## **Solar Detective: Mapping India’s Solar Infrastructure Using Agentic AI**

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### **🌞 1) Motivation / Goal to Achieve**

India is scaling up solar energy rapidly, but comprehensive and up-to-date information about existing projects is scattered across government portals, company PDFs, press releases, and industry databases. This fragmented data makes it difficult for developers, investors, and planners to:

* Track what solar capacity already exists
* Understand where opportunities or infrastructure gaps lie
* Make informed investment or policy decisions

**Your challenge:** Build an AI-powered agent that **scrapes, aggregates, and organizes** publicly available data to produce a **nationwide map of all commercial solar projects in India**.

Then, develop a **smart dashboard** that visualizes this data to offer a clear picture of the country's solar energy landscape, project by project.

### **⚙️ 2) Functionalities / Features**

#### **AI Agent Capabilities**

* Scrape structured and unstructured data from:  
  + Government portals (e.g., MNRE, SECI, POSOCO/Grid India)
  + Company investor reports and PDFs
  + News articles and press releases
  + Open satellite imagery / GIS platforms
* Clean, match, and standardize project-level data
* Store in a searchable and filterable database

#### **Key Information to Extract Per Project**

* **Basic Info:**
  + Capacity (MW)
  + Location (lat/long), project images
  + Developer / Owner / Operator
  + Year of commissioning
  + Type: Utility-scale, Rooftop, Floating, Hybrid (e.g., with storage or wind)
* **Technical Details:**
  + Cell technology (c-Si, CdTe, etc.)
  + Bifacial vs monofacial
  + Grid interconnection infrastructure
* **Business & Policy Details:**
  + Upstream manufacturers
  + Offtake agreements (PPA vs merchant market)
  + Financing details (if public)
  + Historical performance or dispatch data
  + Irradiance and grid proximity metrics

#### **Dashboard Functions**

* Interactive map of all solar projects in India
* Filters by size, type, developer, commissioning year, and location
* Clickable pop-ups with project-level metadata
* Exportable views for policy briefs or investor pitch decks

### **🔧 3) Hints & Resources How to Build It**

**Starter Data Sources:**

* [MNRE India](https://mnre.gov.in) – Ministry of New & Renewable Energy
* [SECI](https://www.seci.co.in) – Solar Energy Corporation of India
* [POSOCO / Grid India](https://posoco.in/en/) – Real-time dispatch & infrastructure
* [Investor Relations PDFs\*\*] from Adani, ReNew, Tata Power, Azure
* [NSEFI](https://www.nsefi.in) – National Solar Energy Federation of India
* [Google Dataset Search](https://datasetsearch.research.google.com) – Aggregated datasets

**Helpful Tools:**

* PDF parsing: pdfplumber, PyMuPDF
* Scraping: BeautifulSoup, Selenium, Scrapy
* Mapping: Mapbox, Leaflet, Plotly Dash
* Database: SQLite or Pandas for prototype; PostgreSQL for scaling
* Optional: Use LangChain for document parsing + GPT for summarization

### **🧪 4) Evaluation Criteria for the Prototype**

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| **Criterion** | **Goal** |
| **Data Coverage** | Number and diversity of solar projects mapped from multiple sources |
| **Extraction Accuracy** | Correct parsing of technical and business details |
| **Dashboard Clarity & Usability** | Easy to filter, explore, and interpret project data |
| **Update & Scalability Readiness** | Can the system be reused or updated for other regions or technologies? |
| **Impact Potential** | Helps real users (planners, investors) make better infrastructure decisions |

### **✨ Why This Matters**

India is on track to become one of the world’s largest solar power producers, but its success hinges on **transparency, coordination, and data-driven planning**. With a "Solar Detective" AI agent, we can shine light on the entire energy landscape—empowering smart investments, accelerating new project development, and helping India meet its clean energy goals.