



**AFRICAN ASSOCIATION
FOR TECHNOLOGY &
INNOVATION**

DRONE GROUPE



**Centre Universitaire de Recherche
et d'Application en Télédétection**

AfricaGIS 2021

IMPLEMENTATION OF REMOTE WEBSIG OF A PHOTOVOLTAIC MICROGRID IN CONAKRY (GUINEA)

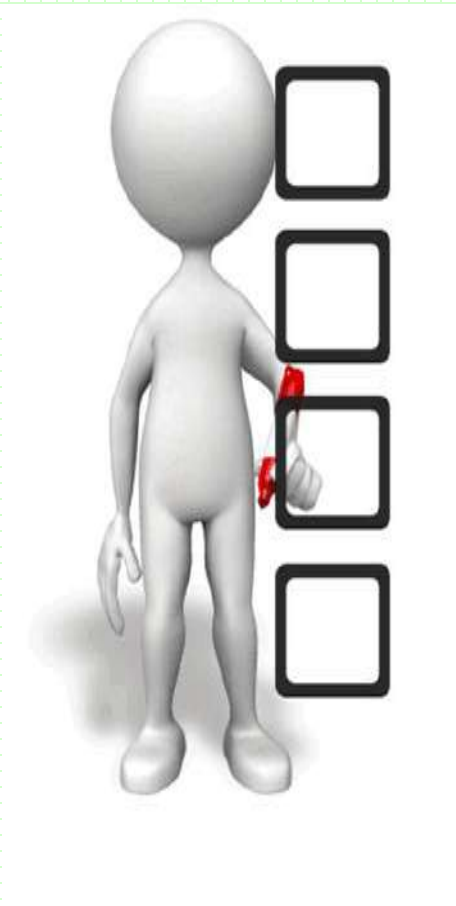
Presented by :

KPEGNE KAKAYO HERVE

Abidjan, November 24, 2021



SUMMARY



INTRODUCTION

I-

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THE STUDY

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Introduction

Importance of energy



ENERGY

Conakry region in Guinea

ELECTRICITY PROBLEM

Inadvertant load shedding: 2 to 5 power outage per day,

- **Palliative:** generators inaccessible to all.
- **Paradox:**
 - Good untapped solar potential

PROPOSED SOLUTION

BRESSAN (2014)

- **Solution:** Photovoltaic Energy
- **Topic :** Implementation of a centralized remote monitoring tool
- **Benefits :**
 - Reduce the period of the Return On Investment
 - limit production losses
 - improve the performance of the installations

Hence the need to use solar energy as an alternative source to fossil fuels

IMPLEMENTATION OF REMOTE WEBSIG OF A PHOTOVOLTAIC MICROGRID IN CONAKRY (GUINEA)

Main objective :

The **objective of** this study is the establishment of a decision support tool in the field of photovoltaic energy to ensure the control, monitoring and maintenance of photovoltaic installations.

Specifics objectives

1

Register solar **plants** of Conakry in order to create a spatial database of Web mapping.

2

Model the data acquisition and centralization system of the photovoltaic **power plant** observed in order to feed the database.

3

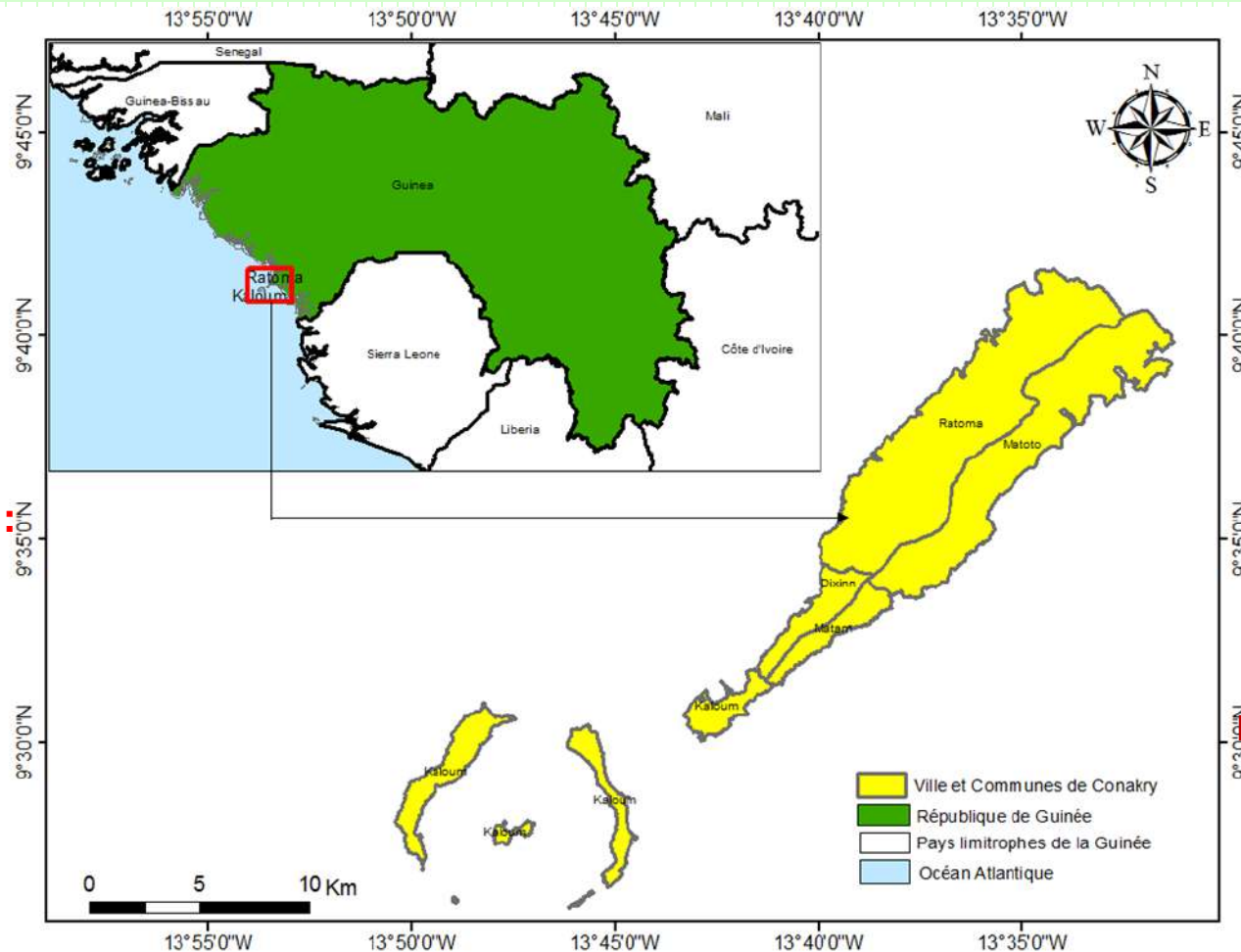
Set up a remote-control system for photovoltaic **power plants** in order to correct or prevent anomalies and malfunctions.

I-

PRESENTATION OF THE LOCATION OF THE STUDY

I-PRESENTATION OF THE STUDY AREA

PHYSICAL CHARACTERISTICS



□ **CONAKRY**
:

**Capital of
Guinea**

□ **QUARTER**
S : 135

□ **5**

MUNICIPALITIES:
**Ratoma, Dixinn,
Matoto, Matam et
Kaloum + île de
Los.**

□ **AREA :**

308km²

Length of 34 km

Width from 1 à 6

km

□ **POPULATION :**

1.660.973 hab

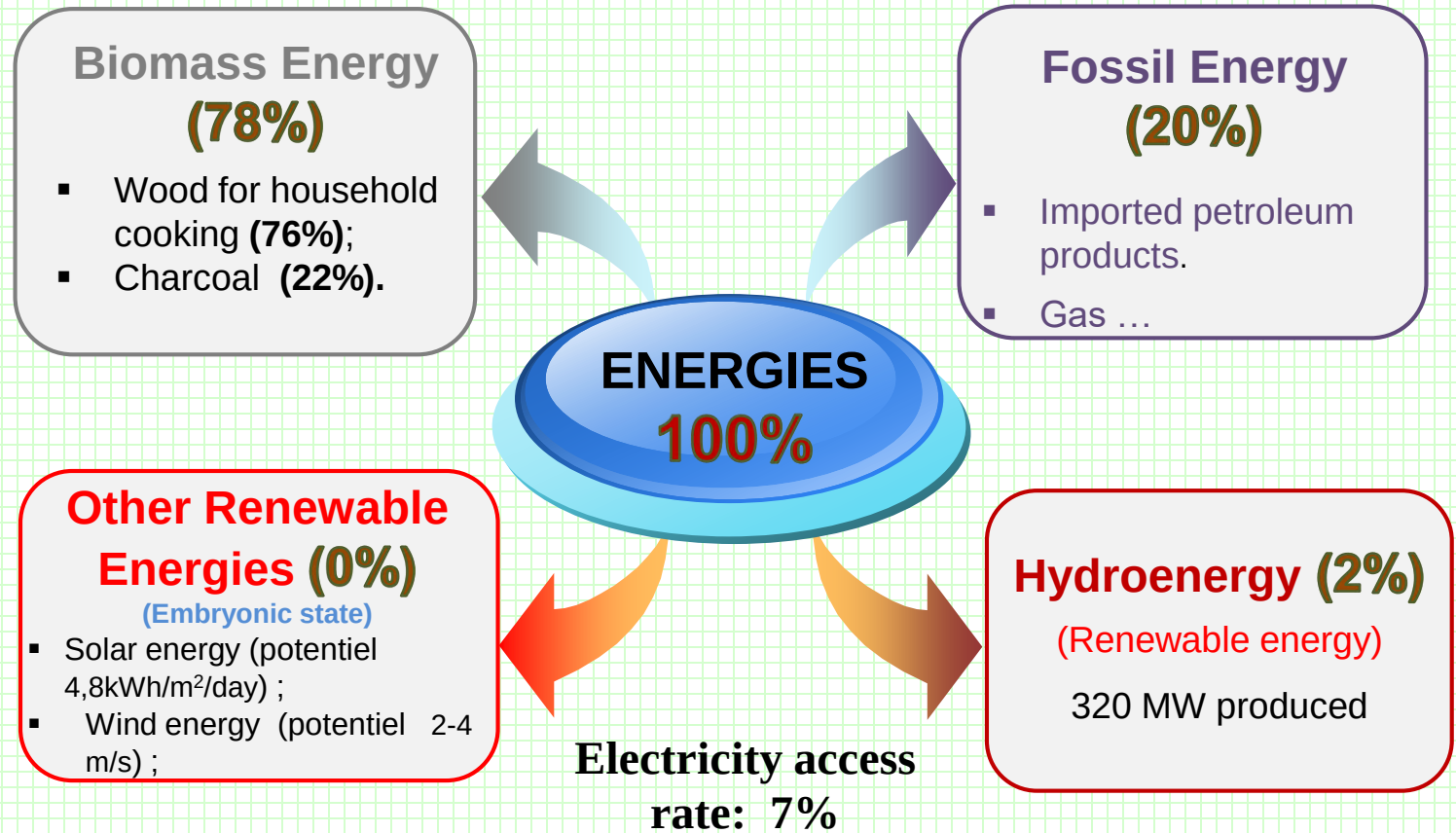
□ **DENSITY :**

5.392 hab

/km²

□ **6 MONTHS OF RAINY SEASON : May to October**

□ **6 MONTHS OF DRY SEASON : November**



Consequences :

- Lack of electricity
- Load shedding in Conakry and in the interior of the country



II-

MATERIALS AND METHODS

FICHE D'ENQUETE	
Numéro Enquête :	Equipe Technique N° :
Date Enquête :	Chef d'équipe :
1- CLIENT	
Type client : ☐ <i>Personne Physique</i> ☐ <i>Personne Morale</i>	
Nom :	Téléphone :
Prénoms :	E-mail :
Personne à contacter :	
2- SITE PV	
2.1- IDENTITE SITE	
Code Site :	Date de mise en service :
Nom site :	Statut :
2.2- SITUATION GEOGRAPHIQUE	
Commune :	Latitude :
Quartier :	Longitude :
Secteur :	
Observation :	
3- COMPOSANTS PHOTOVOLTAIQUES	
3.1- PANNEAUX SOLAIRES	
Nom module :	Surface (m²) :
Fabricant :	Inclinaison :
Technologie :	Azimet :
Puissance (KWp) :	
Nombre de modules :	
Observation :	
3.2- ONDULEURS	
Nom :	Fréquence :
Fabricant :	Quantité onduleur :
Tension Maximale :	
Observations :	
3.3- BATTERIES	
Modèle :	Fabricant :
Tension (V) :	Capacité (Ah) :
Observations :	
3.4- REGULATEUR	
Type :	Observations :
Modèle :	
Fabricant :	
3.5- CAPTEUR DE TEMPERATURE	
Type :	Observations :
Modèle :	
Fabricant :	



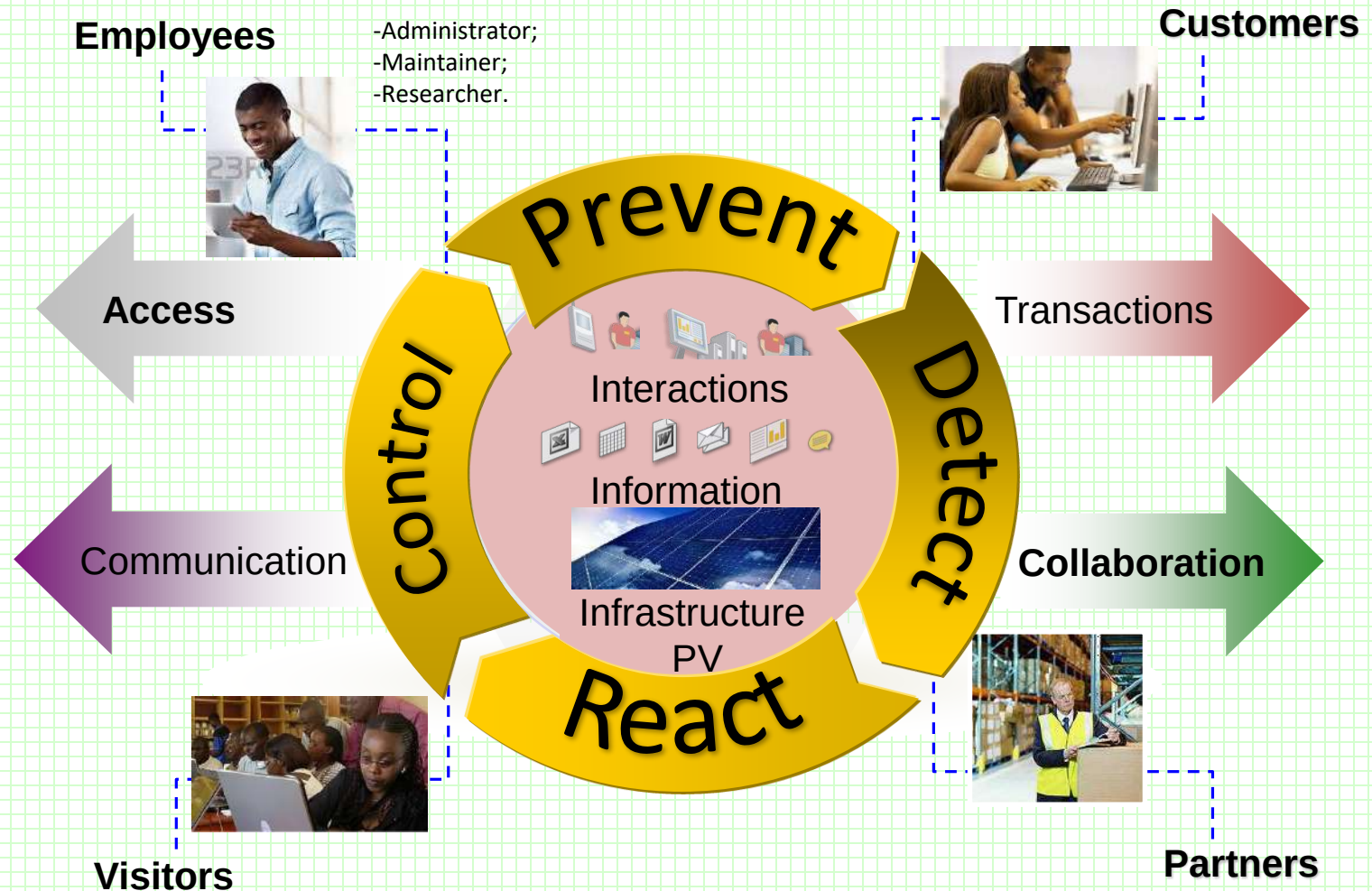
Prospecting equipment

- GPS receiver (GARMIN 62);
- Camera (Techno C9);
- Survey form.

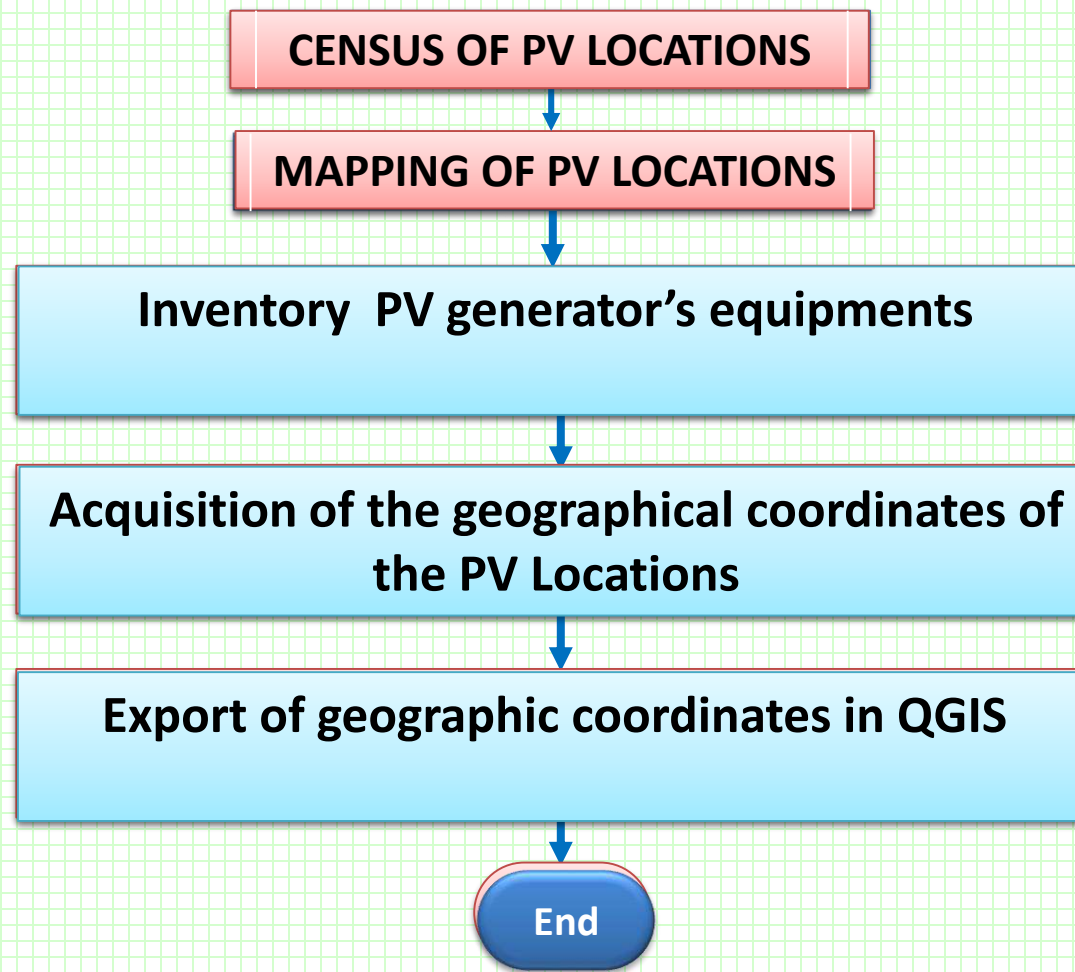


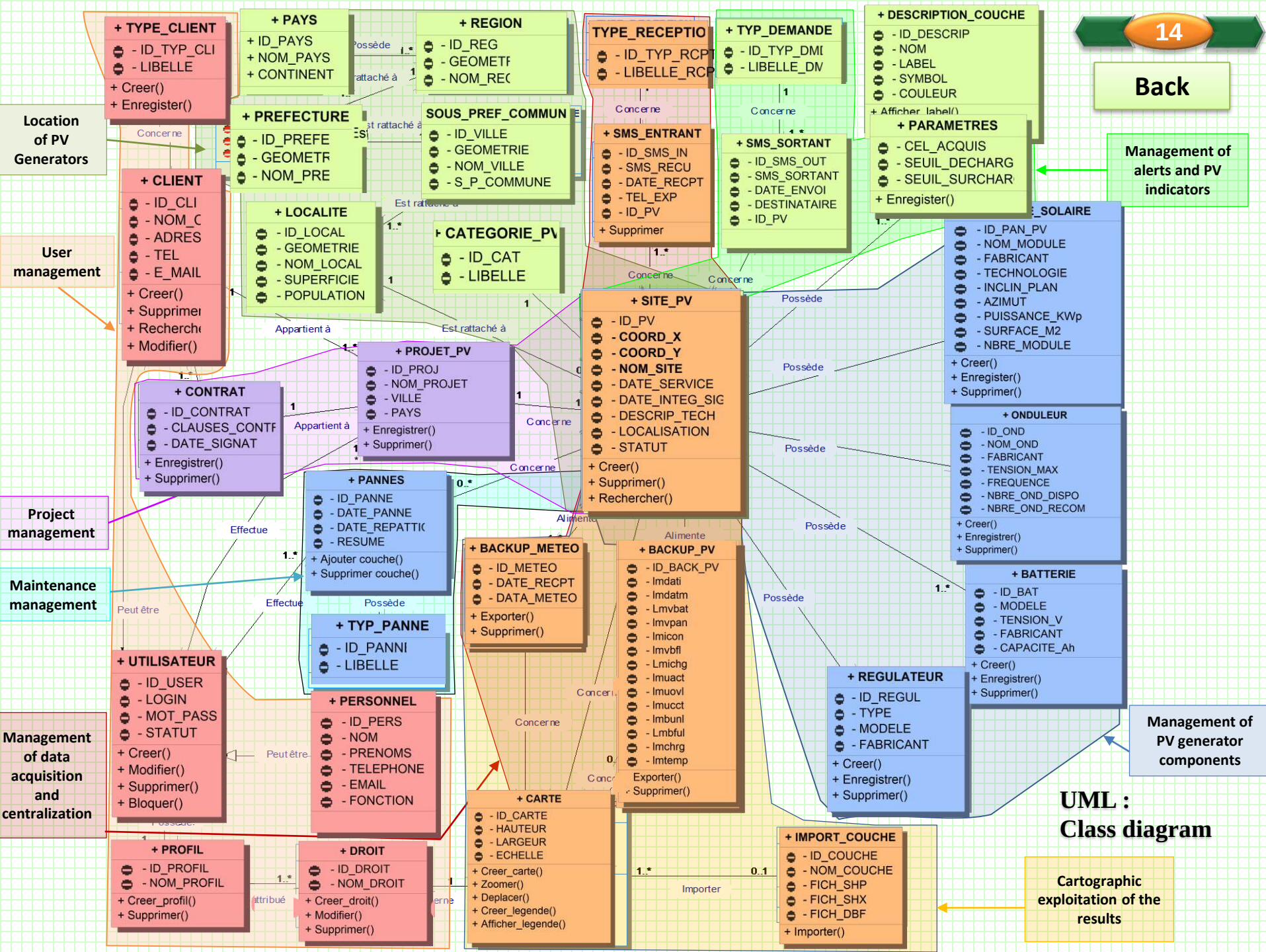
- Win' Design (AGL);
- Office software.

REQUIREMENTS



PROCESS OF INTEGRATING PV LOCATIONS INTO THE WEBSIG AND MAPPING OF THE IDENTIFIED PV LOCATIONS



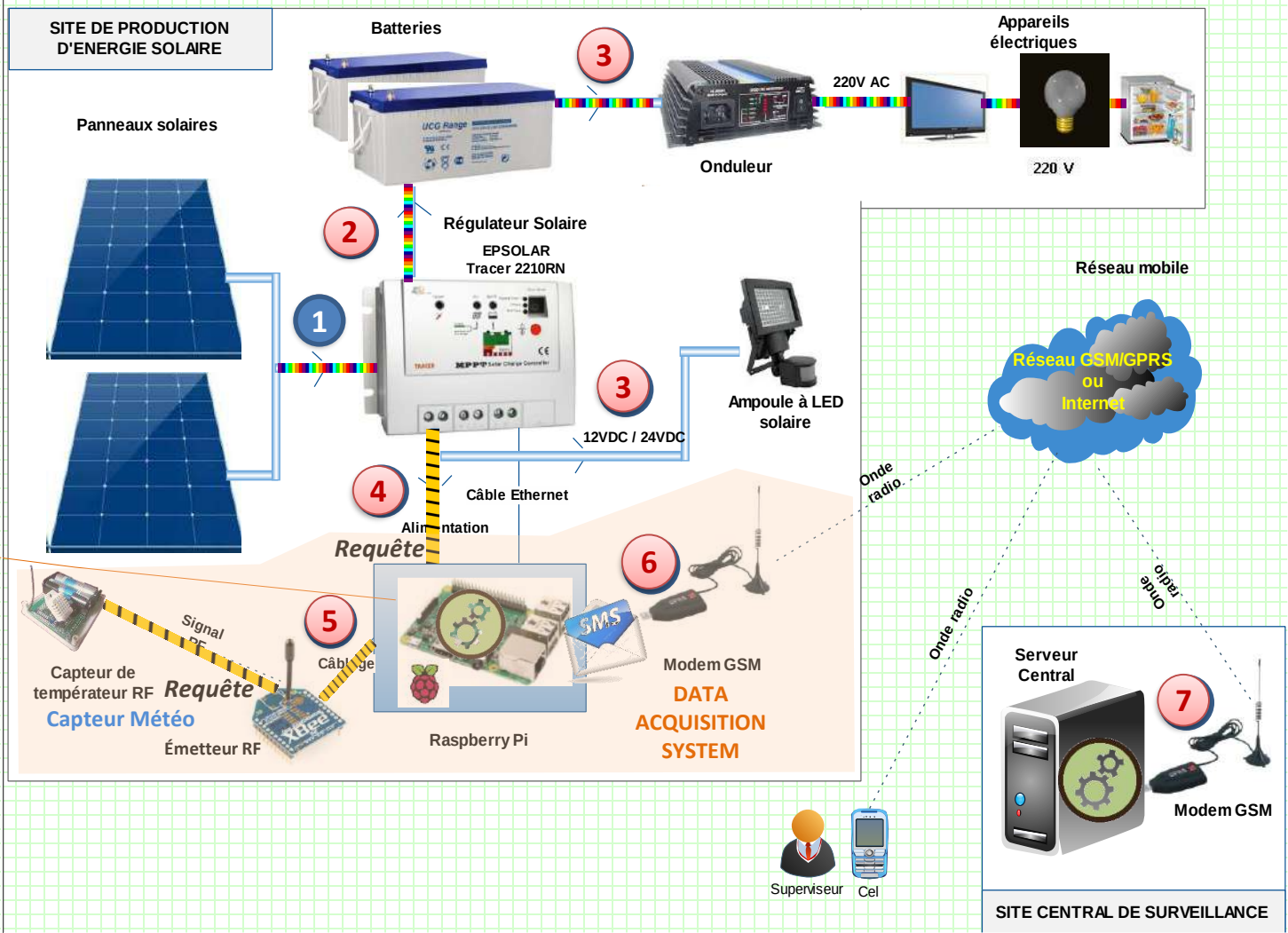


SYSTEM FOR CENTRALIZING THE DATA COLLECTED

INOVATECH PV

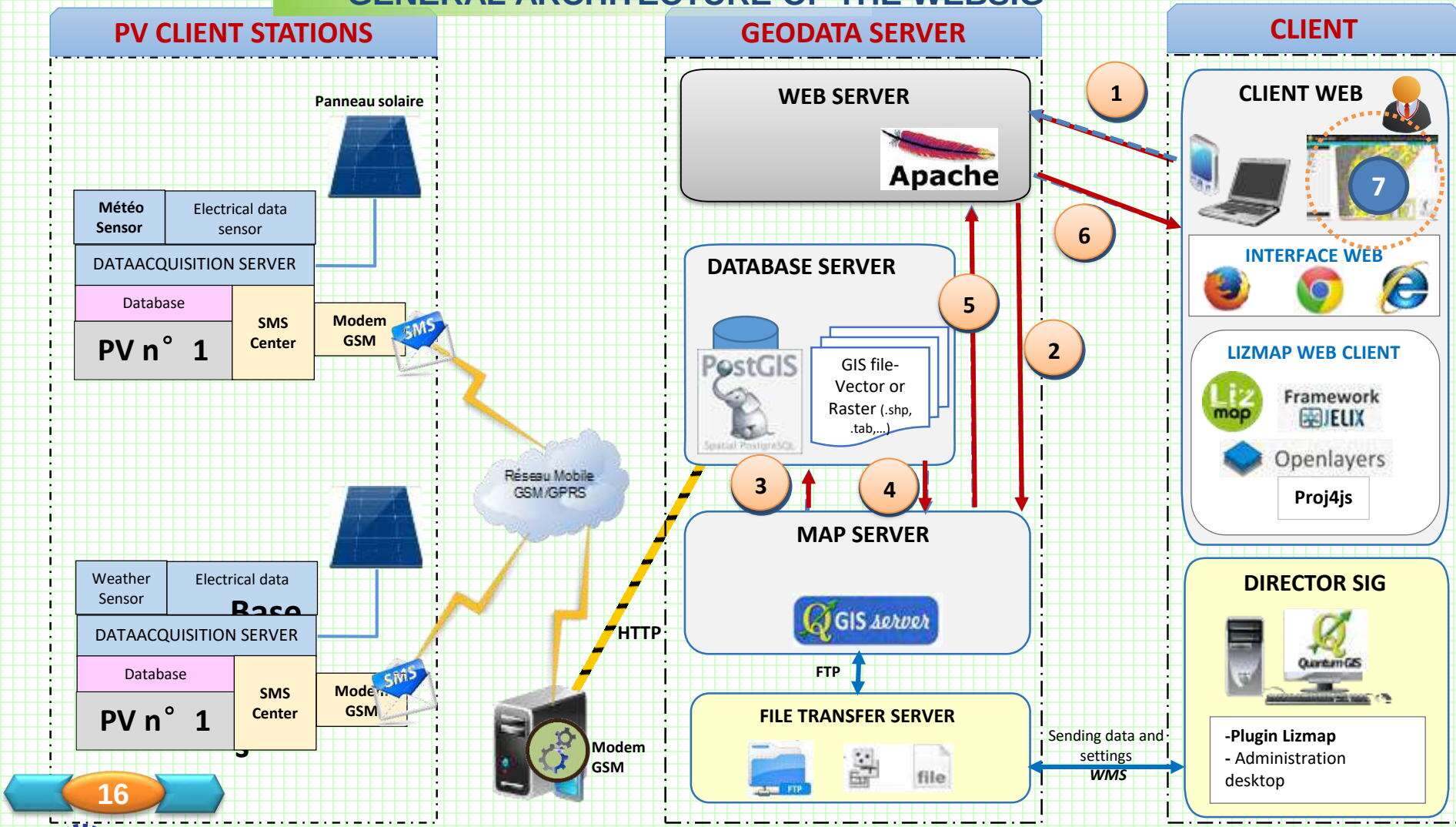
LONGITUDE	LATITUDE
-13.640138	9.604047
SIM Number : 00224 623 XX XX XX	

Mapping the geographic coordinates of the PV power plants to the SIM number of the GSM modem



7 When the SMS arrives at the central server, it processes it and stores the measurements in its spatial database.

GENERAL ARCHITECTURE OF THE WEBSIG



16

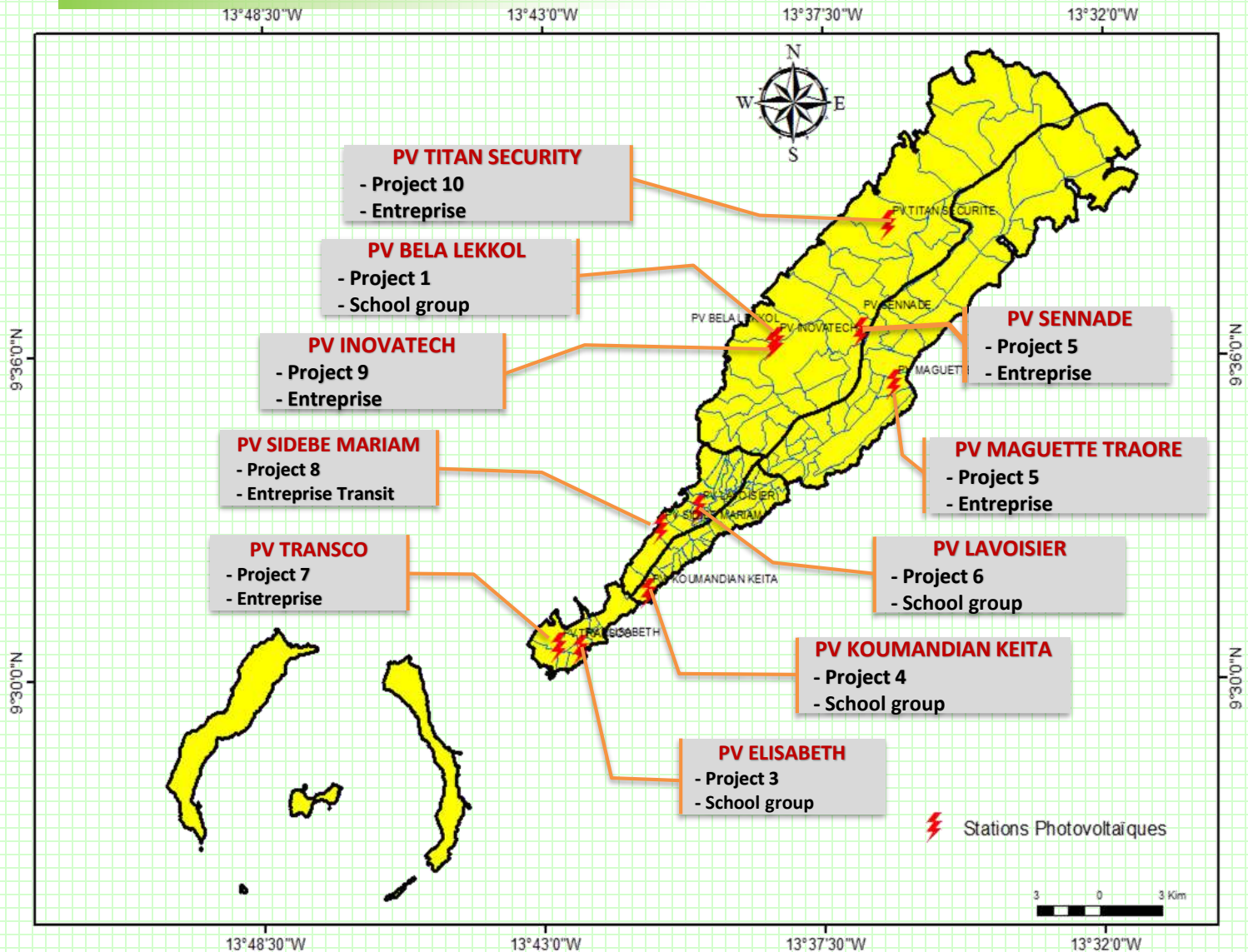
7

The user receives this page and views it in his browser

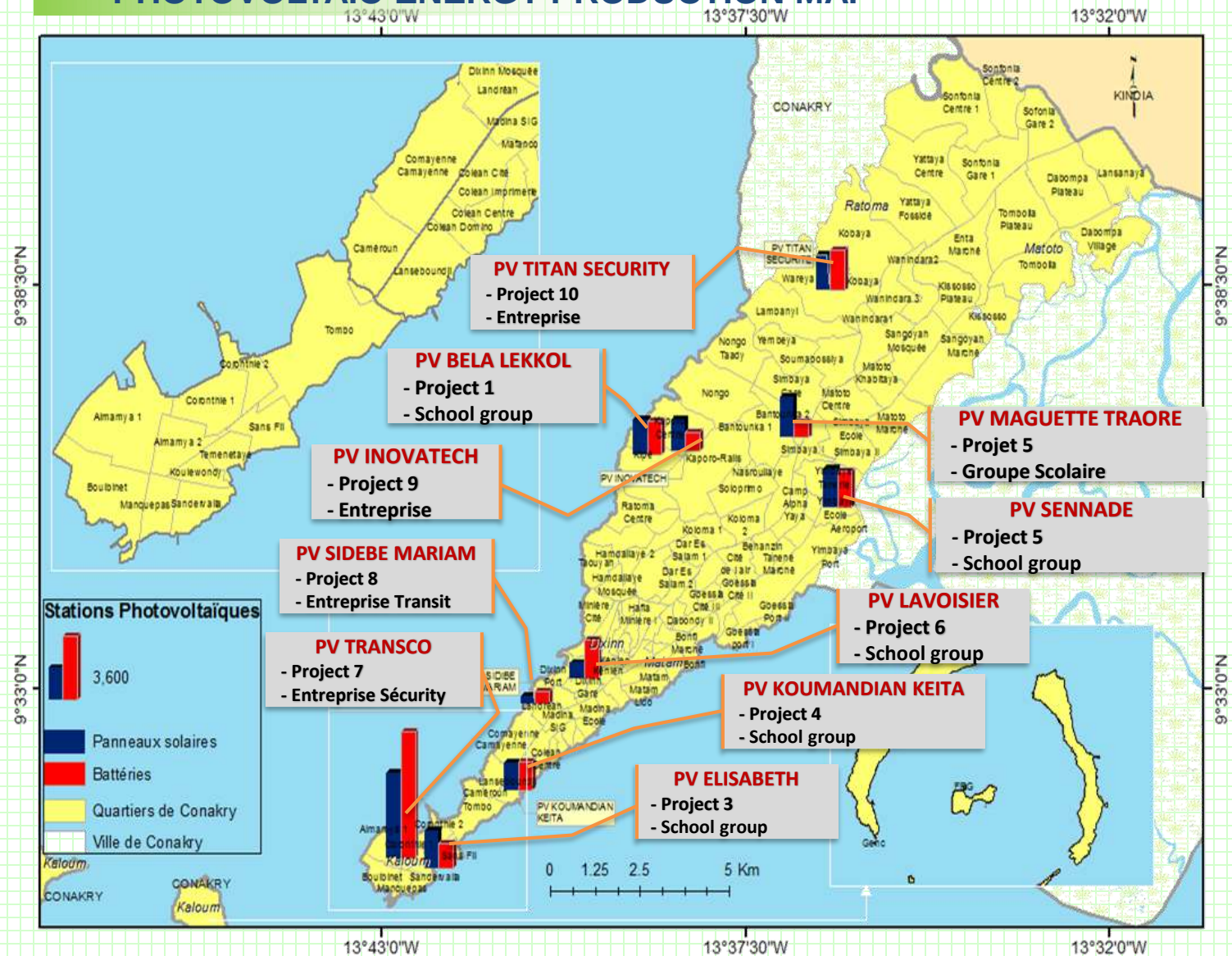
III-

RESULTS

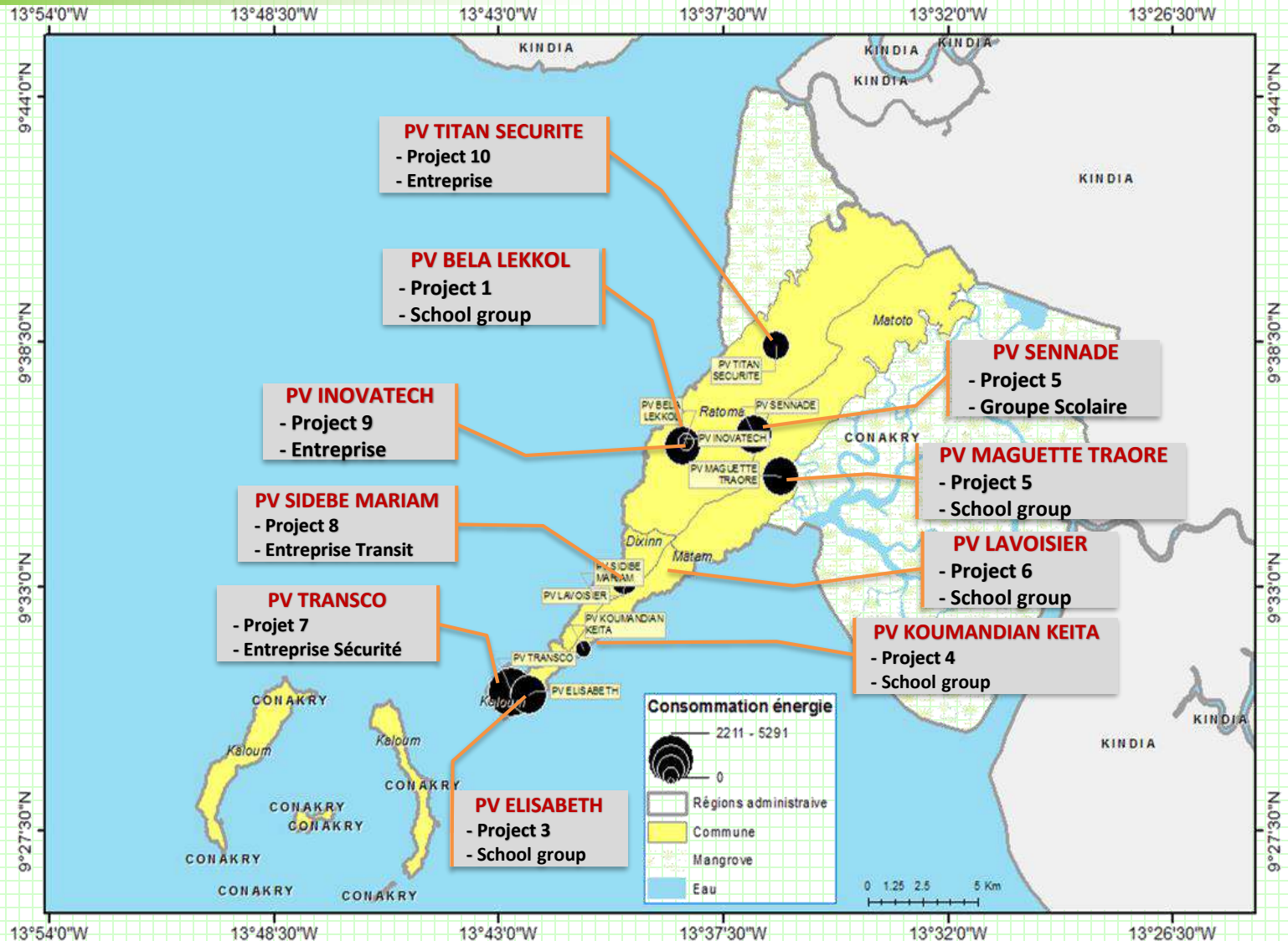
MAPPING OF PV SOLAR GENERATORS



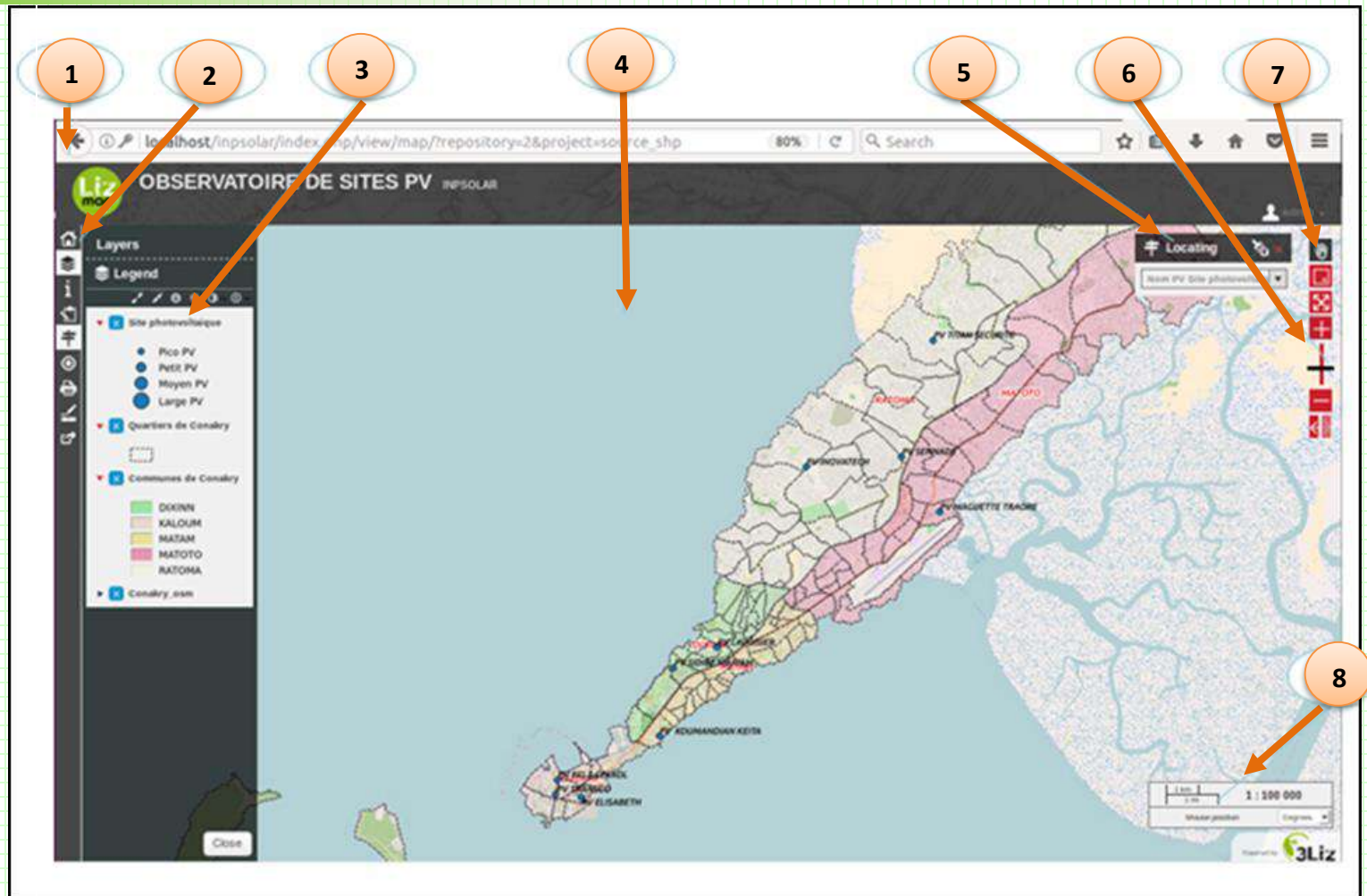
PHOTOVOLTAIC ENERGY PRODUCTION MAP



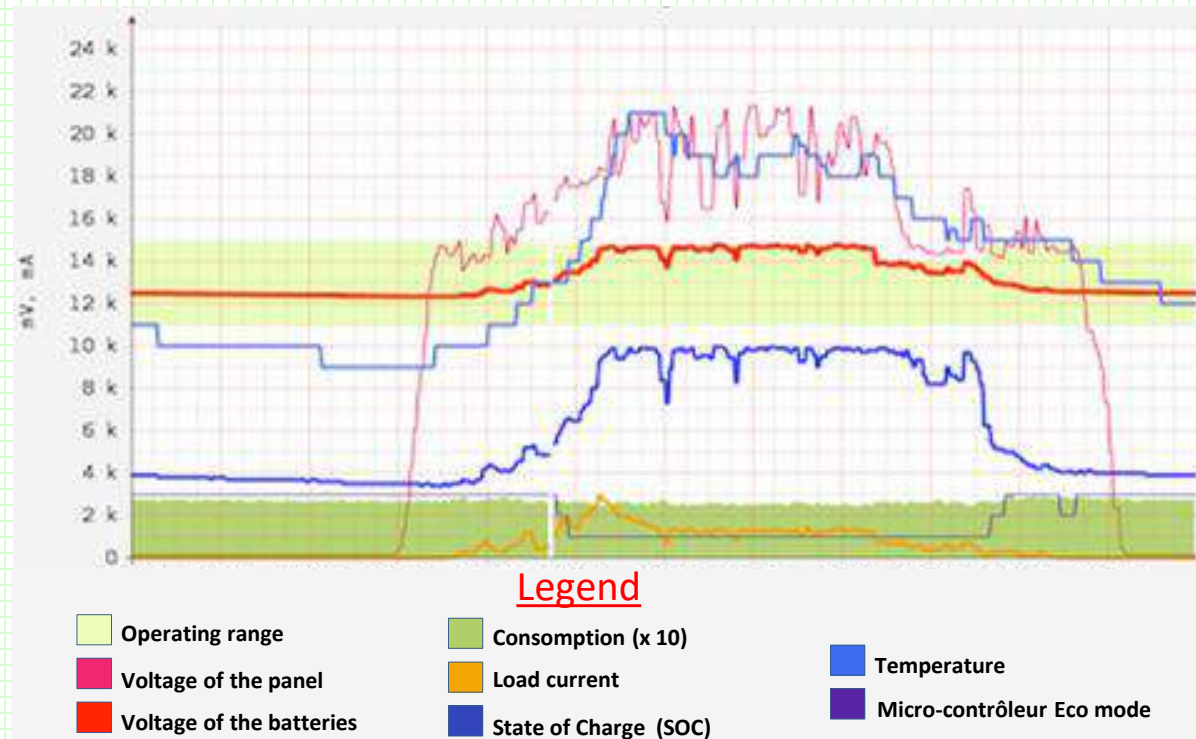
PHOTOVOLTAIC ENERGY CONSUMPTION MAP



INPSOLAR WEBMAPPING MAIN INTERFACE



CURVES OF THE DAILY STATEMENT OF THE PV GENERATOR OF INOVATECH OF 31/03/2016 FROM 00 :00 TO 22 :00



Cacti =
free software
for supervision

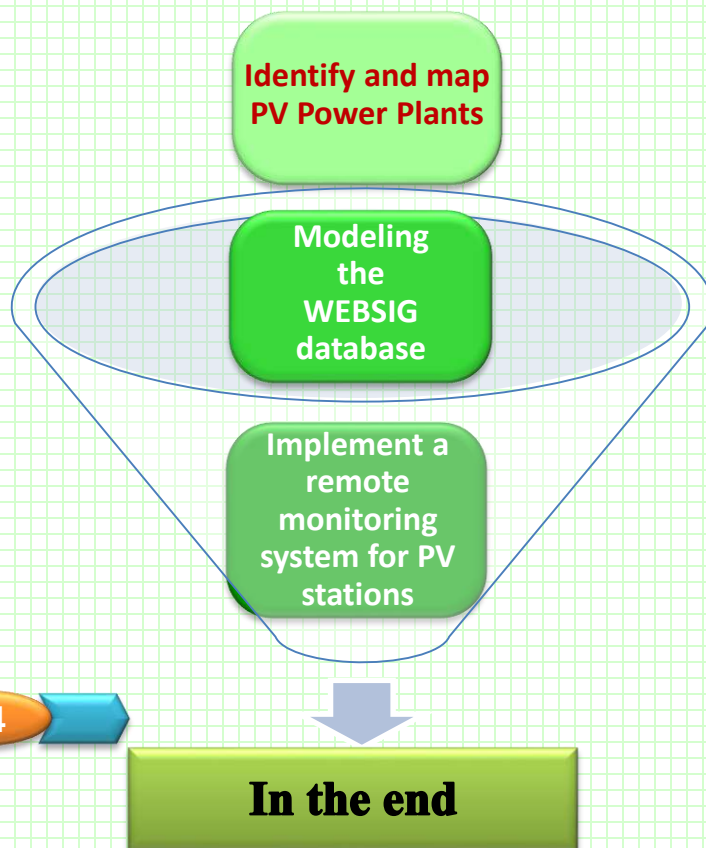
Analysis of daily measurement curves:

The graph shows a great activity during the daily sunshine period which is generally between 9H00 and 18H00 as shown by the high levels of the curves in general.

Purpose of the supervision : Remote sensing and correction of anomalies

GENERAL CONCLUSION AND PERSPECTIVES

Are the specific objectives being met ?



All these research works, allowed us to identify the functionalities of a GIS based on the "5A" namely Abstraction, Acquisition, Archiving, Analysis, Display of data in a Webmapping.

To identify and map PV Power Plants :

Several methods were developed and carefully executed. Thus, we were able to identify and map about ten PV Power Plants in the Conakry area.

To model the WEBSIG database :

We used the UML analysis method to model the Geographic Information System in the form of diagrams that reflect the functioning of WebGIS .

To set up a remote monitoring system for PV Power Plants :

The analysis and interpretation of the thematic maps allowed the realization of a WebSIG. A real tool capable of remotely control PV Power Plants to correct and prevent anomalies.

Recommendations

- ✓ Have dedicated and qualified personnel;
- ✓ Have an adequate supply of materials;
- ✓ Define a membership fee that is accessible to the public;
- ✓ Obtain public or private financial partners to offer solar kits in the project.

Perspectives

- Expand the study area to other regions and outside of Guinea;
- Install QGIS on the nano-computer (Raspberry Pi) of each site to have a local GIS application accessible off the Internet;
- Create a virtual power plant in order to increase the use of renewable energies and sell the surplus of Energy produced.



**Thank you for your kind
attention.**



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FIN

