

# GENRAY DATA SERVICES

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## Available Data Layers



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## 1. Infrastructure Mapping – Operational Assets

### 1.1 Generation Data

PI GenRay EXPLORER has an extensive coverage of operational power generating units which encompasses Gas, Coal, Oil, Nuclear, Dual Fuel, Solar and Wind powered units as part of the energy generation infrastructures across South Asia and Southeast Asia. Integrated with GIS based visualizations of the generation assets, the users can have a better spatial understanding on each project.

#### a) Thermal Nuclear Plants and Hydro

The list of details/datapoints included for thermal and hydro projects are as follows:

- Project ID – Internal reference ID
- Project Name
- Prime Mover
- Technology
- Configuration
- Total Plant Capacity
- Owner Name
- Sub District
- District
- State
- Country

Additionally, we also have a comprehensive database of granular information covering unit level information of Thermal and Hydro power plants which are listed as follows:

- Unit Asset ID - Internal reference ID
- Unit No.
- Capacity
- Date of Commissioning
- Boiler Manufacturer
- Turbine Manufacturer
- Generator Manufacturer
- Reactor Manufacturer
- Engine Manufacturer

## **b) Wind Projects**

The wind project infrastructure includes an extensive coverage of:

- Asset ID - Internal reference ID
- Asset Type
- Manufacturer
- Model Number
- Hub Height
- Commissioning Date
- Installed Capacity
- Project ID - Internal reference ID
- Project Name
- Prime mover
- No. of WTGs
- Capacity
- Owner Name
- Parent Company
- Sub District
- District
- State
- Country

Further, we have also covered technical information pertaining to the wind turbine models being installed by the project owners, which are mentioned as follows:

- Model Number
- Manufacturer
- Rated wind speed
- Type of generator
- Cut in wind speed
- Cut out wind speed
- Rotor diameter
- Rotor swept area
- Gear box type
- Rated power

- Frequency

### **c) Solar Projects**

The solar project details include:

- Project ID- Internal reference ID
- Project Name
- Type of Fuel
- Project Capacity
- Technology
- Owner Name
- Parent Company
- Sub District
- District
- State
- Country

We have also provided module level details covering the technologies being deployed for each project along with solar park layout details:

- Project ID - Internal reference ID
- Module Type
- Technology
- Module Maker
- Model Number
- Number of modules
- Panel Wattage
- Date of commissioning
- Layout ID
- Sum of Capacity
- Description

## **1.2 Transmission Data**

Transmission assets ranges from 220 kV going up till 765kV, including HVDC infrastructure ranging from 200kV to 800kV are mapped. Details about the connecting substations have also been captured for better visualization and spatial analytics.

### **a) Transmission Lines**

The transmission line infrastructure coverage includes:

- Asset ID- Internal reference ID
- Asset Type
- Type of Current
- Voltage level
- Name of transmission line
- Starting Point
- Ending Point
- LILO at point
- Circuit configuration
- Line length
- Circuit km
- Conductor
- Operator
- Owner
- Date of commissioning
- Country

The transmission line database also covers information relating to the ending and starting substations which are also visualized along with the transmission lines. The details covered are mentioned in the subsequent section.

### **b) Substations**

The major details pertaining to the substations are listed as follows:

- Asset ID- Internal reference ID
- Asset Type
- Type of current
- Voltage level
- Voltage ratio
- Name of substation
- Capacity
- Owner

- Sub District
- District
- State
- Country

In India for certain PGCIL (Extra High Voltage) substations following level of data points are available:

- Under Construction Capacity
- Spare capacity at 220KV level
- Spare capacity at 400KV level

### **1.3 Natural Gas**

GenRay EXPLORER powered by our in-house geo-spatial visualization capabilities has successfully delved into extending the reach in the natural gas markets and has come up with an even more comprehensive coverage in the latest version. In the previous version, EXPLORER captured all the major natural gas pipeline infrastructure, major pipeline facilities such as section valves, pigging stations, compressor stations, gas terminals and large-scale consumers across South Asia. The latest version covers upstream assets such as gas blocks and gas processing plants, addition of new layers at the downstream end such as Industrial Park, in the South Asia and Southeast Asia region. Demarcation of all the different areas operated by regional gas providers. It also covers LNG regasification infrastructure details, adding to it an in-depth coverage of the large-scale gas consumers, integrating the entire upstream, mid-stream and downstream sides of the business.

#### **a) Gas Pipeline Network**

The list of pipeline details are as follows:

- Asset ID- Internal Reference ID
- Asset Type
- Pipeline section name
- Starting point
- Ending point
- Diameter
- Pipeline section length
- MOC
- Pressure
- Pipeline name
- Pipeline length
- Commissioning year

- Pipeline capacity
- Pipeline network
- Network length
- Pipeline network capacity
- Owner
- Operator

### **b) Pipeline Facilities**

The list of pipeline details are as follows:

- Name of station
- Type of station
- Operator
- State
- Country

### **c) Gas consumers and Industrial Parks**

Appreciable coverage of gas consumers details which includes:

- Asset ID- Internal Reference ID
- Name of consumer
- Type of consumer
- Max gas consumption
- Commissioning Year
- Gas Suppliers
- Nature of use
- Installed capacity (for power plants)

There is a separate layer of Industrial Park (Gas Supplied) which include the following details:

- Asset ID- Internal Reference ID
- IP Name
- Gas Pipeline Connected
- Gas Supplier
- Governing Body



- Area (km2)
- District
- State
- Country

#### **d) Gas Processing Plants**

Detailed information on gas processing plants which covers:

- Asset ID- Internal Reference ID
- Asset Type
- Asset Name
- Basin
- State
- Gas Processing Capacity
- Oil Processing Capacity
- Number of Upstream Pipeline Connected
- Upstream Pipeline(s)
- Diameter
- Type of Upstream Pipeline(s)
- Gas Fields Connected
- Major Consumer/ Consumer Pipeline Connected
- EPC Contractor
- Owner
- Operator

#### **e) Gas Blocks**

The gas block detail covers:

- Asset ID- Internal Reference ID
- Asset Type
- Block Name
- Block Type
- Area
- Status
- No of Fields

- Allotment Year
- Block Operator
- Basin Name
- Total in Place (Reserves)
- Country
- Block Owner
- Ownership Share

We have covered field level details of the associated blocks which includes:

- Asset ID- Internal Reference ID
- Field ID- Internal Reference ID
- Country
- Field Type
- Field Name
- Field Area
- Common Blocks
- Gas Reserves in Place
- Condensate Reserves in Place
- Oil Reserves in Place
- Commencement Year
- Investment
- Owner
- Operator

#### **f) LNG Terminals**

LNG infrastructure coverage includes:

- Asset ID- Internal Reference ID
- Asset Type
- Asset Name
- Type of Terminal
- State
- District
- Capacity

- Date of Commissioning
- Number of Storage Tanks
- Dimension of Tank
- Capacity of Each tank
- Type of Containment Tank
- Material of Construction
- Insulation I
- Insulation II
- BOG Compressors
- Primary vaporizer
- Re gas vaporizers
- No of Jetties
- Jetty Length
- Jetty Capacity
- Unloading Arms
- Hybrid Arm
- Vapor Return Arm
- Max Unloading Rate
- Truck Loading Rate
- Truck Loading
- Importing Countries
- EPC
- EPC Marine
- Pricing Model
- Capital Cost
- Ownership
- Type of Contract

#### **g) LNG Liquefaction**

LNG infrastructure coverage includes:

- Asset ID – Internal Reference
- Asset Type
- Asset Name

- Type of Terminal
- Latitude
- Longitude
- Country
- State
- District
- Area Of Port (Km2)
- Gas Fields
- Date of Commissioning
- No. of Train
- Design Capacity (MTPA)
- Liquefaction Technology
- Refrigerant Used
- No. of Heat Exchanger
- No. of Compressors
- No. Of BOG Compressor
- No. of Turbines
- No. of LNG Storage Tanks
- Capacity of Each LNG tank(M3)
- Type of Containment Tank
- Material of Construction
- No. of Condensate Storage Tank
- Ownership
- Operator
- Investment
- Contracting Company
- Major Exporting Country
- EPC Contractor

#### **h) Geographical Area (GA)**

LNG infrastructure coverage includes:

- Asset ID – Internal Reference
- GA Name

- State
- Bidding Round
- Owner/Operator
- Nearest Natural Gas Pipeline (Existing, U/C, Proposed)
- Nearest Tap Off Point
- Gas Procurement Mode
- Authorization Year
- Status
- Total Geographical
- Area
- Total Population

## 2. Site Suitability Assessment

### 2.1 Site Suitability Layers

#### a) Land Use

Detailed estimate providing information on the land cover and the types of human activity involved in land use. Facilitating the assessment of environmental impacts on, and potential or alternative uses of, land on the desired coordinates. Source: GRE + European Space Agency (ESA). The selected coordinate would belong to a particular land use type at a resolution of 100m at the equator.

Land Use Classes:

- Bare Areas
- Consolidated bare areas
- Cropland
- Grassland
- Herbaceous cover
- Mosaic Cropland/ natural vegetation
- Mosaic herbaceous cover/ tree and shrub
- Mosaic natural vegetation
- Mosaic tree and shrub/ herbaceous cover
- Shrub or herbaceous cover
- Shrubland
- Shrubland deciduous
- Shrubland evergreen
- Sparse vegetation
- Tree Cover
- Tree or shrub cover
- Unconsolidated bare areas
- Urban areas
- Water bodies

#### b) Exclusion Zone

- Road Network

- 
- Railway Network
  - Transmission Network
  - Military Restrictions
  - Airspace in & around Civil Aerodromes
  - Protected Areas
  - Waterways
  - Urban Settlement

**c) Surface Roughness**

Estimate of the height above the surface at which wind speed goes to zero if the turbulent layer extends completely to the ground at the desired coordinates. Source: GRE + European Space Agency (ESA).

The selected coordinate would have a surface roughness of a particular Roughness factor at a resolution of 100m at the equator.

**d) Proximity to Road Network**

Estimate providing information on the distance of the nearest road network i.e., national highways/major roadways to the desired coordinates. Source: GRE + GEOFABRIK-OSM

The selected coordinate would be located at a distance of specific kilometres from the nearest National Highway/ Major Road Network at a resolution of 100 m at the equator.

**e) Proximity to Transmission Network**

Estimate providing information on the distance of the nearest substation i.e., [ $>66\text{kV}$ ] to the desired coordinates. Source: GRE + GEOFABRIK-OSM.

The selected coordinate would be located at a distance of specific kilometres from the nearest  $\geq 66$  kV substation at a resolution of 100 m at the equator.

**f) Elevation (SLOPE)**

Estimate of the topographic gradient or incline of the land for every 100 feet of horizontal distance at the desired coordinates. Source: GRE + USGS Shuttle Radar Topography Mission (SRTM). The selected coordinates would have a respective slope in degrees at a resolution of 100 m at the equator.

**g) Soil Bearing Capacity**

Estimate of the capacity of the soil to support the loads applied to the ground. Is the maximum average contact pressure between the foundation and the soil which should not produce shear failure at the desired coordinates. Source: GRE + World Soil Information (ISRIC). The selected coordinates would have a soil bearing capacity in  $\text{kN/m}^2$  at a resolution of 100m at the equator.

**h) Natural Disaster: Floods**

Estimate of the annual percentage of occurrence of incidents that inundates landmass otherwise normally dry, either after heavy rainfall or after rivers or lakes overflows its banks at the desired coordinates. Source: GRE + NASA Global Flood Mapping (NASA). The selected coordinates would be flooded up to some % of the days annually at a resolution of 100m at the equator.

**i) Natural Disaster: Earthquake**

Estimate of the severity of earthquakes based on the seismicity, or seismic activity, frequency, type, and size of earthquakes experienced over a period at the desired coordinates. Source: GRE + German Research Centre for Geosciences (GFZ). The selected coordinates would be prone to seismic activities up to a specific number on Richter Scale at a resolution of 100m at the equator.

**j) Natural Disaster: Cyclone**

Estimate of the events with system of winds rotating about a centre of low atmospheric pressure, advancing at a speed of about 30 to 50 kilometres an hour, and often brings heavy rain along with at the desired coordinates. Source: GRE + Global Risk Data Platform. The selected coordinates would have predictive cyclonic events/ year at a resolution of 100 m at the equator.





# GENESIS RAY

*Complexity Simplified*



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