



Webinar series: Innovative tools for advancing low emission and climate resilient energy planning in Asia

**Session 2: Assessing renewable energy potential using the Geospatial Toolkit: Applications in Vietnam's Thanh Hoa Province**  
**April 21, 2016**

Organized by the Asia LEDs Partnership  
and LEDs Global Partnership's Energy Working Group

# Disclaimer

- *The LEDS GP does not endorse or recommend specific products or services. Information provided in this webinar is featured on the LEDS GP website as one of many best practices resources reviewed and selected by technical experts.*

# Some housekeeping items

## Two options for audio (select audio mode)

### *1. Listen through your computer.*

- Please select the “mic and speakers” radio button on the right hand audio pane display

### *2. Listen by telephone.*

- Please select the “telephone” option in the right-hand display, and a phone number and PIN will display

**Panelists** – Please mute your audio device when not presenting.

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# Agenda

- Welcome and introductory remarks
- Overview of the Asia LEDS Partnership and LEDS GP Energy Working Group
  - Sandra Khananusit, *Asia LEDS Partnership*
  - Philip Killeen, *Energy Working Group*
- Presentations – Panelists:
  - Donna Heimiller, *National Renewable Energy Laboratory*
  - Jon Duckworth, *National Renewable Energy Laboratory*
  - Khanh Nguyen, *USAID Low Emission Asian Development Program Country Coordinator*
- Questions and answers
- Short Survey

# The Asia LEDS Partnership and LEDS GP Energy Working Group

Sandra Khananusit, Asia LEDS Partnership Secretariat

Philip Killeen, LED GP Energy Working Group Secretariat

# LEDS Global Partnership

An international initiative aiming to harness the collective knowledge and resources of governments, donors, international organizations, and practitioners in scaling up and strengthening implementation of climate resilient low emission development around the world.

Catalyzes action and collaboration across more than 160 countries, plus international donor and technical organizations.

Operates through “regional platforms” (delivery) and “technical working groups” (expertise).

# This webinar series

## Innovative tools for advancing low emission and climate resilient energy planning in Asia

- March: SEI's LEAP: Applications in Vietnam and Indonesia
- April: NREL's Geo-spatial Toolkit: Application in Vietnam
- May: IUCN's Gender Equality for Climate Change Opportunities Methodology: Application in Sri Lanka

*A collaboration between the Asia LEDS Partnership  
and LEDS Energy Working Group*

# ALP 2016 priorities

- Support capacity building for low emission energy planning and implementation
- Link the finance and LEDS communities to strengthen know-how of policymakers on investment mobilization
- Facilitate regional learning through peer exchange and new knowledge product development and dissemination



# ALP 2016 activities: Highlights

## Webinars and training:

- Innovative tools for advancing low emission and climate resilient energy planning
- Online training program on low emission energy planning and implementation (with planned in-person training at events)

## Events:

- Regional workshop on “Mechanisms that catalyze finance for grid-connected clean energy in Asia” (June in Hanoi)
- Asia LEDS Forum 2016 on “Mobilizing finance for implementing INDCs” (June in Hanoi)

Case studies, blogs, articles, and more!

# Energy Working Group (EWG)

The LEDS EWG promotes low emission and climate resilient development in the energy sector through:

- Learning, information exchange, communication of best practices
- Advisory services & technical assistance
- Enhanced opportunities for coordination and collaboration

# EWG 2016 activities: Highlights

## Webinars:

- Innovative tools for advancing low emission and climate resilient energy planning
- Low emission climate resilient energy strategies

## Energy training:

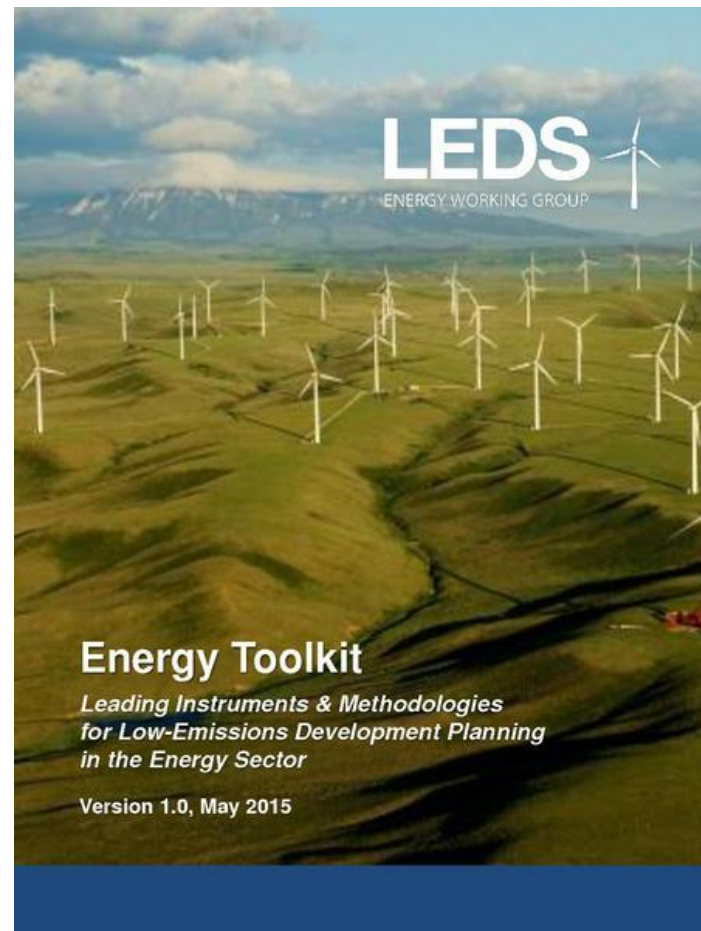
- Asia LEDS Partnership regional workshop
- Africa LEDS Partnership regional workshop

LEDS sustainable energy & development world atlas

Energy LEDS community of practice

# LEDS Energy Toolkit

- Reference guide for well-established LEDS planning tools & methodologies
- Focus on tools available at low or no cost
- 2015 version: 18 tools
- Will be updated and extended



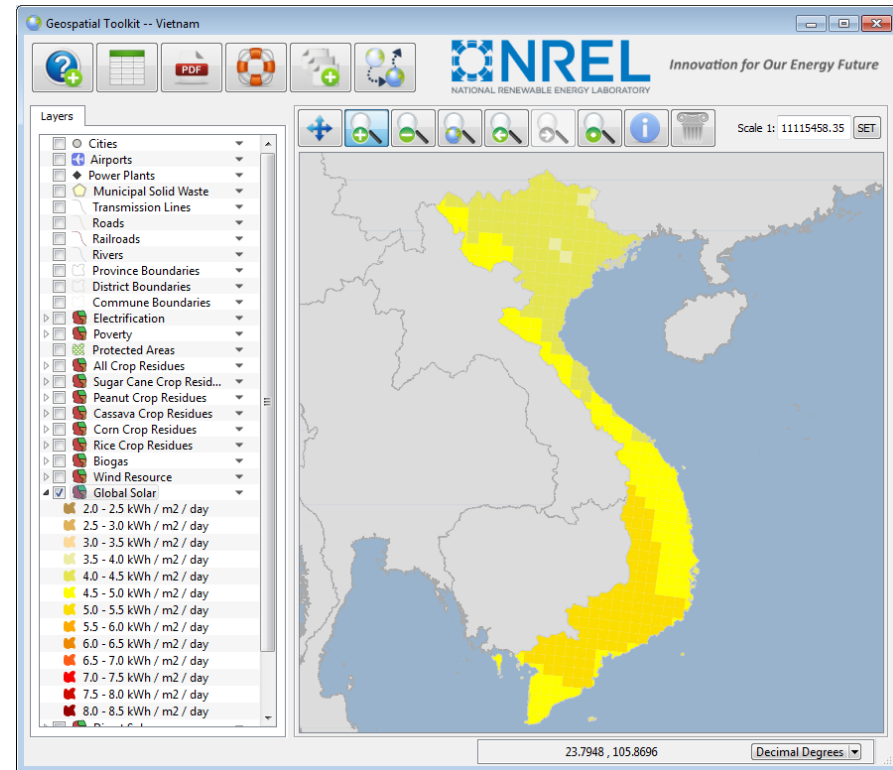
# Introduction to the Geospatial Toolkit

Donna Heimiller

National Renewable Energy Laboratory

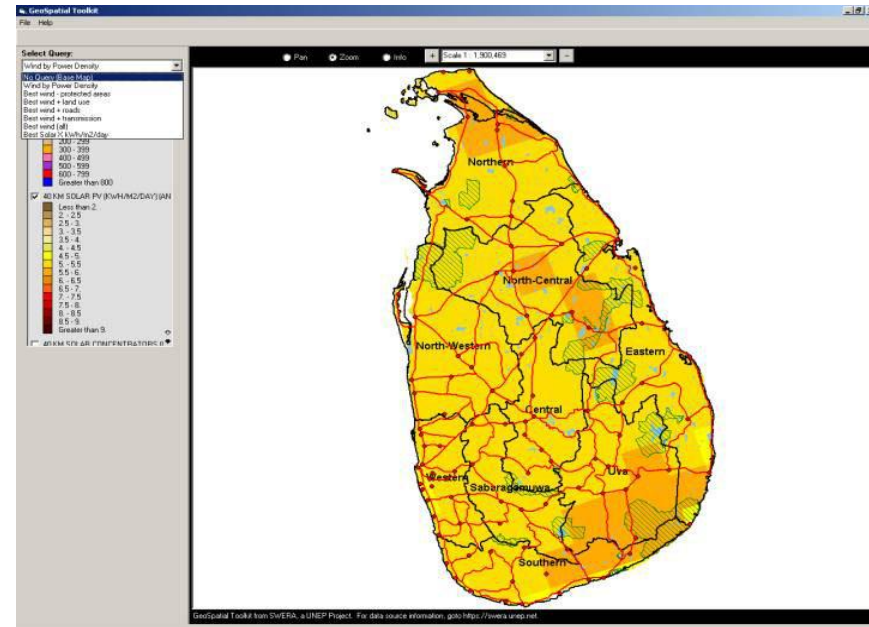
# What is a Geospatial Toolkit?

- Stand-alone computer application
- Data viewer & analysis tool
- Combines renewable resource information with other data
- Explores data visually and with targeted geospatial analysis functionality
- Each Geospatial Toolkit is country- or region-specific



# Geospatial Toolkit background

- Originally created to facilitate interaction with regionally mapped wind and solar resource assessments
- Evolved to include more technologies, queries, and data layers
- Re-designed using open source components to enable free/wider distribution

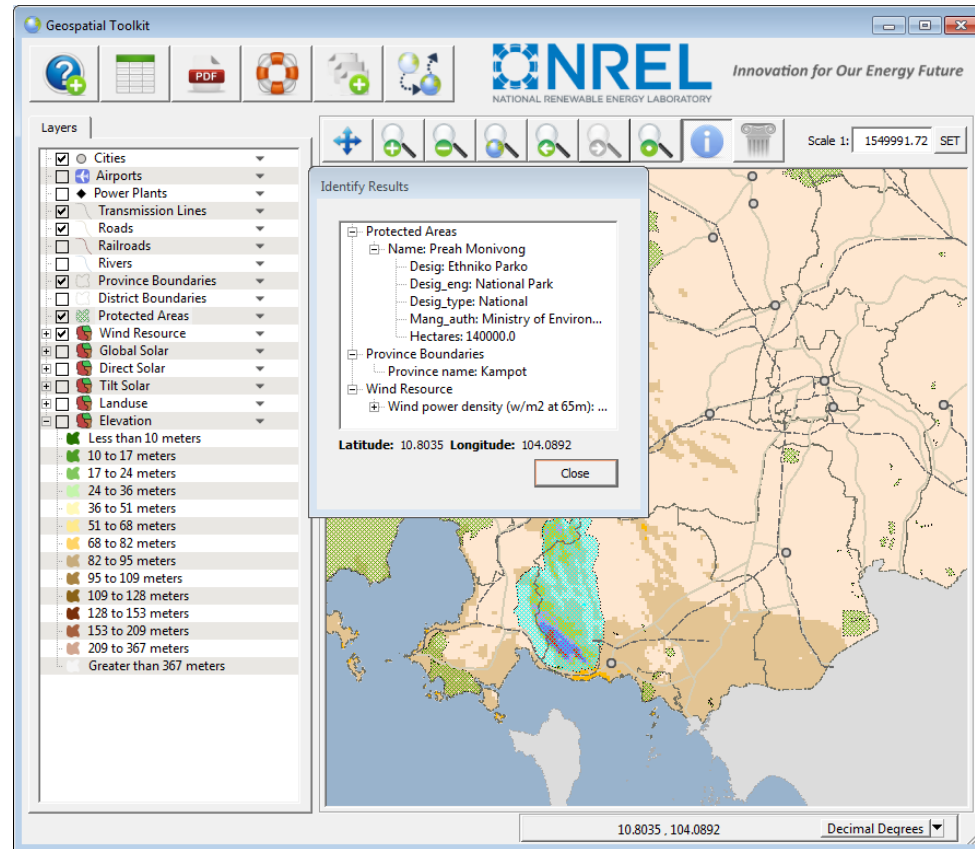


2005 – Sri Lanka  
UNEP Solar and Wind Energy  
Resource Assessment (SWERA) Project



# Geospatial Toolkit functionality

- High-level visual exploration through pre-defined country data packages
- Targeted/guided geospatial analysis to visualize potential development issues and quantify energy potential
- Interact with renewable energy tools such as HOMER
- Platform is adaptable – functionality depends on data availability
- Users can add other data layers for visualization





# Combining resource & other data

- For sites, can answer:
  - How far is resource from load centers, transmission lines, and roads?
  - Is site a protected area? Can we build on it? What is the land currently used for? Is site too steep to build on?
- For countries, can answer:
  - How much land area has good-quality resource, close to infrastructure, and in suitable development areas?

**Good answers depend on good data!**

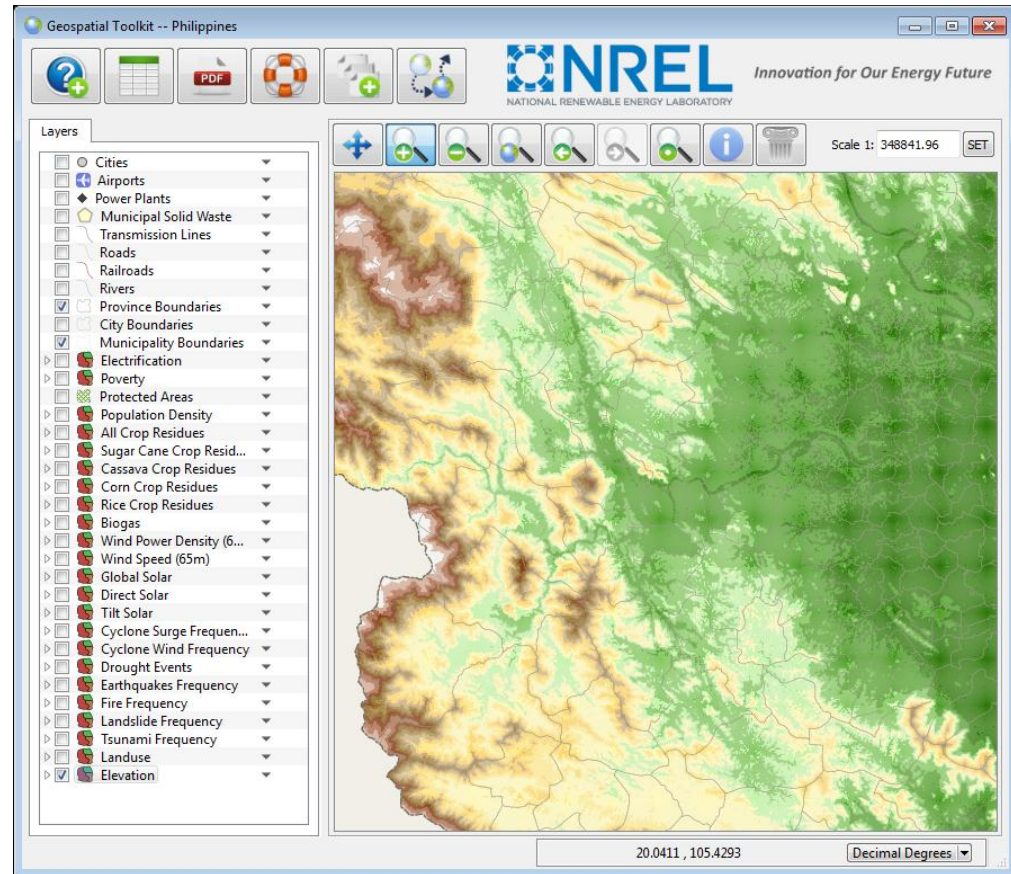
# Data in the Geospatial Toolkit

- **Renewable resource data**
  - Gridded solar and wind resource data
  - Biomass, geothermal, hydro, and conventional resources can also be added
- **Base data**
  - Elevation and slope
  - Land use/land cover
  - Protected areas
  - Political boundaries
  - Cities/towns
  - Rivers and lakes
- **Infrastructure data**
  - Transmission lines
  - Roads and railroads
  - Power plants
- **Other data of interest (examples)**
  - Meteorological stations
  - Rural development priorities (schools, clinics, etc)

*For many layers, global data sources may be used, but those sources may be dated or lack detail*

# Geospatial Toolkit – Demonstration

- Displaying data
- Tool functions
- Analysis options

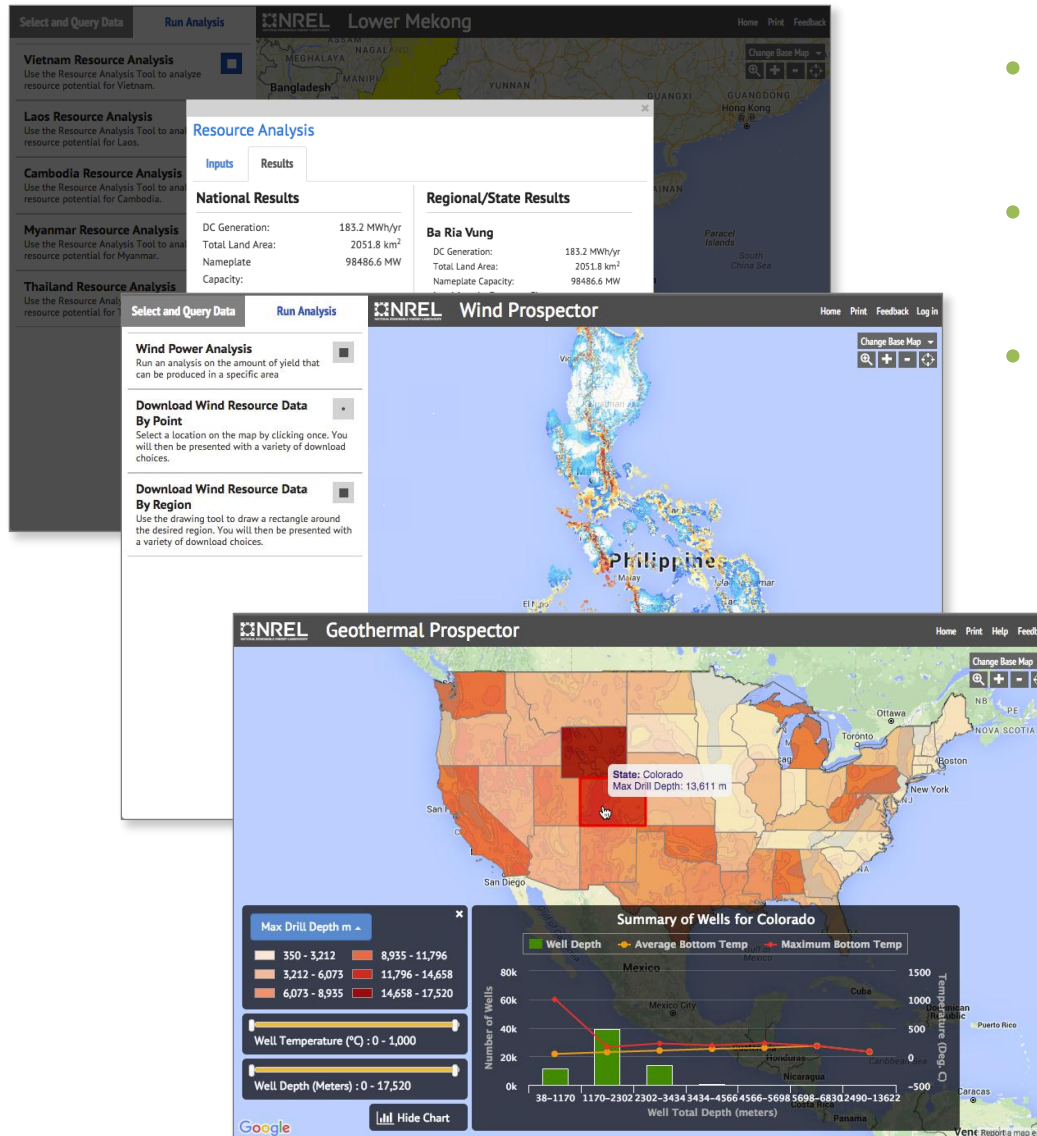


# Enterprise Geospatial Toolkit

Jon Duckworth

National Renewable Energy Laboratory

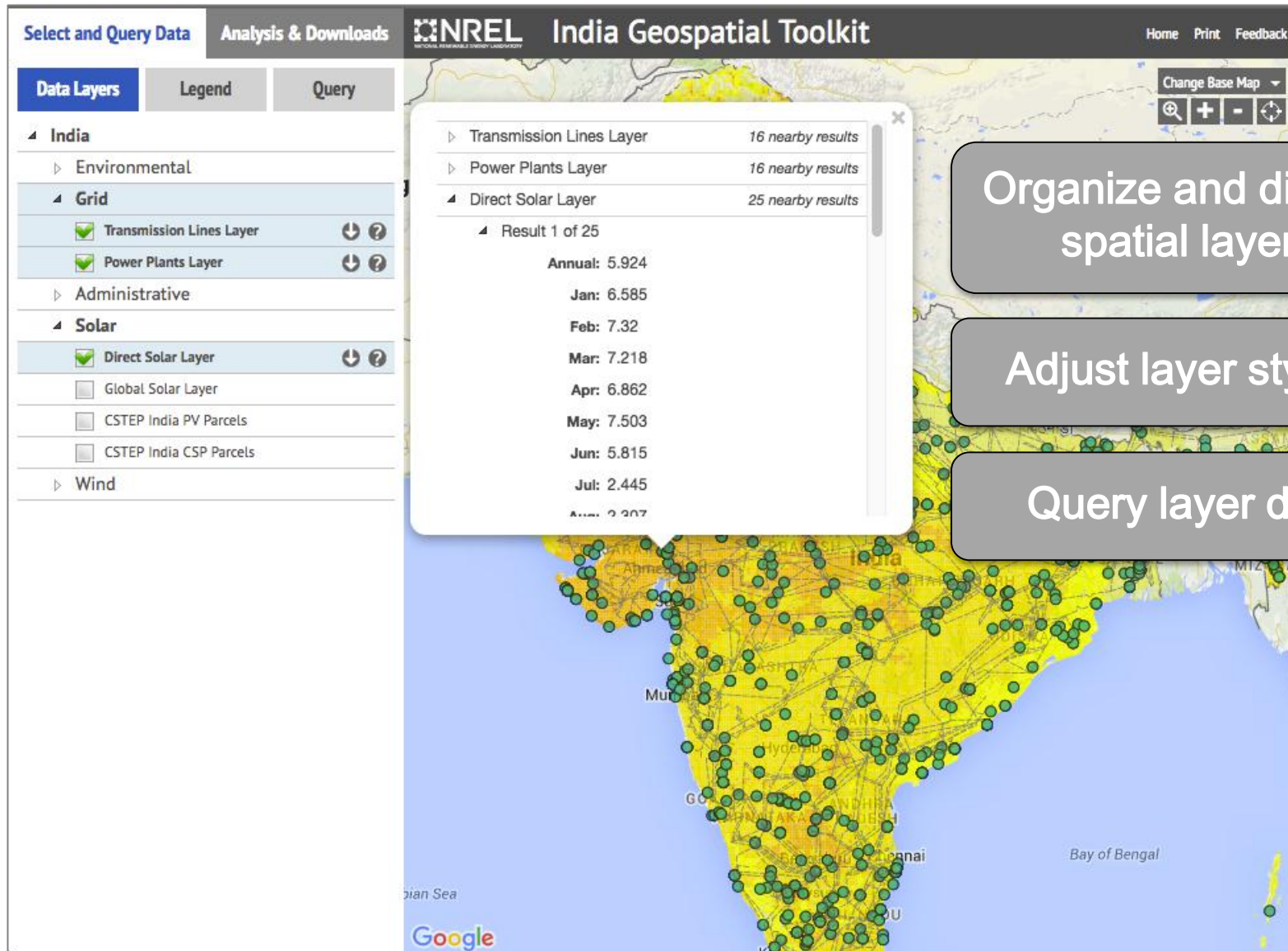
# OpenCarto web GIS framework



- Highly customizable and visually compelling interface
- Sophisticated analysis on massive datasets
- Wider range of tools than proprietary software
- Share data and analysis with wide audience
- Security and authentication
- Multiple applications leveraging same body of work



# Core GIS functionality



# Core GIS functionality

The screenshot displays the NREL India Geospatial Toolkit interface. The main map shows India with various spatial layers overlaid. On the left, a sidebar titled 'Select and Query Data' contains a 'Data Layers' panel with a tree view showing categories like 'India', 'Environmental', 'Grid', 'Administrative', and 'Solar'. The 'Grid' category is expanded, showing 'Transmission Lines Layer' and 'Power Plants Layer'. The 'Solar' category is also expanded, showing 'Direct Solar Layer', 'Global Solar Layer', 'CSTEP India PV Parcels', and 'CSTEP India CSP Parcels'. A 'Legend' panel and a 'Query' panel are also visible. A 'Transmission Lines Layer' popup shows 16 nearby results. A 'Power Plants Layer' popup shows 16 nearby results. A 'Direct Solar Layer' popup shows 25 nearby results, with a table of annual and monthly values. A 'Direct Solar Layer' metadata popup provides a description, source, spatial resolution, and download options (CSV, Shapefile, KML, GeoJSON). A 'Direct Solar Layer' data download popup shows the same download options. A 'Direct Solar Layer' data query popup shows the same query options. A 'Direct Solar Layer' data query popup shows the same query options. A 'Direct Solar Layer' data query popup shows the same query options.

**Select and Query Data** | **Analysis & Downloads** | **NREL** | **India Geospatial Toolkit** | Home | Print | Feedback

**Data Layers** | Legend | Query

**India**

- Environmental
- Grid**
  - Transmission Lines Layer
  - Power Plants Layer
- Administrative
- Solar**
  - Direct Solar Layer
  - Global Solar Layer
  - CSTEP India PV Parcels
  - CSTEP India CSP Parcels

**Transmission Lines Layer** 16 nearby results

**Power Plants Layer** 16 nearby results

**Direct Solar Layer** 25 nearby results

**Result 1 of 25**

Annual:	5.924
Jan:	6.585
Feb:	7.32
Mar:	7.218
Apr:	6.862
May:	7.503
Jun:	5.815
Jul:	2.445
Aug:	2.207

**India Direct Solar Layer**

**Description:** Direct normal irradiance (DNI) averaged annually and monthly from April 2004 to March 2009.

**Source:** SUNY/Albany (2010)

**Spatial Resolution:** 6 arc-minutes (nominally 10 km)

**Additional Information:**

**Direct Solar Layer**

Download map layer data in the following geospatial data formats:

CSV | Shapefile | KML | GeoJSON

Organize and display spatial layers

Adjust layer styling

Query layer data

Download spatial data layers

Get layer metadata

# Core GIS functionality

Printable maps & reports

## Renewable Energy Pre-screening Report

Colorado Test Site (Lat: 38.685510, Lon: -103.974609)

Thu Apr 07 2016

Back

Print

### Introduction

This renewable energy (RE) pre-screening assessment tool (<http://maps.nrel.gov/femp>) was funded by and conducted on behalf of the U.S. Department of Energy's (DOE's) Federal Energy Management Program (FEMP) in support of U.S. Federal agencies' use of renewable energy technologies in accordance with the Energy Policy Act of 2005 (EPAct 2005), Executive Order (EO) 13423 and the Energy Independence and Security Act of 2007 (EISA 2007).

The objective of this analysis is to provide a high-level assessment of the expected economic performance of available renewable energy technologies. These results provide a basis for determining whether the feasibility of any technology is warranted.

### Pre-screening Inputs and Results

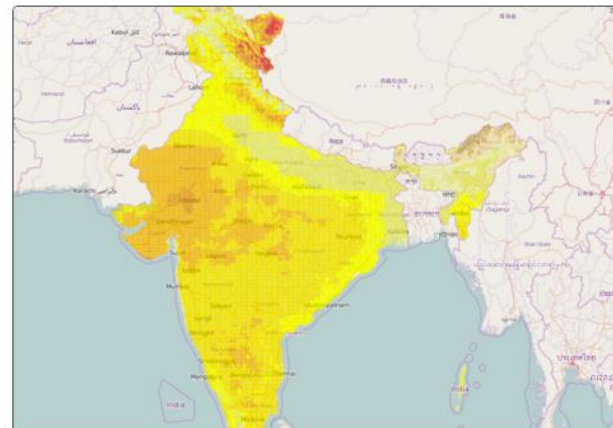
A summary of the technology calculation inputs are presented in Table 2. Default values are in bold. Default values are drawn from geospatial databases (renewable resource values) and from values reported by FEMP in the "Distributed Generation Renewable Energy" ([http://www.nrel.gov/analysis/tech\\_lcoe\\_re\\_cost\\_est.html](http://www.nrel.gov/analysis/tech_lcoe_re_cost_est.html)).

Table 1. Input Performance and Cost Functions

PV Inputs

## Print Wizard

### A Sample Printed Map



### Map Legends

#### Direct Solar Layer

- 1.5 - 2.0 kWh / m2 / day
- 2.0 - 2.5 kWh / m2 / day
- 2.5 - 3.0 kWh / m2 / day
- 3.0 - 3.5 kWh / m2 / day
- 3.5 - 4.0 kWh / m2 / day
- 4.0 - 4.5 kWh / m2 / day
- 4.5 - 5.0 kWh / m2 / day
- 5.0 - 5.5 kWh / m2 / day
- 5.5 - 6.0 kWh / m2 / day
- 6.0 - 6.5 kWh / m2 / day
- 6.5 - 7.0 kWh / m2 / day
- 7.0 - 7.5 kWh / m2 / day
- 7.5 - 8.0 kWh / m2 / day
- 8.0 - 8.5 kWh / m2 / day

### Metadata & Footers

Note: Use HTML to style the footer text.

Print

Download

Downloadable map & legend images



# Big data downloads

### Select and Query Data

#### Wind Power Analysis

Run an analysis on the amount of yield that can be produced in a specific area

### Analysis & Downloads

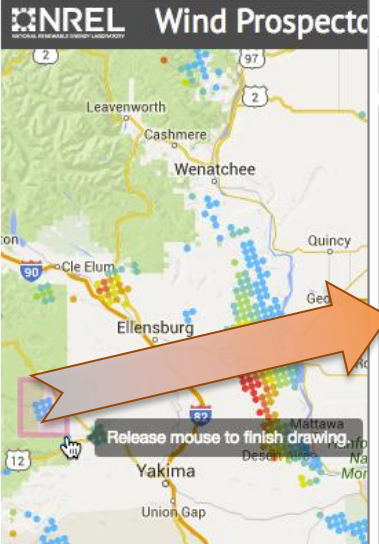
#### Wind Resource Data Download (Point)

Download resource data from the [Wind Integration National Dataset \(WIND\) Toolkit](#), [Western Wind Dataset](#) or [Eastern Wind Dataset](#) (where available) by point. This tool will return data for the station closest to the point drawn.

#### Wind Resource Data Download (Box)

Download resource data from the [Wind Integration National Dataset \(WIND\) Toolkit](#), [Western Wind Dataset](#) or [Eastern Wind Dataset](#) (where available) by box. This tool will return data for all stations falling within the drawn region.

## NREL Wind Prospector



Release mouse to finish drawing.

## Data Download Wizard

WTK EWIS WWIS

### Wind Integration National Dataset (WIND) Toolkit

The Wind Integration National Dataset (WIND) Toolkit is an update and expansion of the Eastern and Western Wind Datasets, and is intended to support the next generation of integration studies. The WIND Toolkit includes meteorological conditions and turbine power for more than 126,000 sites in the continental United States for the years 2007–2013.

The WIND Toolkit has been funded by the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Wind and Water Power Technologies Office, and was created through the collaborative efforts of the

[Documentation](#)

Bri-Mathias Hodge  
National Renewable Energy Lab

### Select Years

Select All Clear All

☒ 2007 ☐ 2008 ☐ 2009 ☐ 2010 ☐ 2011 ☐ 2012

### Select Attributes

Select All Clear All

☒ Wind Power (MW) ☒ Wind Direction (deg) ☒ Wind Speed (m/s)  
☒ Temperature ☒ Surface Air Pressure (Pa) ☒ Density (kg/m<sup>3</sup>)

### Select Download Options

Select All Clear All

☐ Include Leap Day ☒ Convert UTC to Local Time

Download Limit Indicator

[Edit User Info](#) [Download Data](#)

	A	B	C	D	E	F	G	H
1	SiteID	124595						
2	Longitude	-123.65614						
3	Latitude	46.02161						
4	Year	Month	Day	Hour	Minute	density at hub height (kg/m <sup>3</sup> )	power (MW)	surface air pressure (Pa)
5	2007	1	1	0	0	1.218	1.114	99138.744
6	2007	1	1	0	5	1.218	1.03	99140.568
7	2007	1	1	0	10	1.218	0.946	99143.32
8	2007	1	1	0	15	1.218	0.837	99145.152
9	2007	1	1	0	20	1.218	0.83	99145.152
10	2007	1	1	0	25	1.218	0.859	99148.816
11	2007	1	1	0	30	1.219	0.943	99151.552
12	2007	1	1	0	35	1.219	1.034	99151.552
13	2007	1	1	0	40	1.219	1.118	99150.64
14	2007	1	1	0	45	1.219	1.217	99155.216
15	2007	1	1	0	50	1.219	1.323	99157.056
16	2007	1	1	0	55	1.219	1.43	99157.056
17	2007	1	1	1	0	1.219	1.548	99159.8
18	2007	1	1	1	5	1.219	1.689	99158.88
19	2007	1	1	1	10	1.219	1.806	99155.216
20	2007	1	1	1	15	1.219	1.905	99155.216
21	2007	1	1	1	20	1.219	1.993	99156.136
22	2007	1	1	1	25	1.219	2.073	99156.136
23	2007	1	1	1	30	1.219	2.138	99154.304
24	2007	1	1	1	35	1.219	2.235	99153.392
25	2007	1	1	1	40	1.219	2.369	99154.304
26	2007	1	1	1	45	1.219	2.541	99147.896
27	2007	1	1	1	50	1.219	2.734	99143.32
28	2007	1	1	1	55	1.219	2.884	99137.832
29	2007	1	1	2	0	1.219	3.083	99137.832
30	2007	1	1	2	5	1.219	3.319	99135.08
31	2007	1	1	2	10	1.22	3.561	99136.904
32	2007	1	1	2	15	1.22	3.77	99136.904
33	2007	1	1	2	20	1.22	3.963	99132.336
34	2007	1	1	2	25	1.22	4.181	99132.336
35	2007	1	1	2	30	1.22	4.316	99133.248
36	2007	1	1	2	35	1.22	4.422	99133.248
37	2007	1	1	2	40	1.22	4.549	99132.336
38	2007	1	1	2	45	1.22	4.691	99128.672
39	2007	1	1	2	50	1.22	4.895	99127.76

## Time-series resource data (wind & solar)

# Guided help tours

The screenshot displays the NREL Wind Prospector web application interface. The main map shows the Philippines with various geographical features and labels. On the left, a 'Data Layers' panel lists categories like County & State Borders, Environmental Concern, Infrastructure, Land Ownership, Regions & Study Areas, Site Analysis, Topography, Wind Resource, Philippines, Physical, Political, Infrastructure (with sub-items Transmission Lines and Power Plants), Natural Hazards, and Renewable Resource (with sub-items Tilt Solar, Direct Solar, Global Solar, Wind Speed (80m), Wind Speed (100m), Wind Power Density (100m), Mindanao Hydro Resource, Mindanao Biomass Resource, Visayas Biomass Resource, and Luzon Biomass Resource). A 'Legend' and 'Query' tab are also visible. A 'Run Analysis' button is at the top. A 'Select and Query Data' tab is active. A 'Home Print Feedback Log in' menu is in the top right. A 'Change Base Map' dropdown is in the top right. A large orange callout box in the top right corner contains the text 'Interactive guided help'. A white callout box in the center of the map, titled 'The Layer Tree', contains the text 'Use your finger or the mouse to turn on (check) the Wind Speed (100m) and Transmission Lines layers.' and has 'BACK' and 'NEXT' buttons.

Select and Query Data Run Analysis NREL Wind Prospector Home Print Feedback Log in

Data Layers Legend Query

- County & State Borders
- Environmental Concern
- Infrastructure
- Land Ownership
- Regions & Study Areas
- Site Analysis
- Topography
- Wind Resource
- Philippines
  - Physical
  - Political
  - Infrastructure
    - Transmission Lines
    - Power Plants
  - Natural Hazards
  - Renewable Resource
    - Tilt Solar
    - Direct Solar
    - Global Solar
    - Wind Speed (80m)
    - Wind Speed (100m)
    - Wind Power Density (100m)
    - Mindanao Hydro Resource
    - Mindanao Biomass Resource
    - Visayas Biomass Resource
    - Luzon Biomass Resource

Philippines

Use your finger or the mouse to turn on (check) the Wind Speed (100m) and Transmission Lines layers.

BACK NEXT

Change Base Map

# Dynamic Technical Potential (*beta*)

The screenshot displays the 'Lower Mekong Geospatial Toolkit' interface. The 'Resource Analysis' window is open, showing various input filters for wind resource analysis. The 'Resource' is set to 'Wind'. The 'Country' is 'Vietnam'. The 'Region(s)' list includes Quang Ngai, Quang Ninh, Quang Tri, Soc Trang, Son La, TP. Ha Noi, and TP. Hai Phong. The 'Limit By Power Density' is set to 'W/m²' with a range of 100 to 400. The 'Limit to Road Corridors' is set to 'None'. The 'Limit to Transmission Corridors' is set to '5 kilometers'. The 'Limit By Land Use' is set to 'Exclude Protected Areas'. The 'Limit By Slope' is set to 'Min: 0 Max: 3'. The 'Save Layer As' field is 'Demo Analysis'. The 'Run Analysis' button is highlighted.

**Custom filters by resource**

**Summary tabular results**

**Resource Analysis**

**Inputs**

**Resource:** Wind

**Country:** Vietnam

**Region(s):** Quang Ngai, Quang Ninh, Quang Tri, Soc Trang, Son La, TP. Ha Noi, TP. Hai Phong

**Limit By Power Density (W/m²):** Min: 100, Max: 400

**Limit to Road Corridors:** None, kilometers

**Limit to Transmission Corridors:** 5, kilometers

**Limit By Land Use:** Exclude Protected Areas

**Limit By Slope:** Min: 0, Max: 3

**Save Layer As:** Demo Analysis

**Reset** **Run Analysis**

**National Results**

DC Generation:	60.1 MWh/yr
Total Land Area:	2013.5 km²
Nameplate:	96648.1 MW
Capacity:	

**Regional/State Results**

**Quang Ninh**

DC Generation:	60.1 MWh/yr
Total Land Area:	2013.5 km²
Nameplate:	96648.1 MW
Capacity:	

**Land Area by Resource Class**

196- 196 W/m²:	1.39 km²
197- 197 W/m²:	3.07 km²
206- 206 W/m²:	0.55 km²
207- 207 W/m²:	7.38 km²
209- 209 W/m²:	1.15 km²
212- 212 W/m²:	3.94 km²
212- 212 W/m²:	2.04 km²

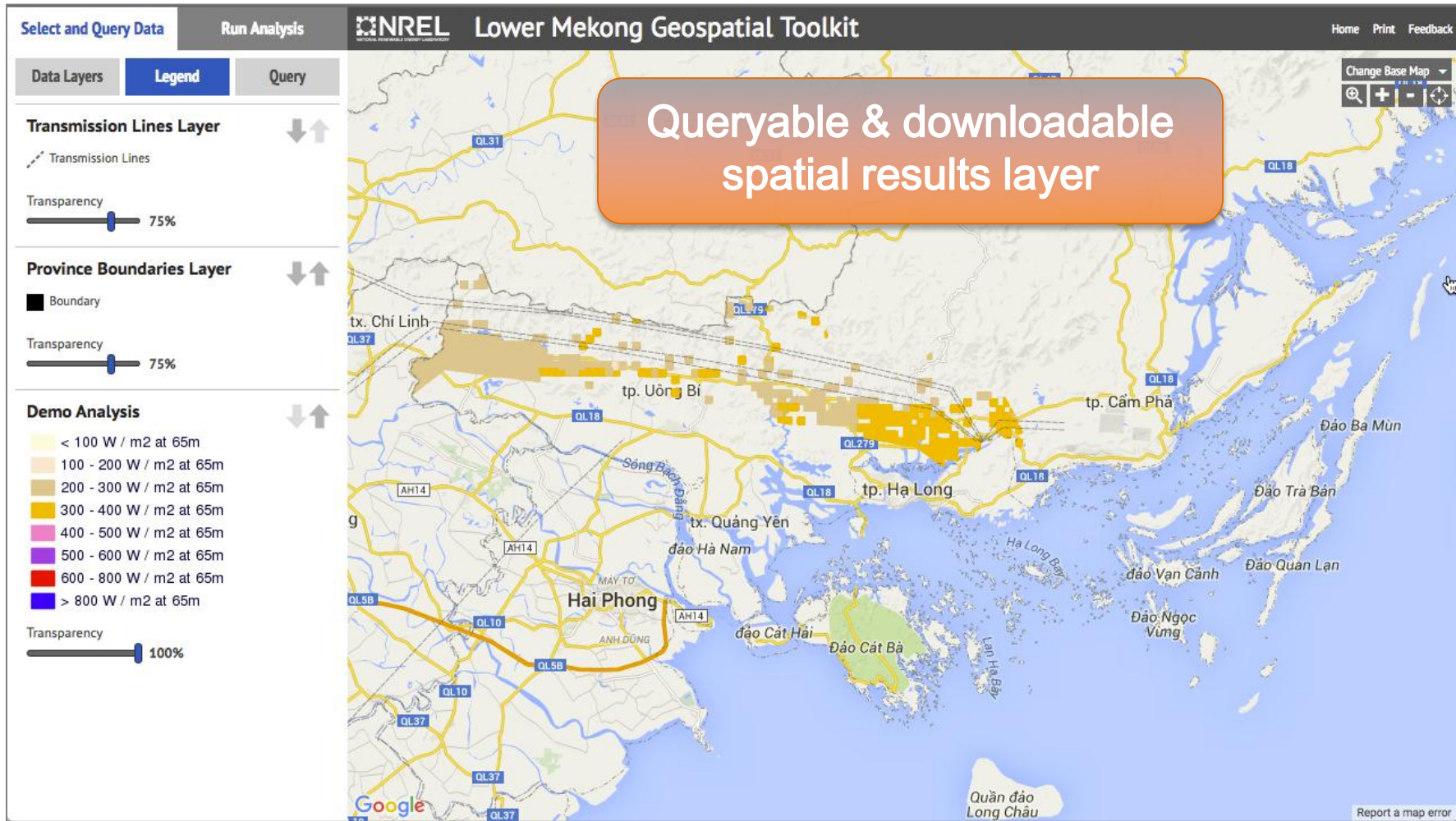
**Wind Resource Bounds**

Minimum:	196.0 W/m²
Maximum:	392.0 W/m²

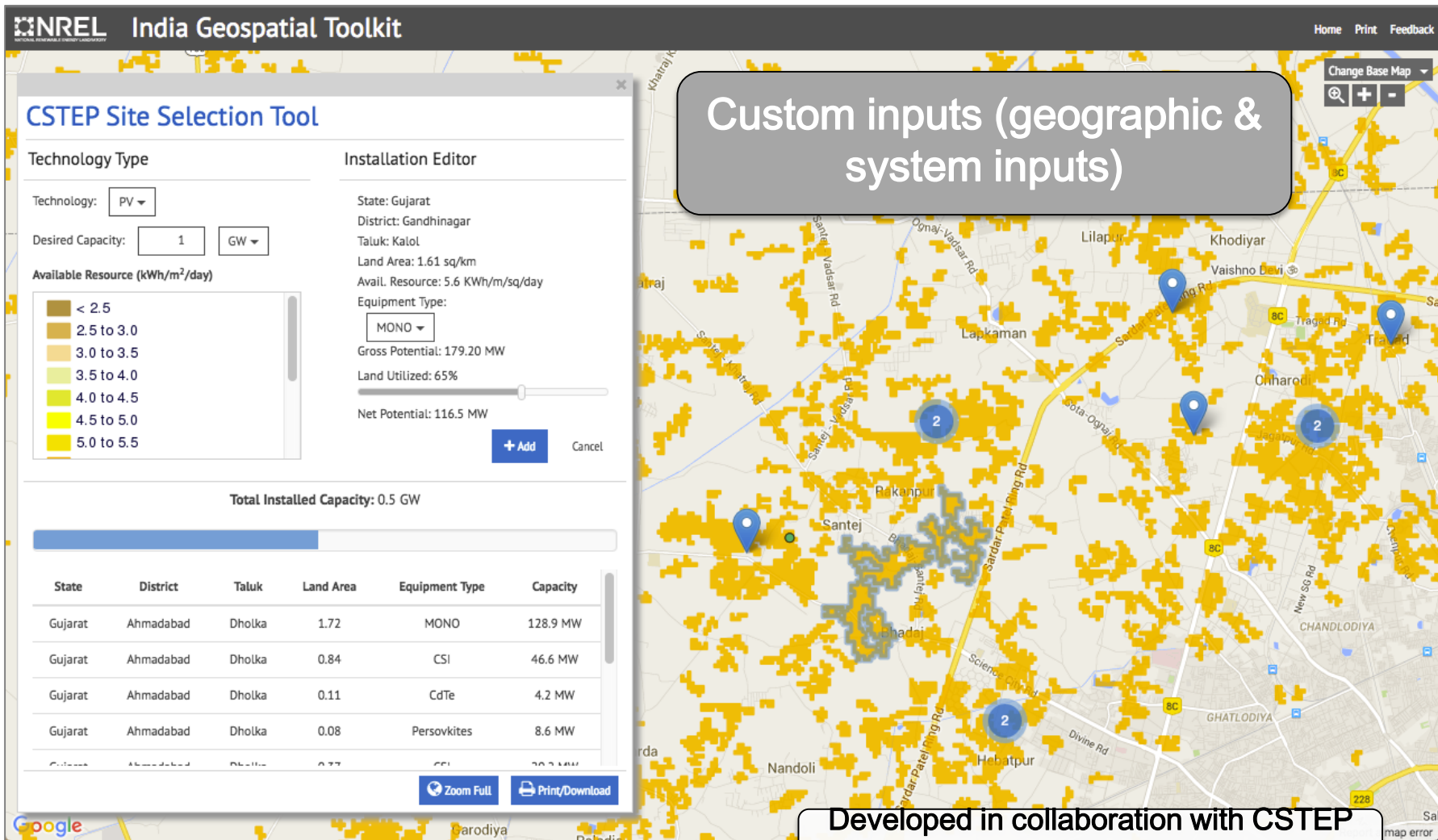
**Tip:** Return to this interface from the map table of contents by clicking the info button: ?



# Dynamic Technical Potential (*beta*)



# System Planning (*beta*)



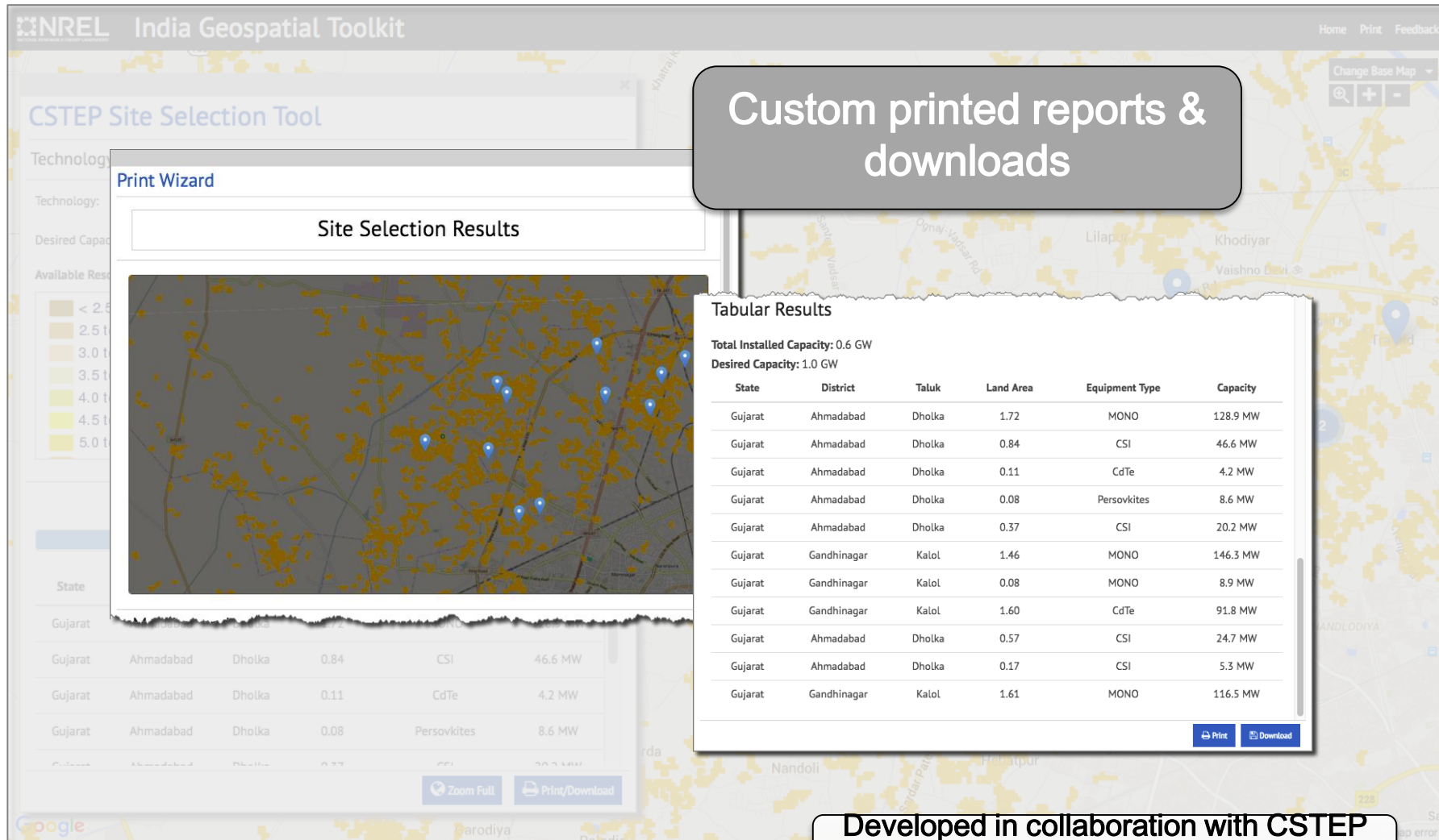
The screenshot displays the NREL India Geospatial Toolkit interface. On the left, the 'CSTEP Site Selection Tool' is active, showing configuration options for Technology Type (PV), Desired Capacity (1 GW), and Available Resource (kWh/m²/day) with a color-coded legend. The 'Installation Editor' on the right shows details for a site in Gujarat, including State, District, Taluk, Land Area, Avail. Resource, Equipment Type (MONO), Gross Potential (179.20 MW), Land Utilized (65%), and Net Potential (116.5 MW). Below these, a table lists the 'Total Installed Capacity: 0.5 GW' with columns for State, District, Taluk, Land Area, Equipment Type, and Capacity. The table contains five rows of data. The background is a map of Gujarat with yellow markers indicating potential sites. A grey callout box with the text 'Custom inputs (geographic & system inputs)' is overlaid on the map. At the bottom right, a white callout box states 'Developed in collaboration with CSTEP India'.

**Custom inputs (geographic & system inputs)**

**Developed in collaboration with CSTEP India**

State	District	Taluk	Land Area	Equipment Type	Capacity
Gujarat	Ahmadabad	Dholka	1.72	MONO	128.9 MW
Gujarat	Ahmadabad	Dholka	0.84	CSI	46.6 MW
Gujarat	Ahmadabad	Dholka	0.11	CdTe	4.2 MW
Gujarat	Ahmadabad	Dholka	0.08	Persovkites	8.6 MW
Gujarat	Ahmadabad	Dholka	0.77	CSI	30.3 MW

# System Planning (*beta*)



# Using GsT for Green Growth Action Plan (GGAP) Development in Thanh Hoa

Khanh Nguyen

USAID Low Emissions Asian Development (USAID LEAD) Program  
Institute for Sustainable Communities (USAID Contractor)



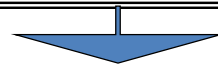
# Contents

1. Thanh Hoa at a glance
2. Why GsT was selected and used
3. Issues/challenges with the use of GsT



# Thanh Hoa at a glance

- A province in Vietnam
- 3.5 million people
- Gross Regional Domestic Product grew by 136% between 2010-2014
- Foreign investment levels were amongst the highest in Vietnam
- Rapid poverty reduction: 25% of households in 2010 to about 9.9% in 2014
- Economic growth has been dependent on natural resource consumption and ecosystem services and is threaten by climate change

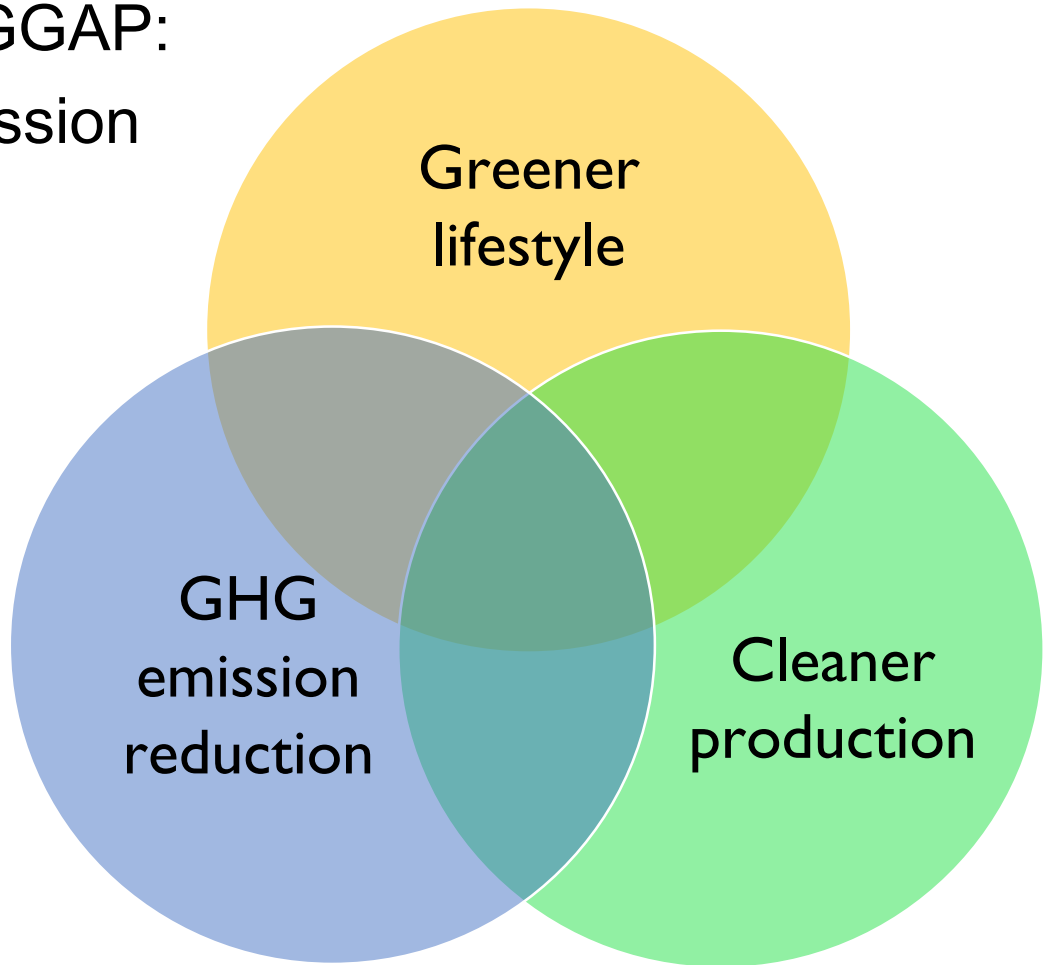


- ❖ Thanh Hoa aims to pursue green growth to sustain economic growth while reducing pollution
- ❖ Thanh Hoa developed its Green Growth Action Plan (GGAP) which was supported by the USAID

# Green growth components

Three components of GGAP:

- Greenhouse gas emission reduction
- Green lifestyle
- Cleaner production



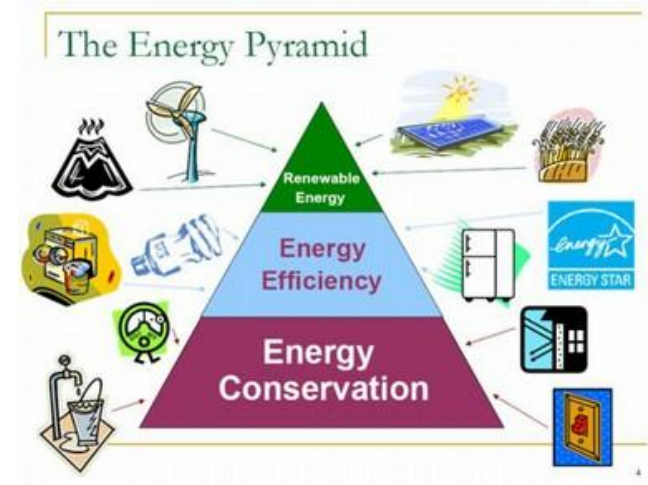
# Why was GsT selected?

## Why renewable energies?

- Renewable energies development (wind, solar, biomass) is key to achieving GHG emission reduction
- Thanh Hoa is good at renewable energy

## Why GsT?

- Free software with built-in dataset
- Combines renewable energy resource information with other data
- Can evaluate renewable energy potential visually in an effective way
- Fairly easy to use
- Ready partners: NREL (tool developer), USAID LEAD program (capacity building partner)



# How was GsT used?

## Preparations

- Training on GsT was provided to the Green Growth Task Force
- Data available locally was identified during the training
- A GsT version for Thanh Hoa was developed



*Training on Geospatial Toolkit*

## Application

- GsT was used to assess wind and solar potential *i.e.*, locating suitable sites
- USAID commented on the selection criteria
- Identified suitable sites were converted into MW using standard land take

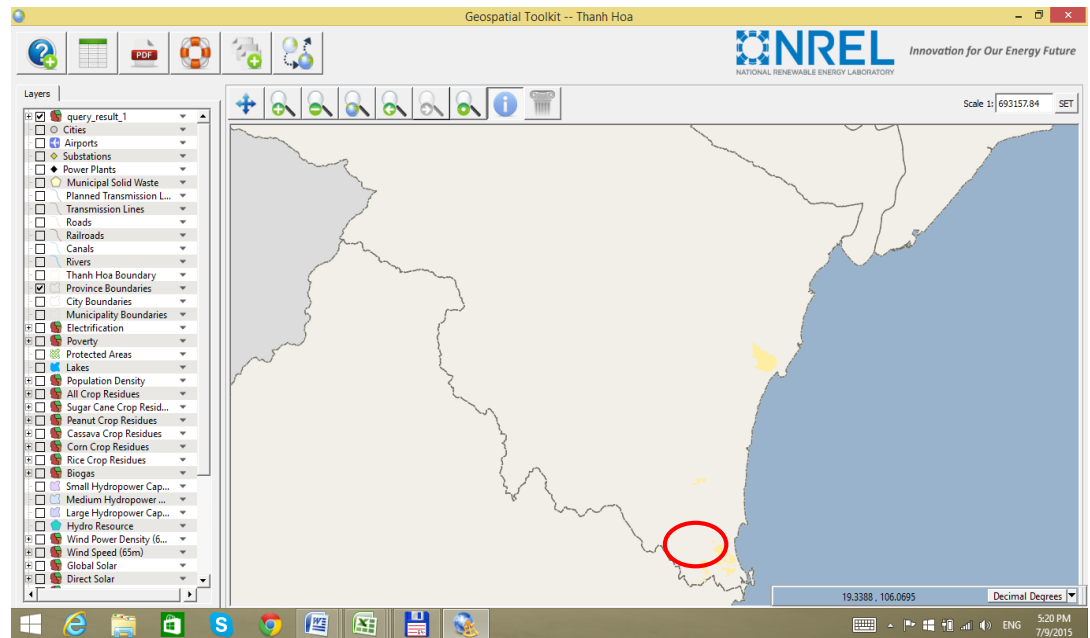
# How was GsT used for wind?

## Selection criteria

Wind resource:  $\geq 6$  m/s  
at 65 m height

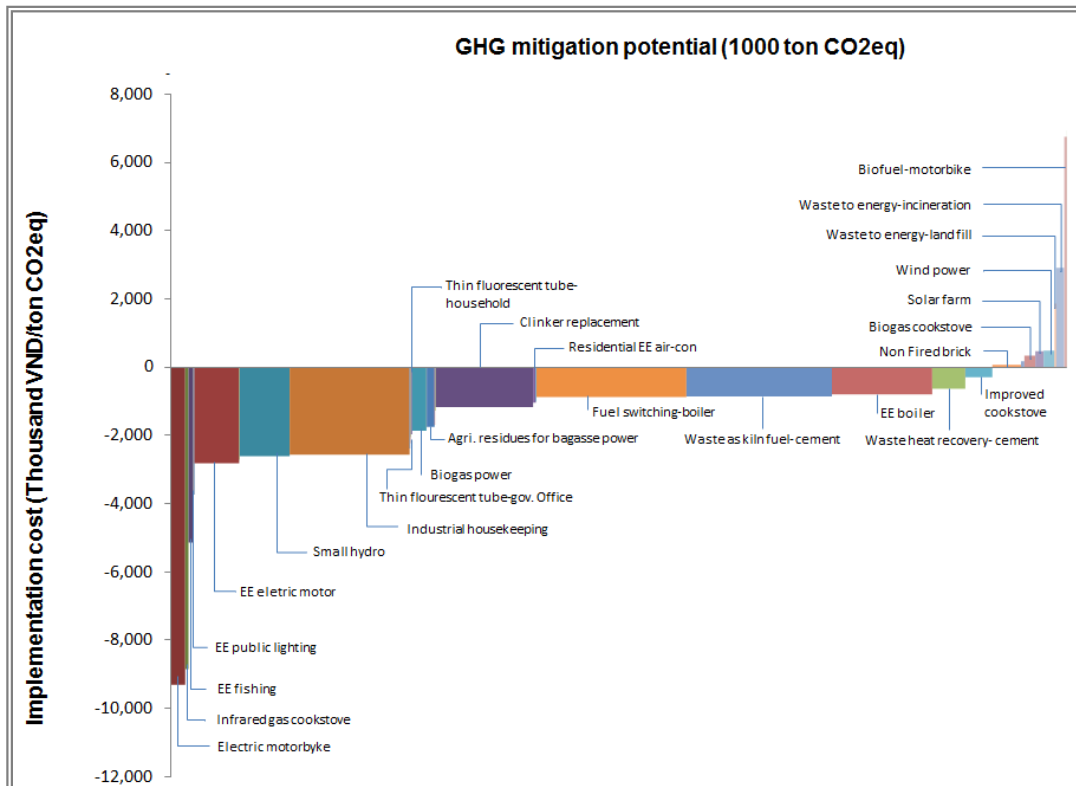
Suitable areas:

- Waste land with flat topography and with road and grid access
- Distance from main road:  $\leq 5$  km
- Distance from transmission grid:  $\leq 5$  km
- Land slope:  $\leq 5^\circ$



# How were GsT results used?

Renewable energy options and other low carbon options were evaluated by a MAC curve to derive prioritized options and therefore targets



- GHG emission reduction targets: 14% by 2020 and 23% by 2030
- Ground mounted solar PV: 20 MW by 2020, 100 MW by 2030
- Rooftop solar PV: 40 buildings each 20 kW by 2030
- Wind power: 20 MW by 2020 and 40 MW by 2030
- GGAP was **APPROVED** on 28 January 2016
- GGTF has asked USAID to help develop concept note for the solar PV plant for funding

# Challenges with GsT application

- Results are dependent on the quality and availability of data – Good results require good data. Thanh Hoa benefited from GIS data made available from other projects
- Results need verification, in the first step by conducting site inspection and then by on-site measurement if the inspection holds promising results.
- The program is relatively slow
- Customization of the tool requires high expertise

# Q & A session

**Thank you for participating - please join the LEDS GP!**

Further reading, recordings of webinars, etc.:

<http://www.asialeds.org>

<http://en.openei.org/wiki/LEDSP/sector/energy>

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# Survey

- How did we do?
- Your feedback is important!

