



**“Development of *Web-GIS* Tool for estimating the Rooftop Solar Power potential for Indian Solar Cities”**






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## Study Objective

To develop a high performing and flexible Web-GIS tool to estimate the rooftop solar power potential for a city.

### Phase I: Chandigarh Area



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## Study Area



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### Pleiades-1A

Specifications	
RESOLUTION	Panchromatic: 30 cm Multispectral: 1.2 m
VEGETAL SWATH WIDTH	20 km, 40 km
SWATH	400-500 m 500-550 m 600-650 m 700-750 m 800-850 m
ACQUISITION DATE	From September 2012
PROGRAMMABILITY	YES
REORDER AREA OF PURCHASE	20 orders for Archive Imagery 100 orders for New Collect Imagery
STORAGE AVAILABLE	YES
SWATH SCALE	1 : 3000



**Ref. Map:** Google Earth (<http://www.google.com/earth/index.html>)

**Source:** <http://www.astrium-geo.com/pleiades>

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## Pleiades Satellite Imagery



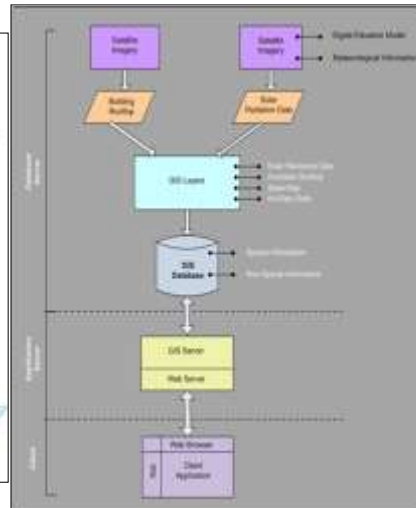
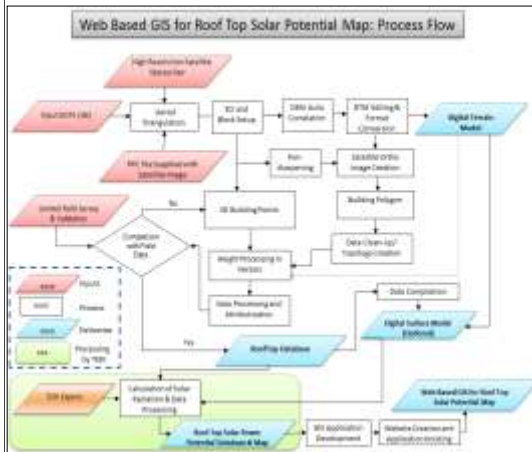
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### Pleiades Satellite Imagery Coverage: Chandigarh Area



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# Methodology



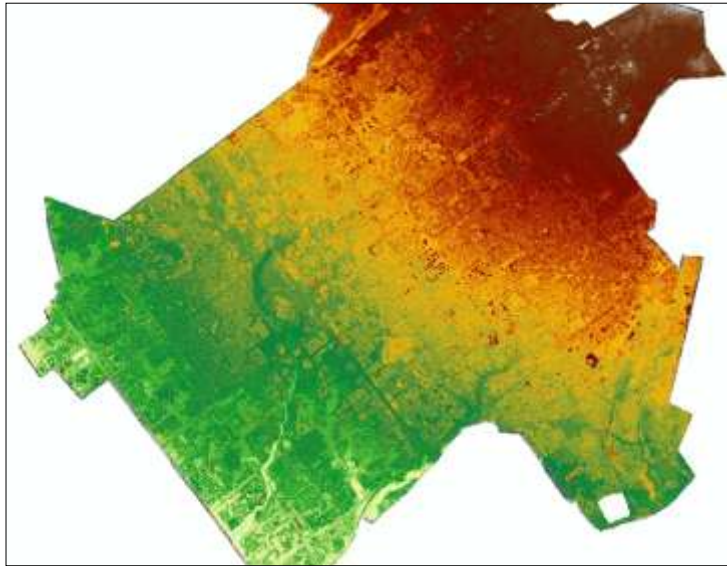
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# GIS Data-sets for Chandigarh Area (Building Rooftop)



## 7 Digital Surface Model (DSM) for Chandigarh

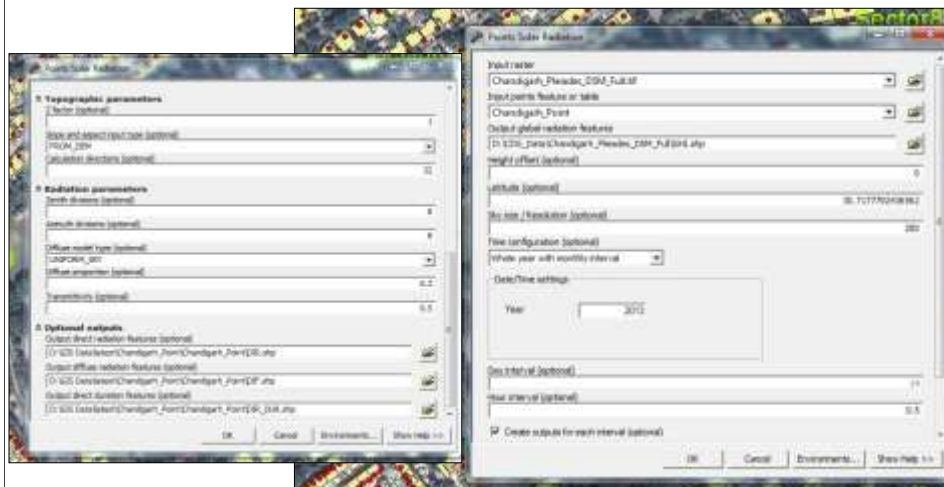
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## Solar Radiation Analyst

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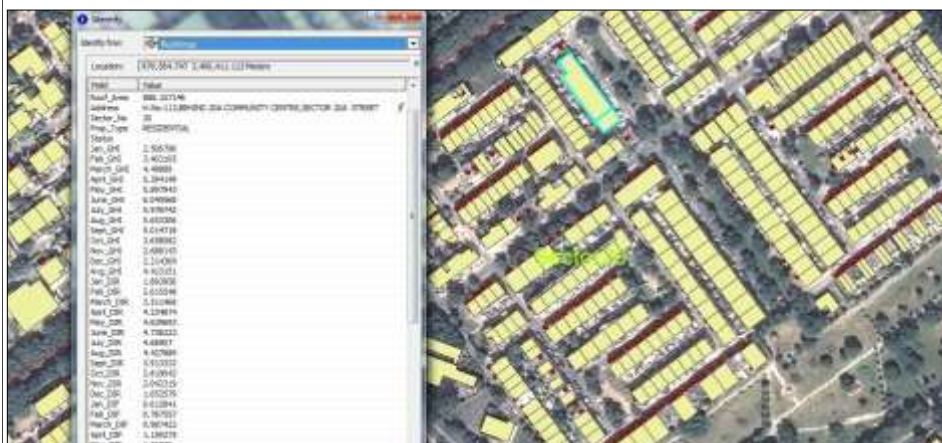
ESRI ArcGIS Solar Radiation Tools:

[http://resources.arcgis.com/en/help/main/10.1/index.html#/An\\_overview\\_of\\_the\\_Solar\\_Radiation\\_tools/009z000000r4000000/](http://resources.arcgis.com/en/help/main/10.1/index.html#/An_overview_of_the_Solar_Radiation_tools/009z000000r4000000/)

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## Rooftop Area and Solar Radiation

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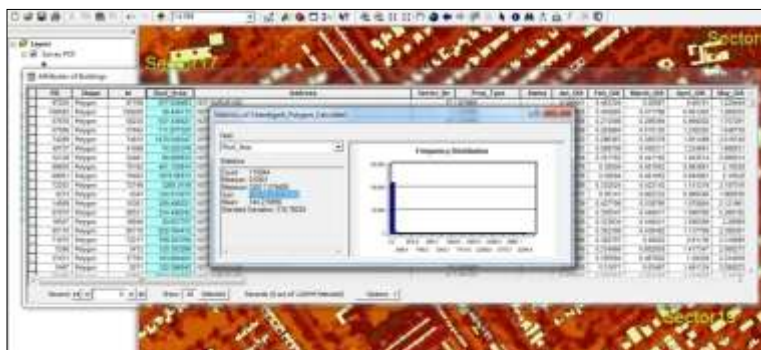


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## Analysis Results: Chandigarh Area

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- ✓ Total Buildings Surveyed (Nos.): 14,000 (approx.)
- ✓ Total Rooftop Digitized (Nos.): 1,10,500 (approx.)
- ✓ Potential Roof Area (70%) for Solar PV (Area > 10 Sq-M && GHI > 4kWh/m2/Day): 4 Sq-Kms. (approx.)
- ✓ Ground Validation for actual Roof Area, and Solar Radiation: 50-60 Samples (approx.)
- ✓ Validation using Solar PV Generation Data: 5-10 Samples (approx.)



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## Using Open-Source GIS and What's new in this study?



- ✓ Web Application: Open Layers, Ext-JS, Geo-Ext, PHP, and Ajax;
- ✓ Open-Source GIS Server: Geo-Server, and Map-Server;
- ✓ Open Geo-Database: PostgreSQL with PostGIS;
- ✓ Tile-Server Caching, Cloud based, and Publicly Accessible.

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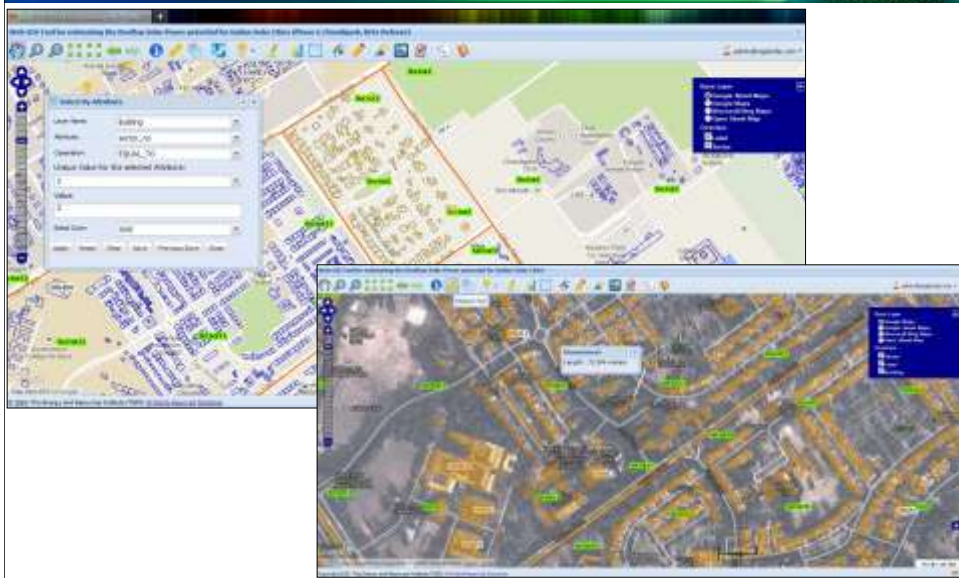
## Rooftop Solar Web-GIS Tool (Version 1.0)



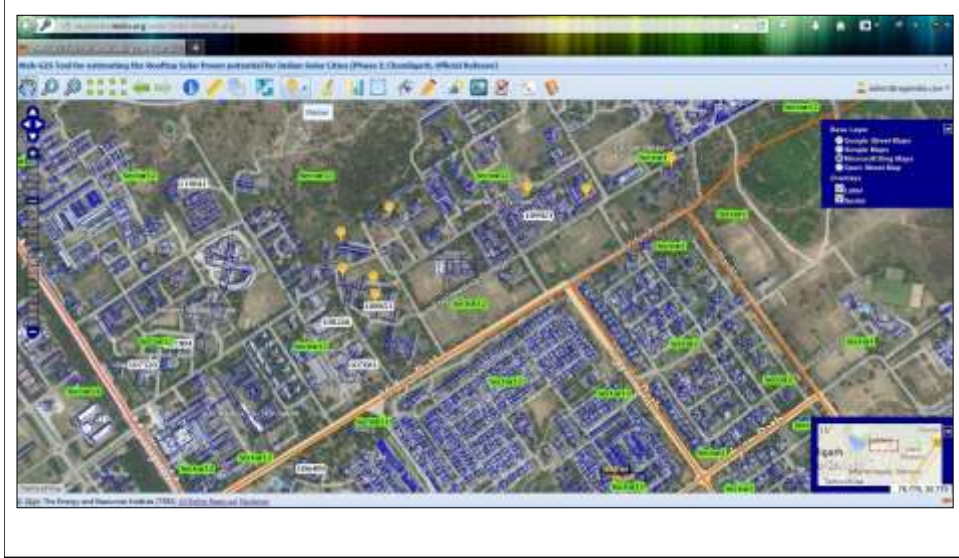
**Public Release:** <http://regisindia.teriin.org/solar/Solar-WebGIS.php>



15 **Rooftop Solar Web-GIS Tool (Analysis Tools)**



16 **Rooftop Solar Web-GIS Tool (Placeholder)**

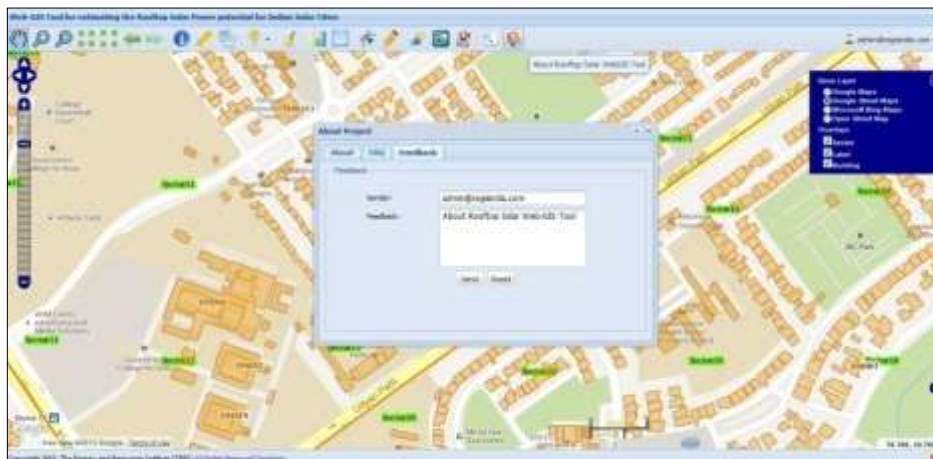








## 21 Rooftop Solar Web-GIS Tool (User Feedback)

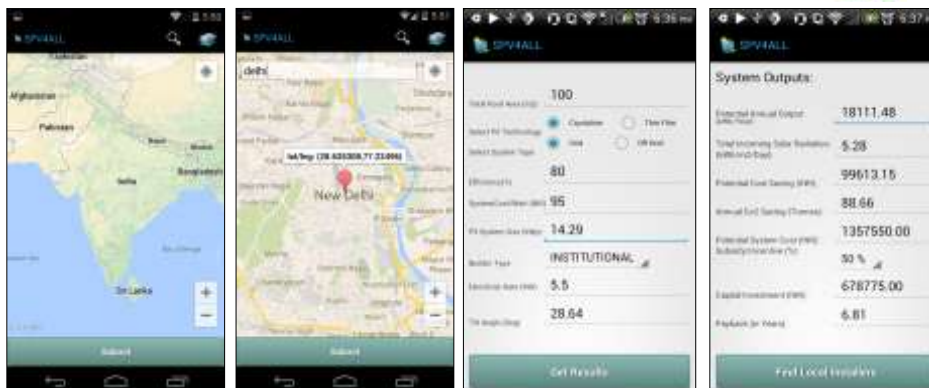


## 22 Mobile Application for promoting SPV systems in India



**SPV4ALL** (Solar PV for ALL)

“Creating consumer awareness for Solar PV systems in India”



SPV4ALL, Version 1.0.1 @ Google Play Store

<https://play.google.com/store/apps/details?id=org.teriin.spv4all&hl=en>

## 23 Features of "SPV4ALL" Android App



(1) Splash Screen



(2) Using GPS →



(3) Satellite View



(4) Locate a Point



(5) User Input(s)



(6) Simulation Output(s)



## 24 SPV4ALL Website



Solar PV for all (SPV4ALL) is an initiative taken by The Energy and Resources Institute (TERI), and supported by Shakti Sustainable Energy Foundation (SSEF) to promote solar PV systems in India. The strategic support is being provided by Chandigarh Renewable Energy Service and Technology Promotion Society (CRETTS) and Ministry of New and Renewable Energy (MNRE), Government of India.

### Rooftop Solar Web-GIS Tool

With a view to provide location for rooftop solar PV systems across the country, TERI with support from Shakti Sustainable Energy Foundation (SSEF) has developed a first-of-its-kind cloud based system. This GIS tool for estimating rooftop solar power potential has been made Open. The main objective of this study is to develop a light performing, and flexible Web-GIS tool to estimate the rooftop solar power potential for Chandigarh area.

Web-GIS TOOL  
MC-018-0184-08/2015



### Mobile Application

SPV4ALL mobile application is specially developed for Android mobile devices, using which users can estimate the rooftop solar power of a point concerned on all part over geographical system based upon the rooftop solar parameters.

Android App on Google Play Store



SPV4ALL ([www.spv4all.org](http://www.spv4all.org))

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## RE-GIS India (Website Highlights)



RE-GIS India ([www.regisindia.org](http://www.regisindia.org))

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## Outcomes from the Study



This proposed Web-GIS tool will be an ideal medium to showcase investors the logistics of rooftop solar energy investment. The proposed tool will have following benefits:

- ✓ It will enable users to estimate the rooftop solar power potential of selected area or buildings for a particular location w.r.t. various SPV technologies (crystalline/thin-film)
- ✓ Will act as a Decision Support System (DSS) to carry-out the pre-feasibility assessment (meso-level) of putting rooftop PV system for a particular location;
- ✓ Will help users to communicate their expression of interest directly to the nodal agencies, as well as they can also contact local SPV installers;
- ✓ Assist users for the viability of any rooftop projects based on possible business models, and financial schemes available.

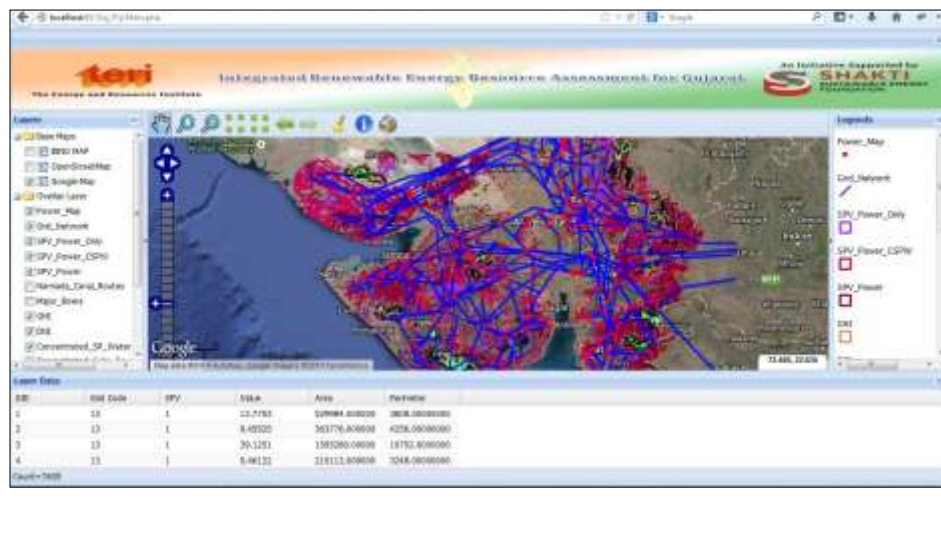
**End-Users Agreement:** <http://regisindia.org/index.php/disclaimer/>

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## Web-GIS based Renewable Energy Atlas for Gujarat (Ongoing Project)



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## Rooftop Solar Web-GIS Tool for NCT-Delhi (Proof of Concept)



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# Thank You



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