GIS Support in Renewable Energy

Presenter   :   Vignesh - 13 years of Experience in GIS Specialist in Renewable Energy
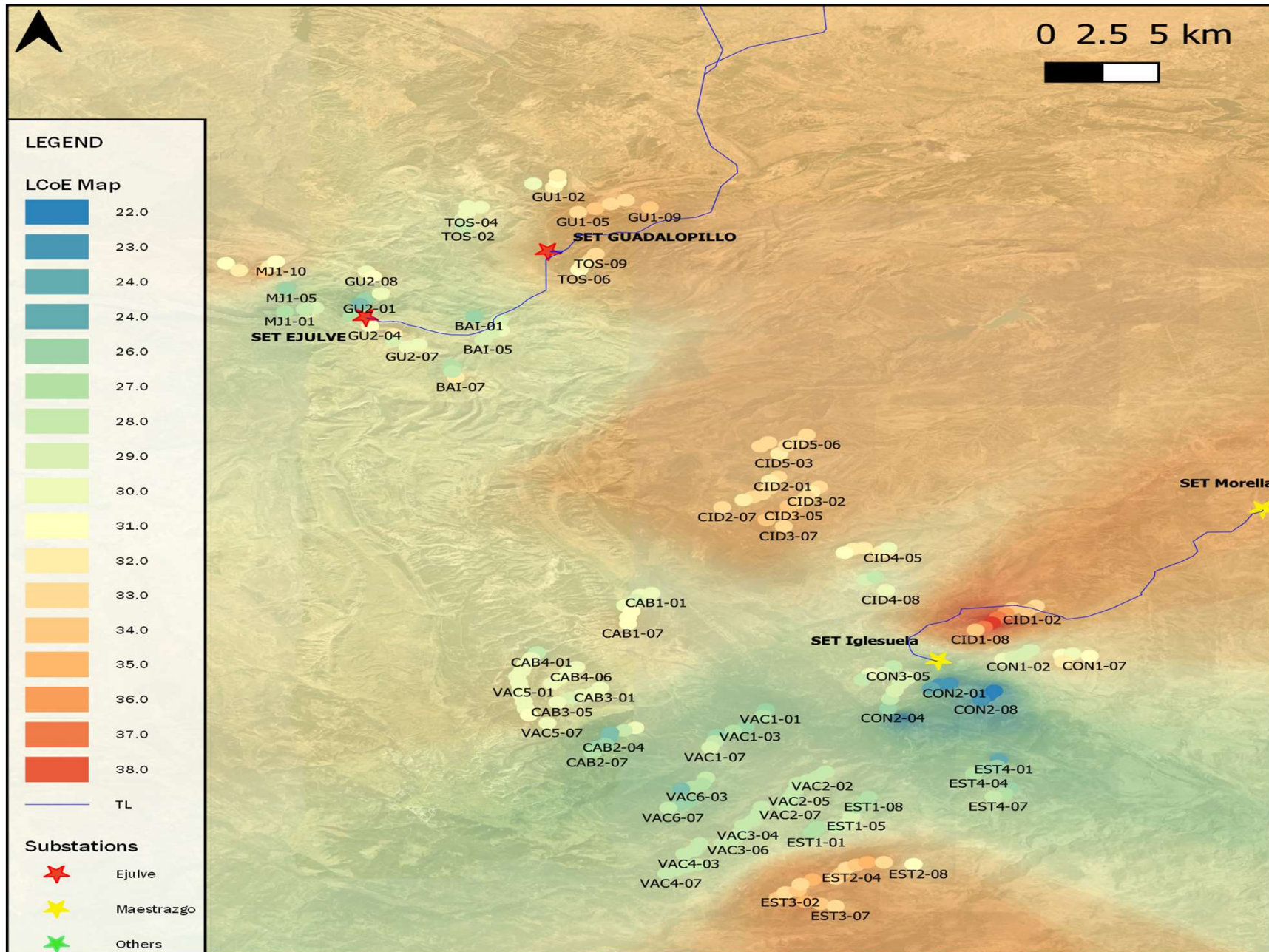
Table of contents

Overview of GIS Analysis in Renewable Energy

Key aspects of the scope on technology wise

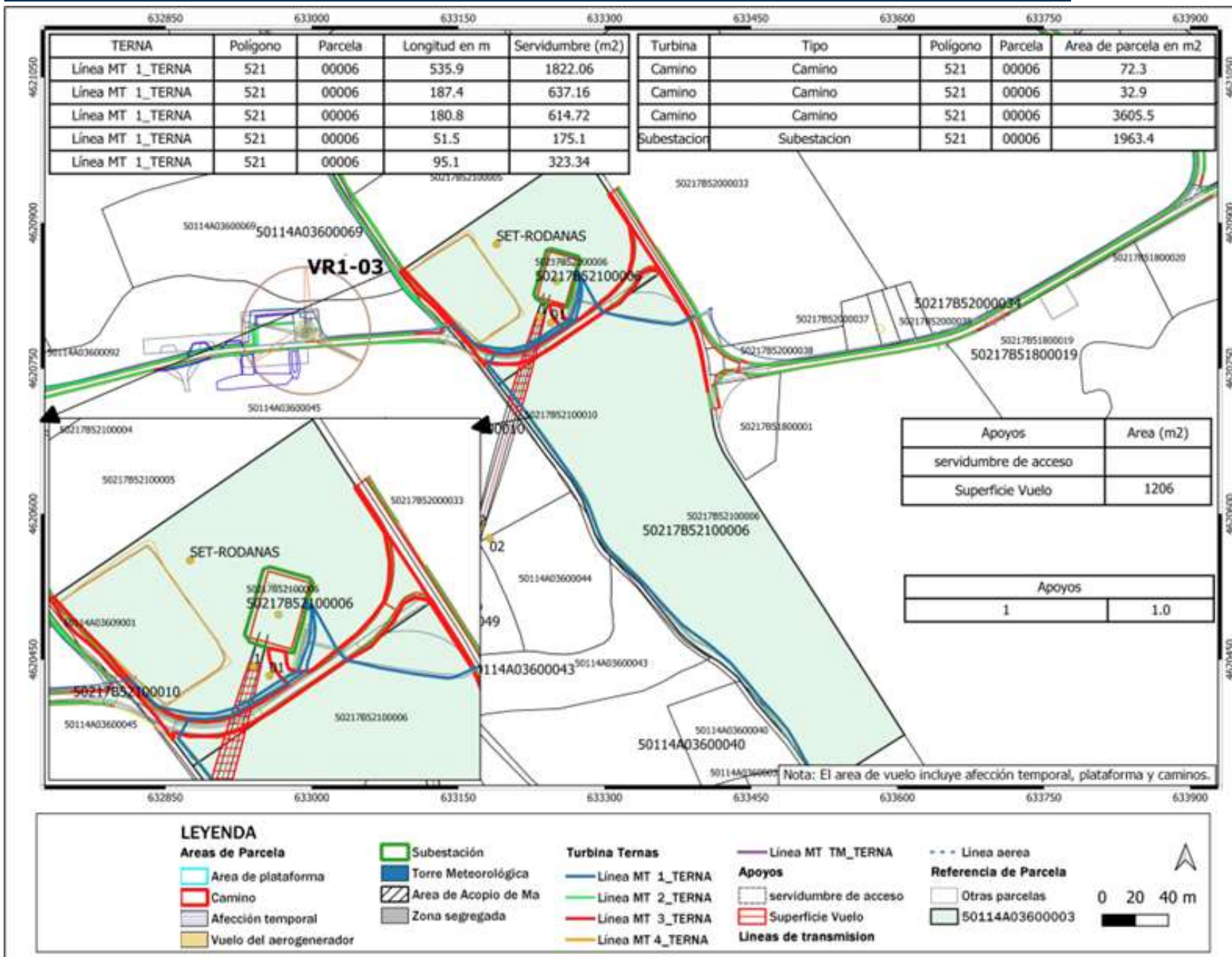| Scope ↓ / Technology →	WIND	SOLAR	Power to X
Data collection / capture	• Open-source data • Wind resource data • Land parcels	• Open-source data • Solar resource data • Land parcels	• Open-source data • Existing Wind/ Solar power stations resource data • Land parcels
Terrain Analysis	• Digital Elevation Model • Contour • Height data • Slope	• Digital Elevation Model • Slope	• Digital Elevation Model • Slope
Site Suitability	• Finding suitable areas based on constraints • Mapping feasible locations	• Finding suitable areas based on constraints • Mapping feasible locations	• Finding suitable areas based on constraints • Mapping feasible locations
Site Affection	• Wind turbine (WTG) area calculation • Wind farm area calculation (road, powerline & substation)	• Photo Voltic (PV) area calculation • Solar farm area calculation (road, powerline, CT & substation)	Yet to start
Map preparation	• Overview map • Detailed map with constraints • Windfarm (WTG) layout	• Overview map • Detailed map with constraints • Solar resource and Slope map	• Overview map • Detailed map with constraints • 3D PtX plant map with label
Web map preparation	• Overview map • Detailed map with constraints • Wind farm construction progress	• Overview map • Detailed map with constraints	• Overview map • Detailed map with constraints
3D Visualization	• GIF file preparation for WTG • Web scene	• GIF file preparation for WTG • Web scene	• GIF file preparation for WTG • Web scene
Data conversion	• Wind farm layers DXF to SHP, KMZ and QGIS Project	• Solar layers DXF to SHP, KMZ and QGIS Project	• PtX layers DXF to SHP, KMZ and QGIS Project

GIS support in Wind

Sample Wind Map - 1

GIS support in Wind Farm Construction- Asset Management

Sample Wind Map - 2
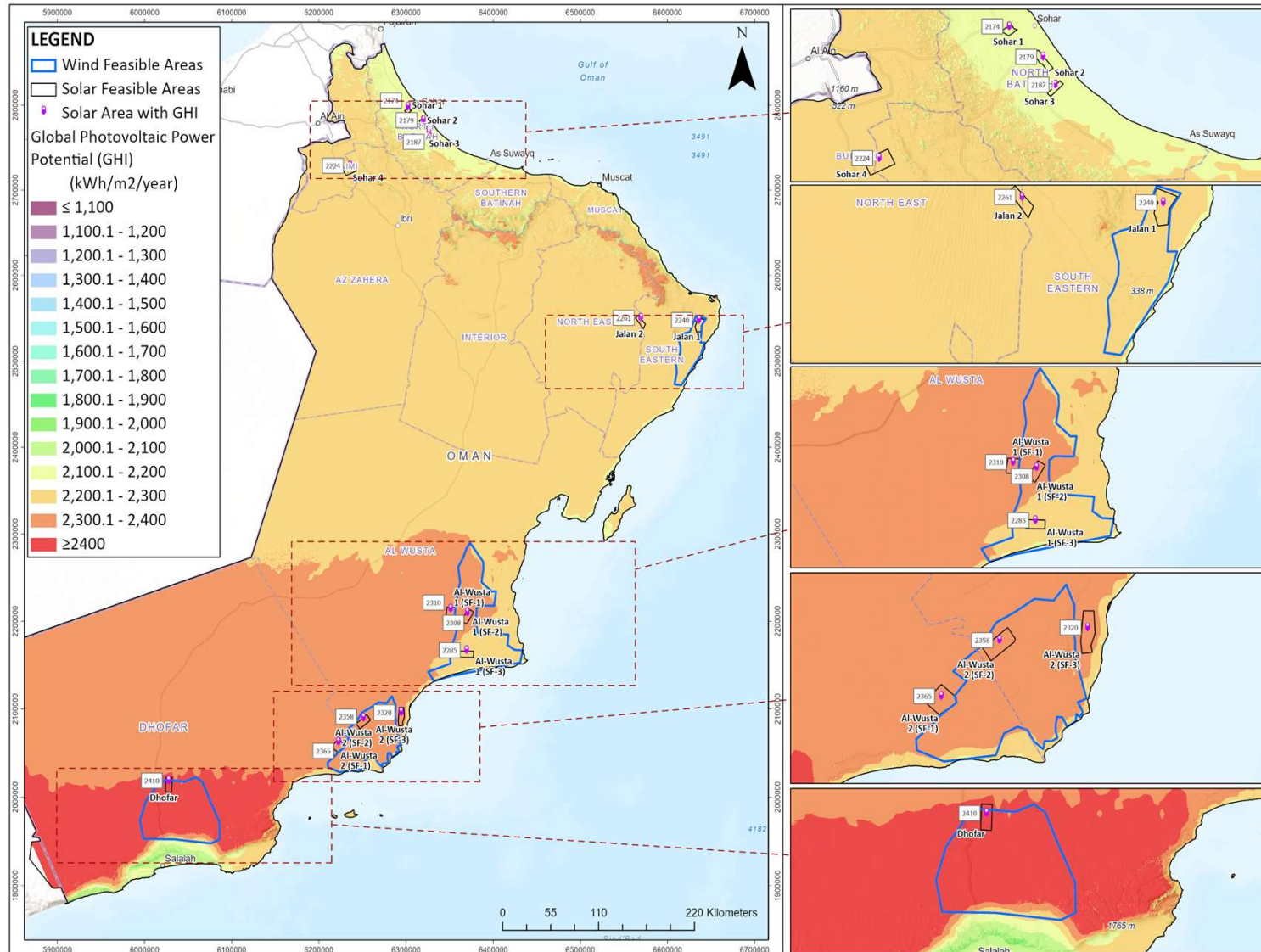

- ➢ Constraints Analysis & Mapping
  - Infrastructure (road, railway, powerlines, etc.)
  - Forest & Reserved areas
  - Environmental constraints
  - Wind turbine (WTG) area calculation
  - Find feasible area

- ➢ Web Mapping
  - Overview map
  - Detailed map with constraints
  - Wind farm construction progress
  - 3D Web scene

5

GIS support in Solar

Sample Solar Map

- ➢ Solar Resource mapping
  - Global Irradiance Map
  - Solar Capacity Factor
  - Solar Development regions map with pipelines and hydrogen demand

- ➢ Terrain Analysis & Mapping
  - Slope
  - Digital Elevation Model

- ➢ Constraints Analysis & Mapping
  - Infrastructure (road, railway, powerlines, etc.)
  - Land use / Land cover data
  - Forest & Reserved areas
  - Environmental constraints
  - Soil type
  - Find feasible area

GIS support in Power to X

Sample PtX Map

- ➢ Overview map of PtX area

- ➢ Detailed map with various themes
  - Site Infrastructure
  - Existing wind / solar farms
  - PtX Components with Area table

- ➢ Constraints Analysis & Mapping
  - Infrastructure (road, railway, powerlines, etc.)
  - Soil type
  - Pipelines
  - Wetland / Flood areas

- ➢ Cost Analysis for hydrogen pipeline mapping

3D Visualization

- ➤ Visualize the WTG with Terrain model and Boundary

- ➤ Deliverable formats
- • Web Scene – able to publish AGOL
- • GIF file

8

General GIS tasks

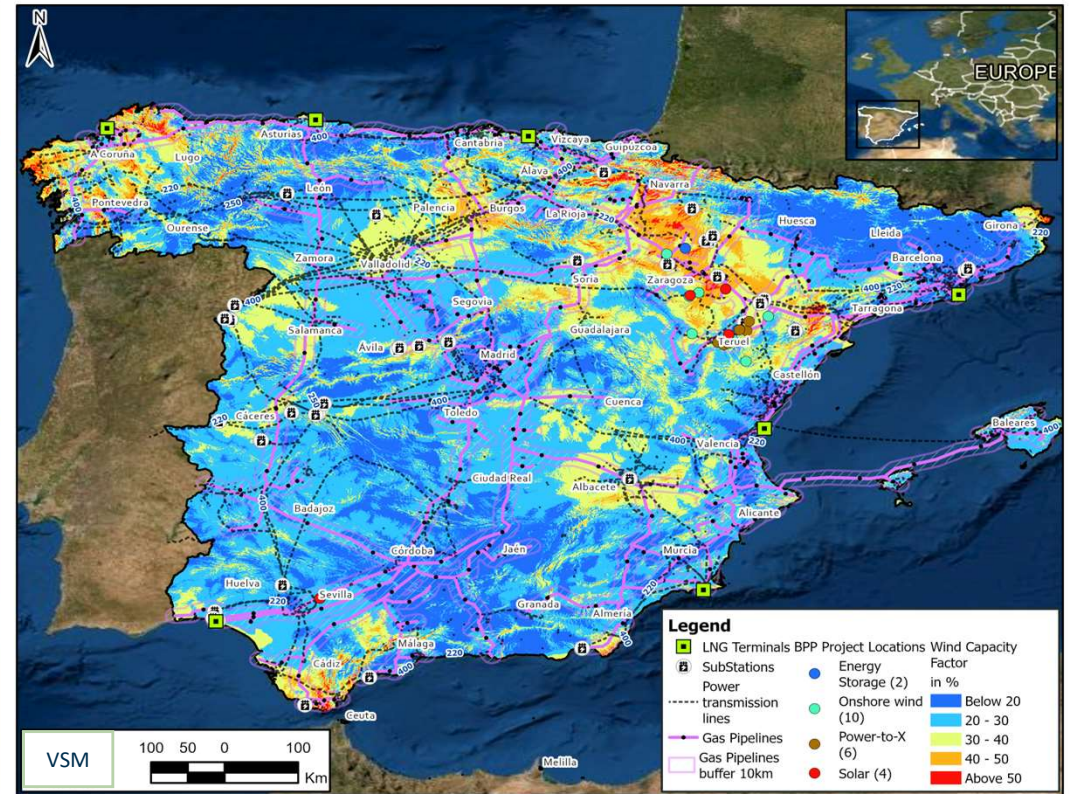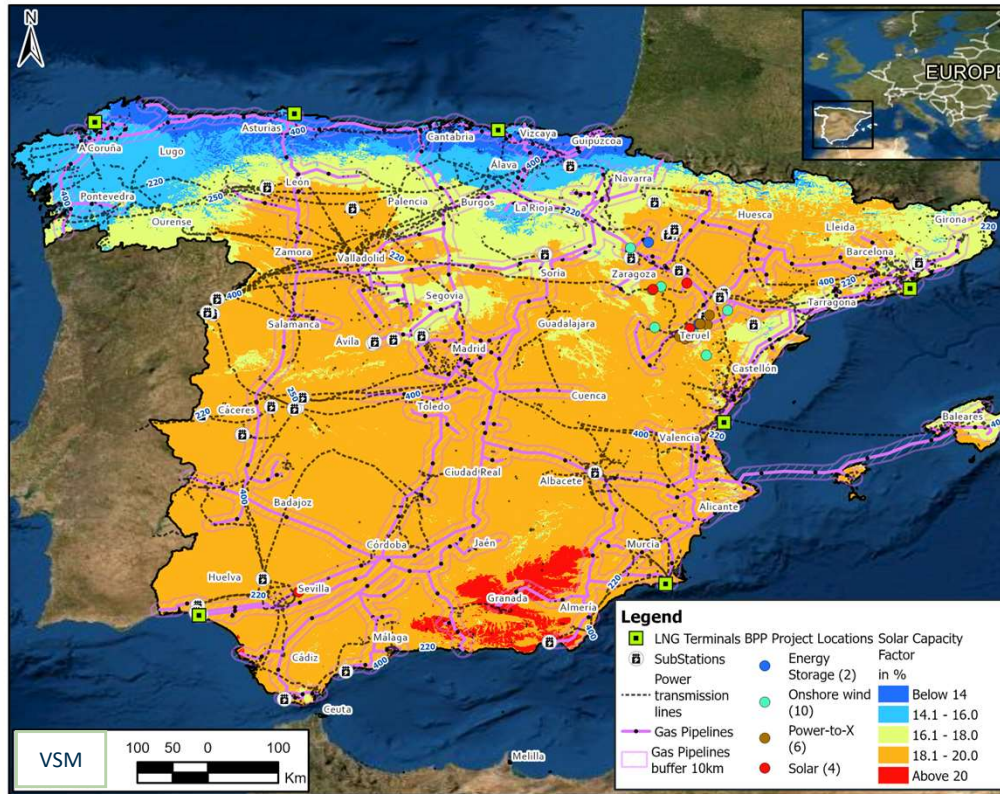**List of common tasks in GIS**

- KMZ / any other GIS formats to SHP file format conversion

- Assigning and Projection change

- Georeferencing the raster image and Digitize the AOI

- Add coordinates to the point data (X , Y)

- Add height to the shapefile

- Landuse and Landcover

- Cadastral parcels

- Online data Source – Cadastral, Pipelines, transmission lines, etc.

- Web layers WMS/WFS/WMTS screening and extraction / digitizing

Weighted Overlay Analysis

- Global PtX Screening – Area calculation from the result of weighted overlay using Wind & Solar Capacity factor and Slope

- Clip with buffer area – Calculate area for inside and outside buffer areas

Country map with Energy locations

Sample maps of Wind & Solar

THANK YOU