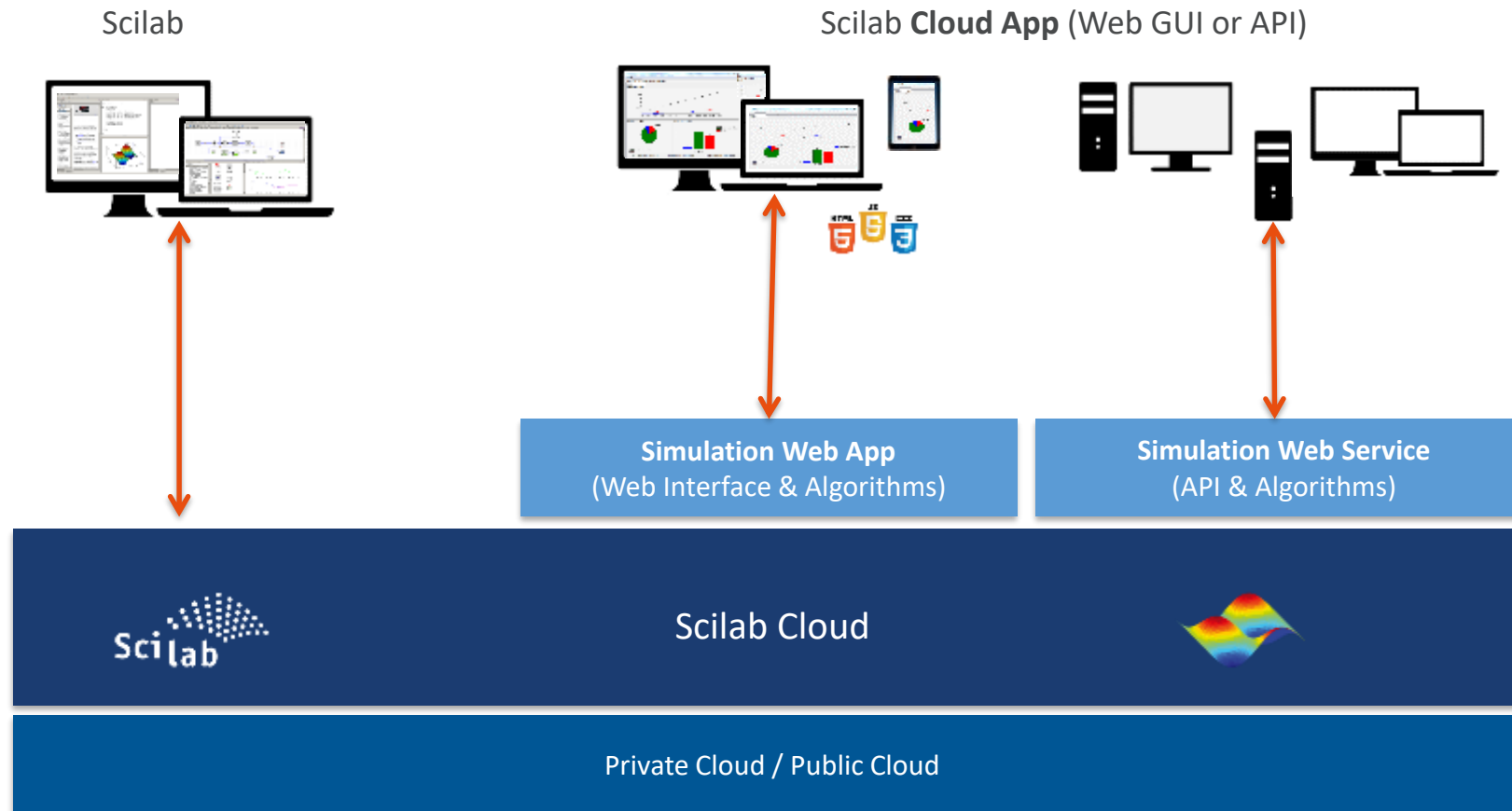
Algorithms/Scripts



User Interface

+ Leverage legacy code with API for Java, C and C++

Application deployment



SANOFI using Scilab Cloud ..

... to optimize energy costs through simulation



Problem

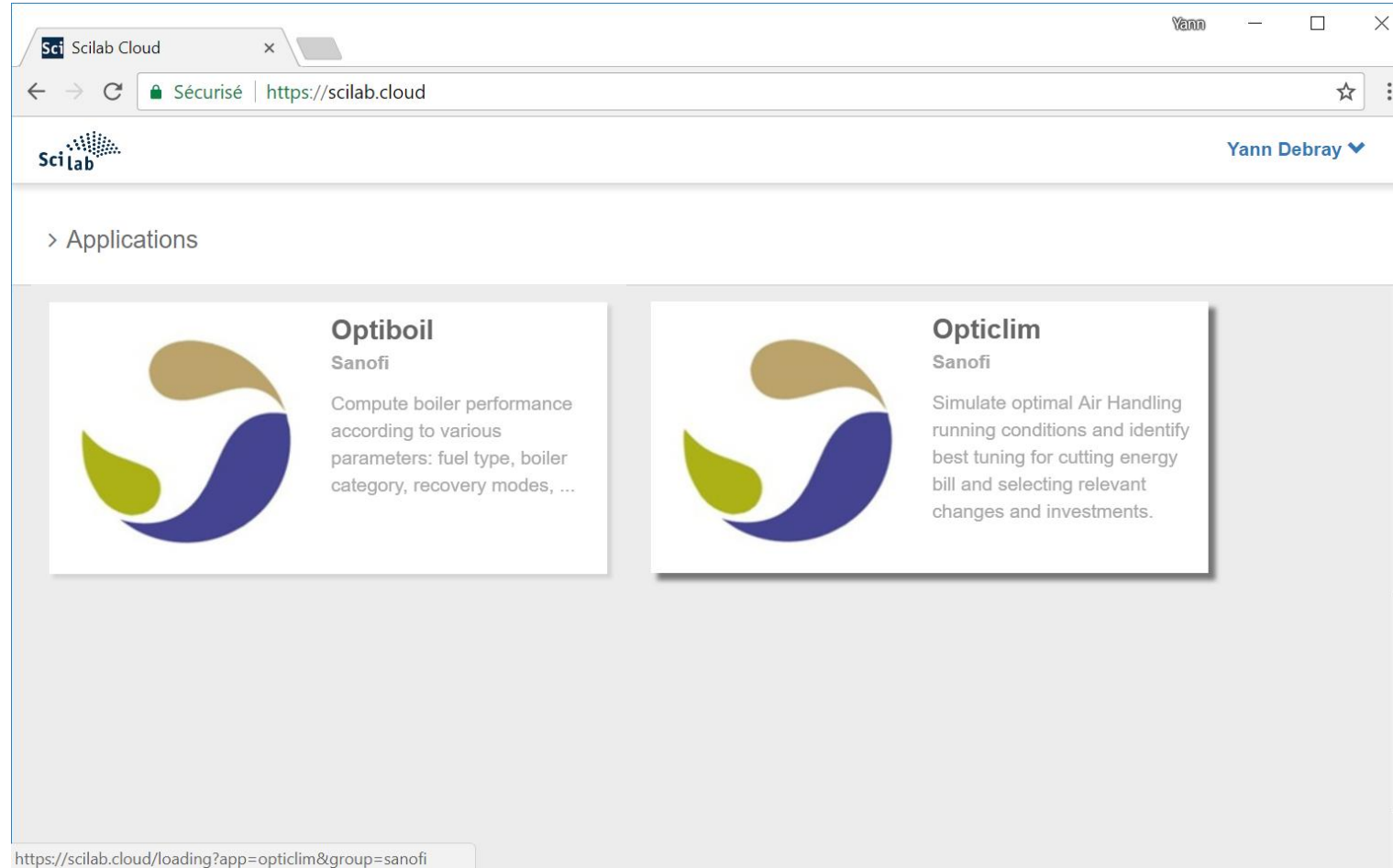
- Inefficient control of HVAC (Heating, Ventilation & Air Conditioning) leads to energy waste
- HVAC = 60 % of energy bill (example: 500k€/year/site)

Objectives

- Save 10M€+ /year in energy bills worldwide
- Energy efficiency at 100+ industrial sites

No installation hassle

Easy access to the end user



Extended forms with full personalization

The screenshot displays the Scilab Cloud OPTICLIM application interface. The browser address bar shows the URL: <https://scilab.cloud/application?app=optictim&group=sanofi&version=-1>. The user is logged in as 'Yann'.

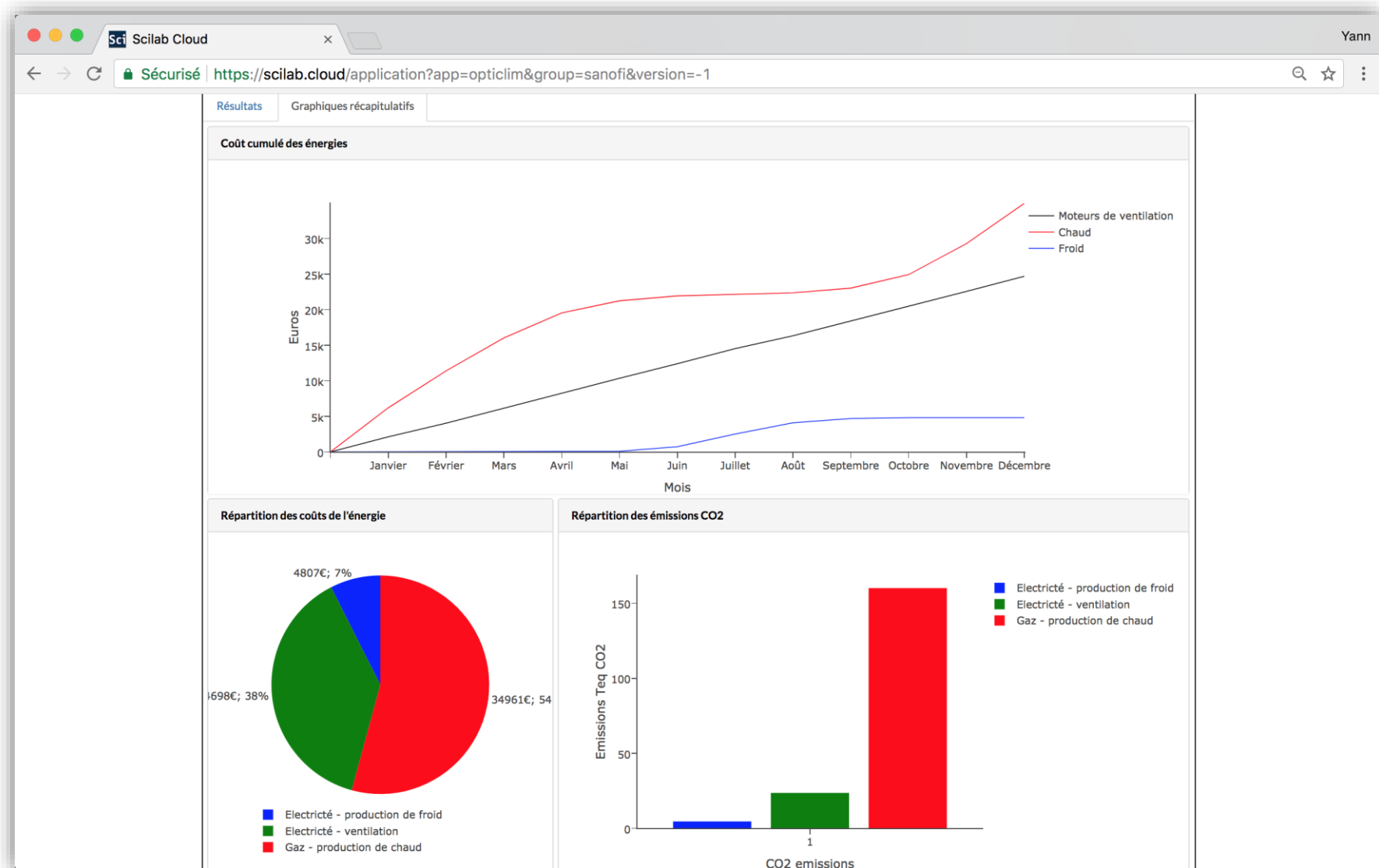
The main content area is titled 'Tests' and includes the following configuration options:

- Choix d'une station météo: Anagni
- Number of AHU on site: 30
- Buttons: Gestion de bâtiment, Calendrier des arrêts de production, Calendrier d'occupation des locaux, Nouvelle CTA
- Local: Energie & régulation, CTA, Récupération d'énergie

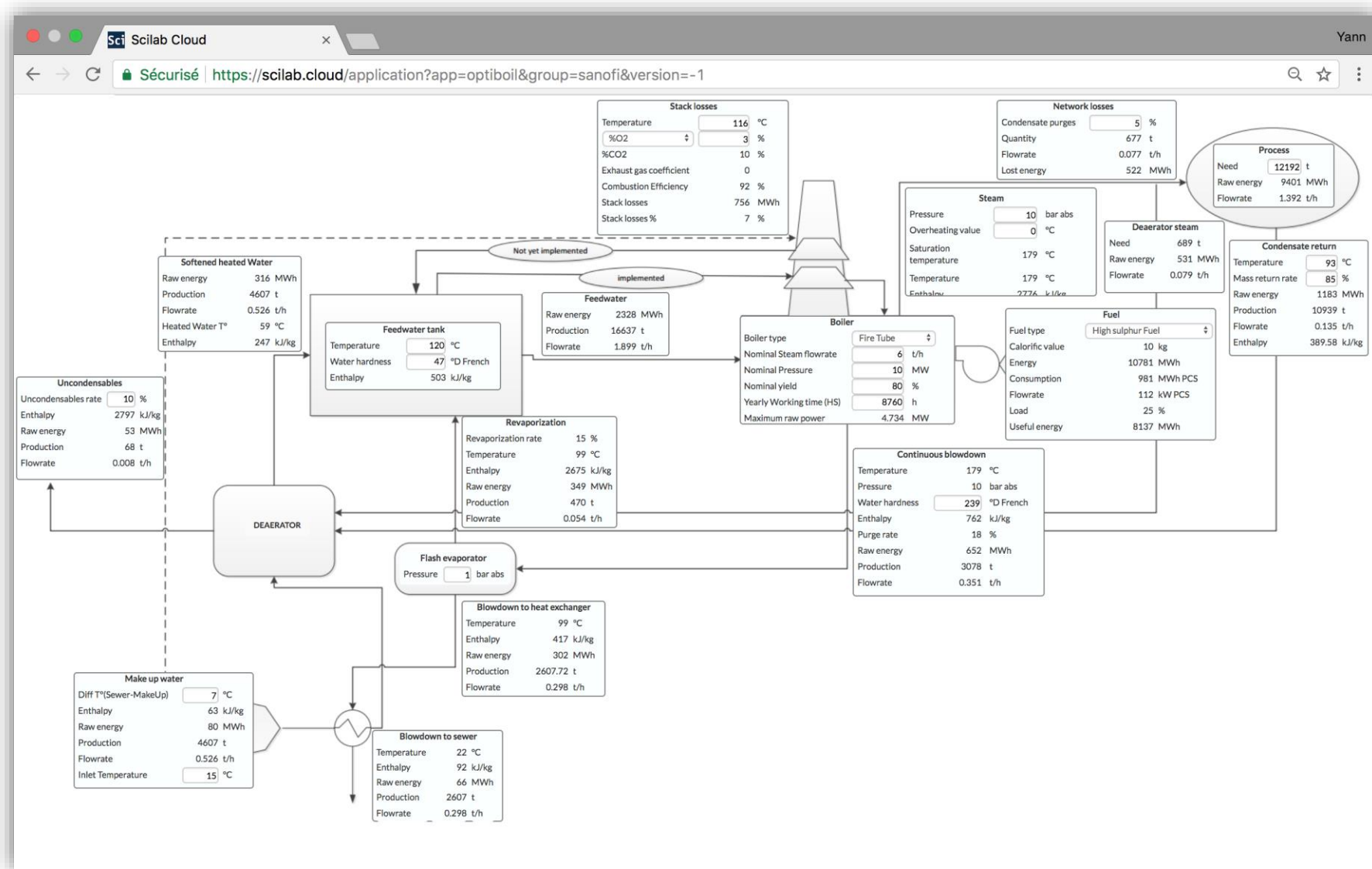
The configuration is divided into 'Valeurs initiales' and 'Valeurs de simulation' sections. The 'Valeurs de simulation' section includes a table of parameters with tolerance values:

	Valeurs initiales		Valeurs de simulation	
		Tolérance		Tolérance
Température de consigne en occupation (°C)	22	1	21	3
Humidité relative de consigne en occupation (%)	55	3	55	3
Température de consigne en inoccupation (°C)	22	1	21	3
Humidité relative de consigne en inoccupation (%)	55	3	55	3
Nombre de personnes présentes pendant les heures ouvrées	2		2	
CTA de prétraitement d'air neuf?	non		non	
Température d'air neuf prétraité				
Hygrométrie d'air neuf prétraité				

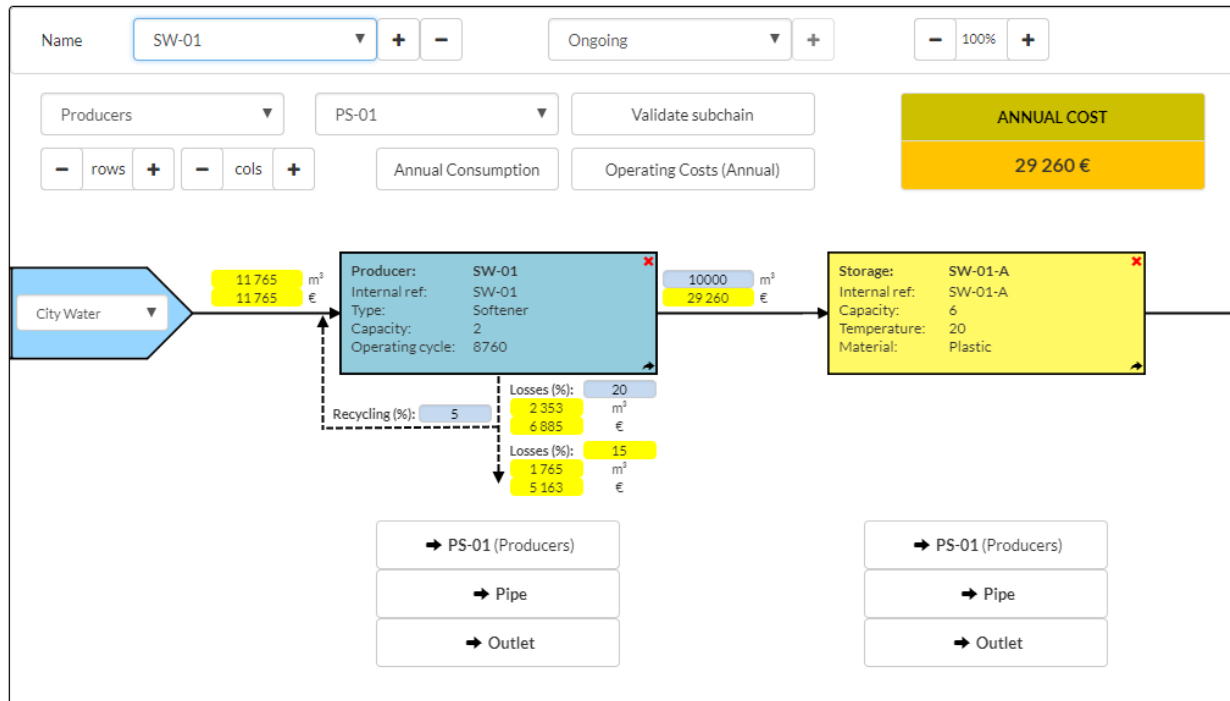
Dynamic graphics with server side computing



System parameters made available in a black box mode

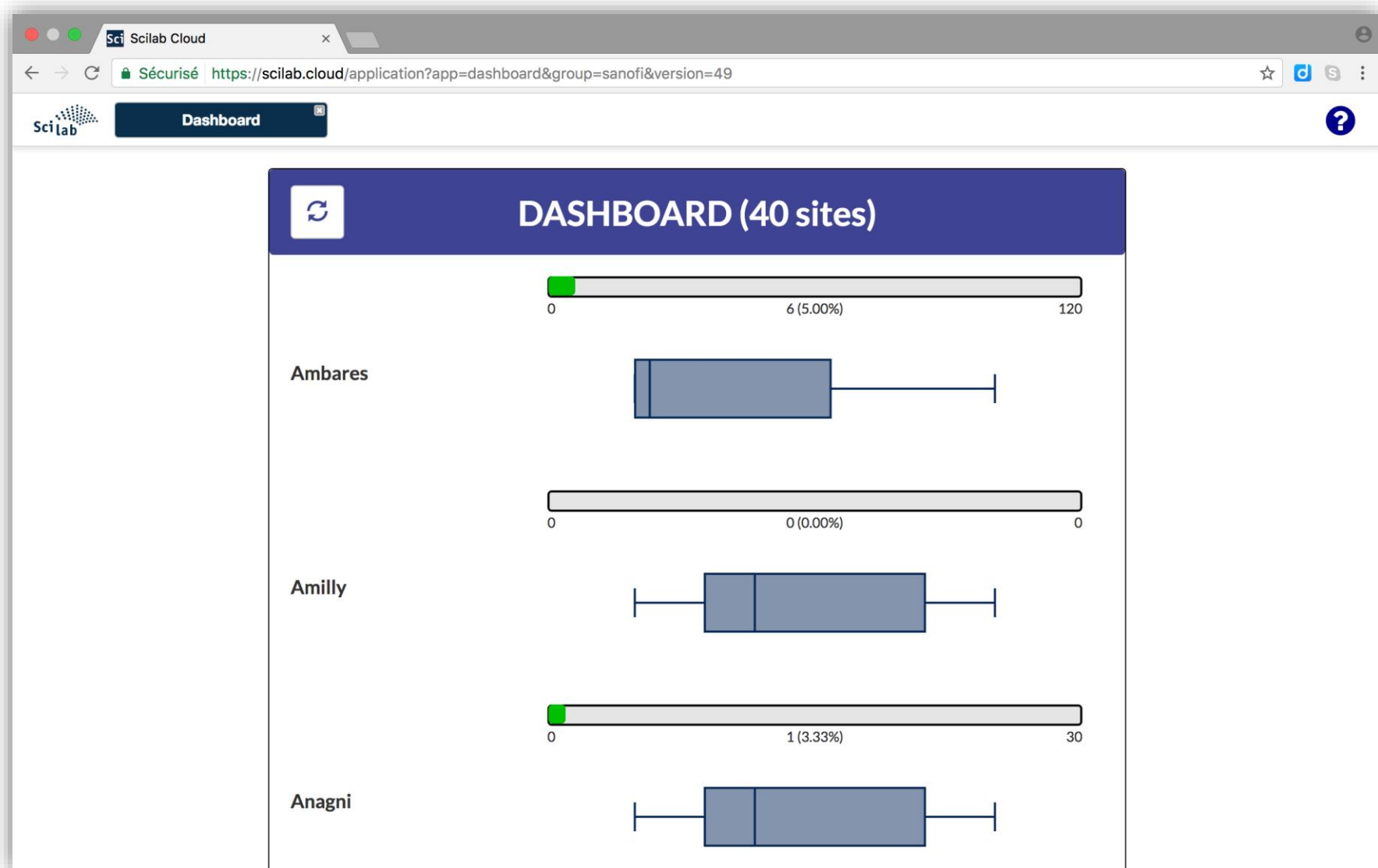


Workflows providing high level KPIs



CSANYIK	SITE LEVEL	PWR-11-13	PURIFIED WATER	PSR-01	PSR-05
24/11/2018					
Energy unit price					
Electricity (€/kWh)	0.078				
Raw Water (€/m³)	2.320				
Black Steam (€/m³)	0.032				
Chilled Water (€/m³)	0.040				
Hot Water (€/m³)	0.000				
Energies Consumptions (annual)					
Consumption of raw water (m³)	89 468	35 083	35 083		
Electricity consumption (kWh)	9 533 004	315 660	315 660	24 480	16 320
Black Steam consumption (kWh)	0	0	0	3 450 048	629 082
Hot water consumption (kWh)		0	0	0	0
Chilled water consumption (kWh)		0	0	0	0
Consumption of purified water (kWh)		29 119	29 119	5 190	800
Costs (annual)					
Raw Water : annual cost (€)	207 566	81 393	81 393	32 383	4 992
Energies : annual cost (€)	743 574	24 621	24 621	112 311	21 404
Operating annual cost (€)	256 610	75 680	75 680	5 659	5 001
Annual production of pharma water (m³)	48 038	29 119	29 119	4 567	736
Purified Water : annual cost (€)	181 694	181 694	181 694		
Clean steam : annual cost (€)	181 749			150 352	31 396
Water For Injectable : annual cost (€)	318 290				
Annual cost for pharma water production (€)	681 732				
KPI's					
PRICE OF PW (€/unit)	6.24	6.24	6.24		
PRICE OF CS (€/unit)	34.27			32.92	42.66
PRICE OF WFI (€/unit)	23.38				
Ratio PHARMA WATER / FEED WATER		0.83	5.18	0.88	0.92
Energy (kWh/m³)		10.84		760.79	876.90
OPERATING COSTS					
Operating costs (€/m³)		2.60	2.60	1.24	6.79
WATER LOSSES					
Water losses (m³)		5 964	5 964	623	64
Water losses (€)		37 215	37 215	20 503	2 730

Consolidated data across the user base





Find out more
scilab.org/cloud