DOE OFFICE OF INDIAN ENERGY

Renewable Energy Screenings and Tools

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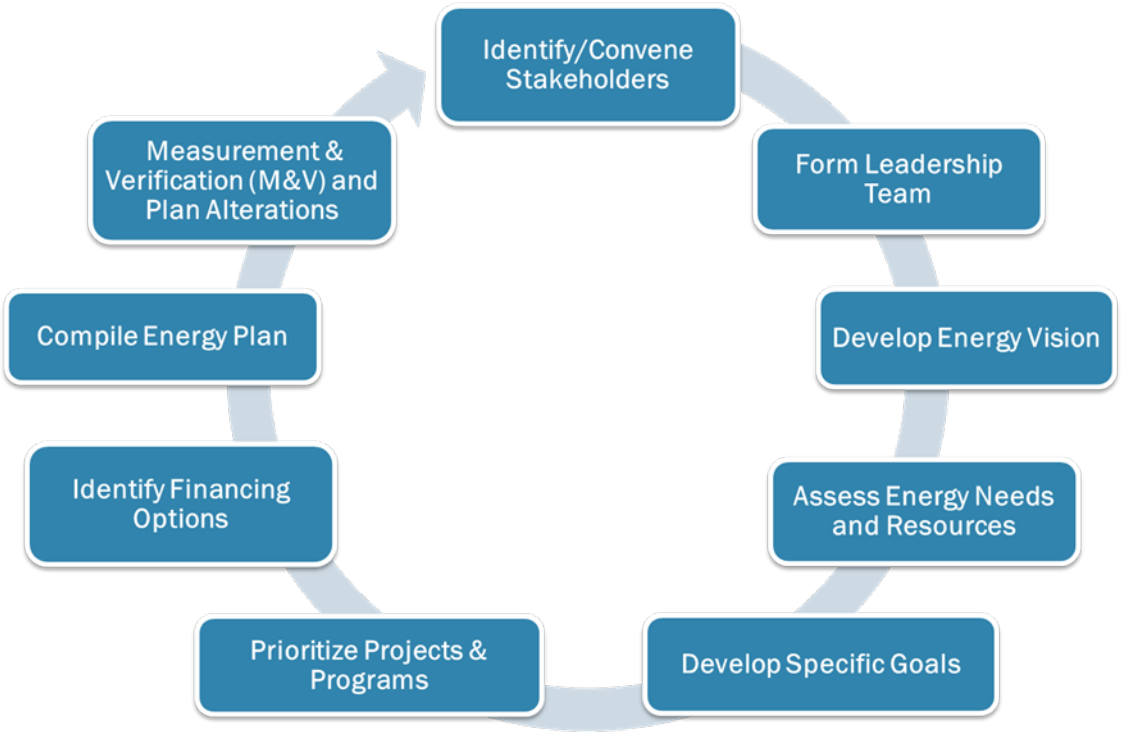
U.S. DEPARTMENT OF ENERGY | Office of Indian Energy

What Is Strategic Energy Planning?

The strategic energy planning process is a framework that can be modified to meet each tribal community's need.

The nine-step process for community strategic energy planning helps tribes:

- Establish a comprehensive understanding of current energy use and costs
- Get insight into efficiency and conservation strategies already underway
- Identify valuable opportunities to further reduce future energy costs through new programs and activities.



Planning Ahead: Setting Goals and Prioritizing Projects

Setting Goals

- Establishing primary goals will help determine the best projects to meet those goals later on.
- Specific and actionable goals provide the framework for choosing among alternatives and designing actions.

Prioritizing

- Evaluate which strategies will achieve the greatest results with the least amount of effort (or money).
- There are several methods for evaluating cost-effectiveness, including:
  - Levelized Cost of Energy (LCOE)
  - Total Resource Cost

Photo by Bob Gough, NREL 15954

What does a Strategic Energy Plan do for You?

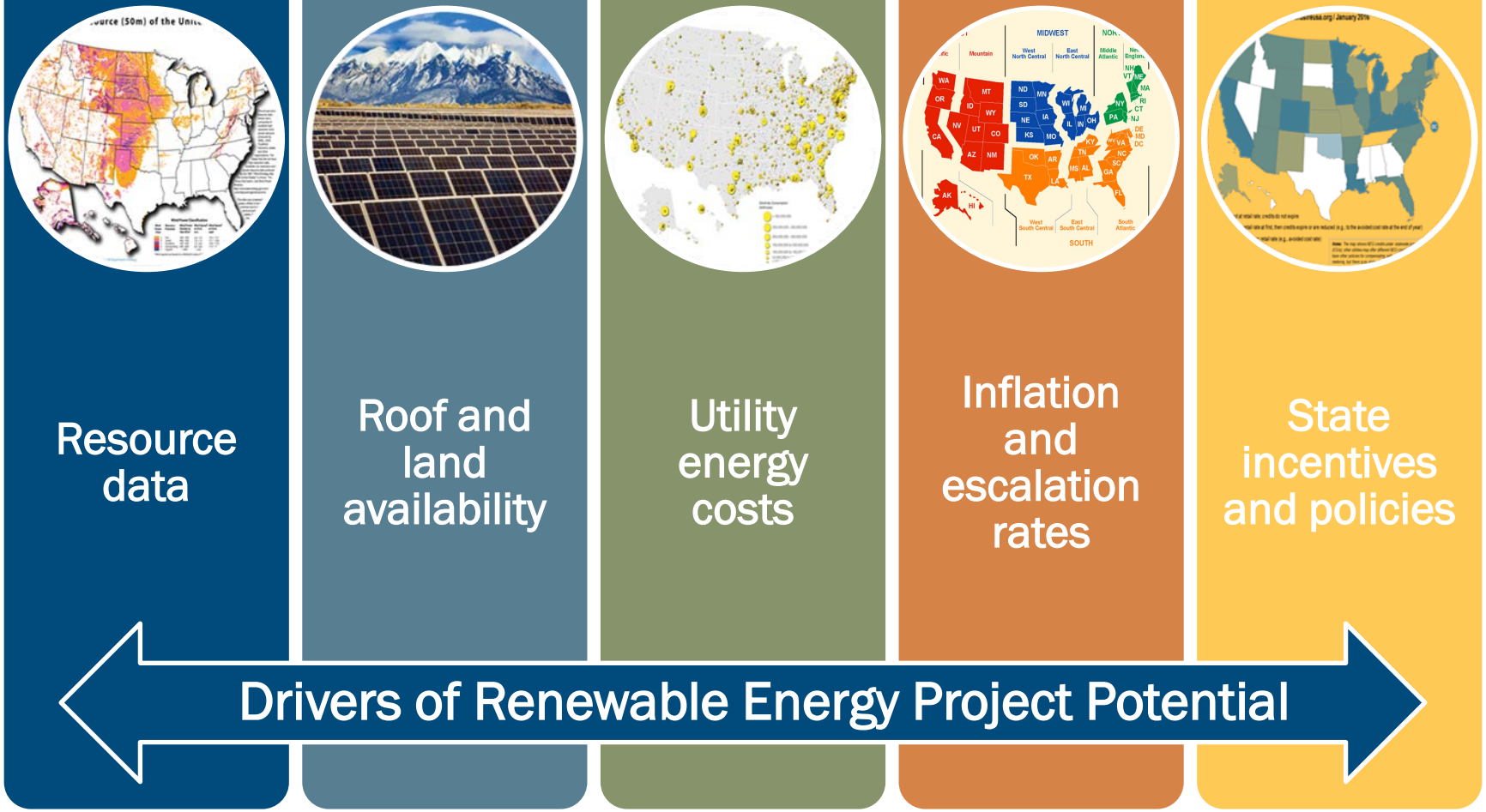
Having an energy plan in place—developed to meet identified objectives—clearly spells out your community's priorities. These may include:

- Cost savings for tribal members
- Potential revenue from renewables
- A stronger economy
- Greater energy independence and security
- Local influence over energy facility siting
- More energy efficient communities
- Healthier communities
- A cleaner environment
- Regional tribal coordination and collaboration
- A chance to demonstrate leadership

The DOE Office of Indian Energy provides Tribes and Alaska Native communities with strategic energy planning technical assistance:

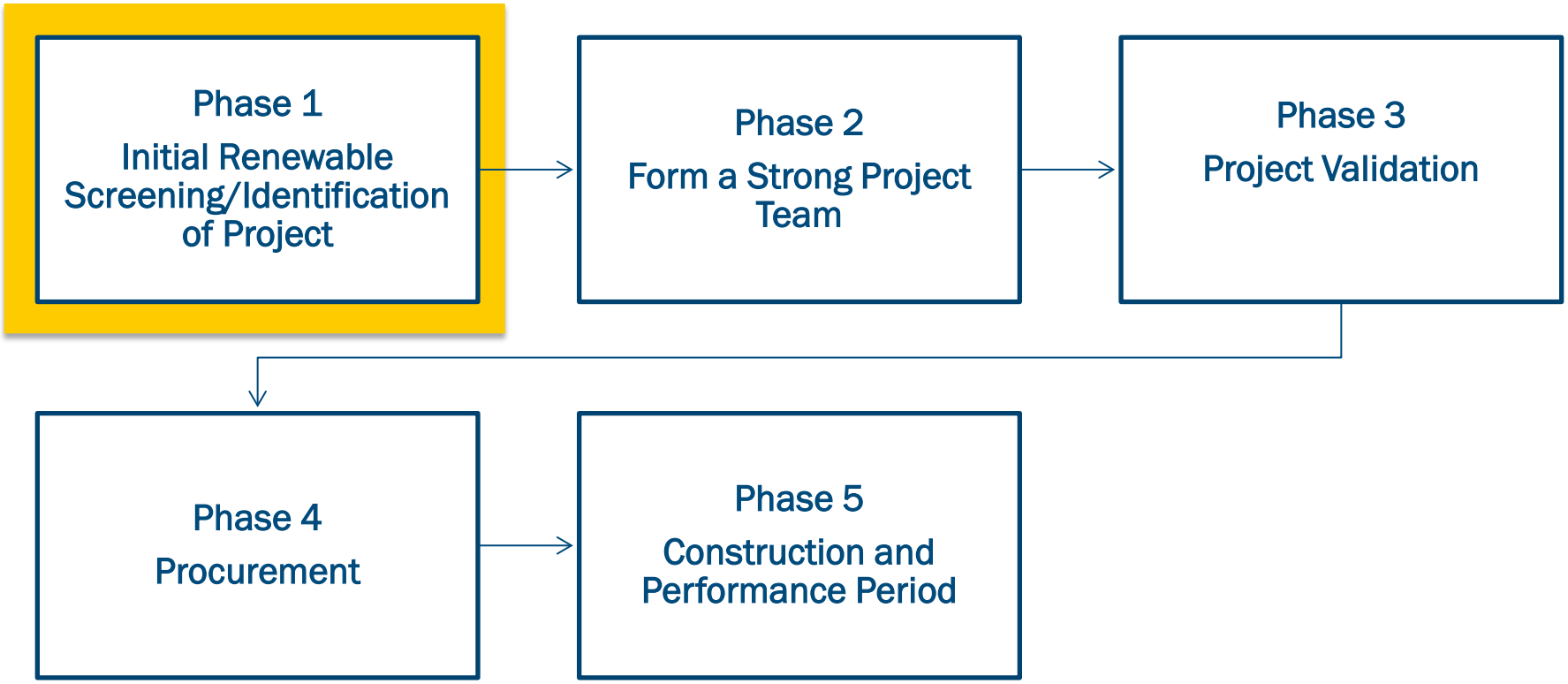
https://energy.gov/indianenergy/request-technical-assistance

Drivers of Renewable Energy Project Potential



Many factors influence the potential of renewable energy projects and each needs to be considered

On-Site Project Implementation Process



A successful on-site renewable energy project includes multiple phases; this presentation will focus on the first step: Screening and identifying renewable energy projects

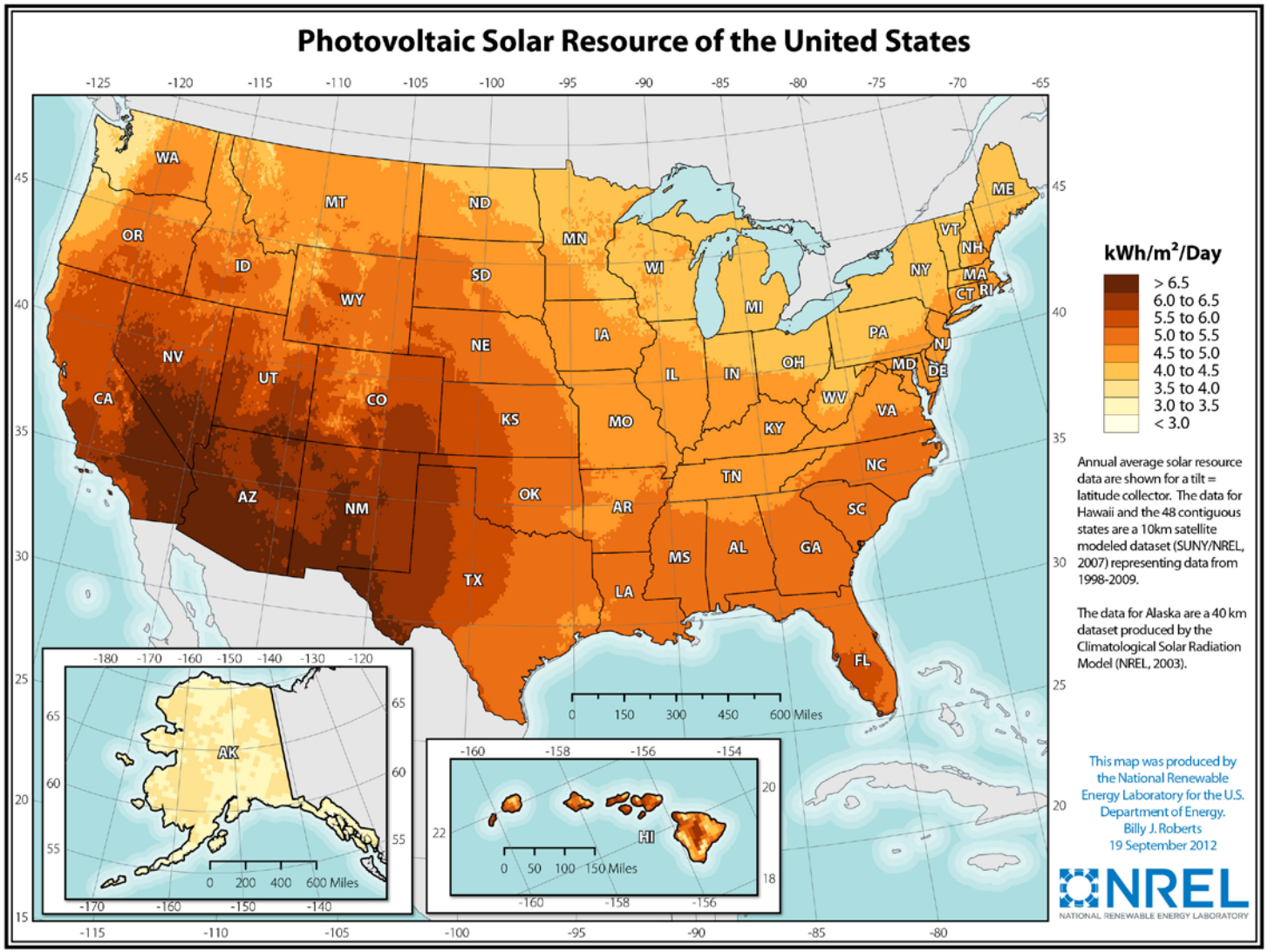
Prescreening Tools

Prescreening is used to select technologies that merit further consideration and rule out others

Resources for pre-screening include:

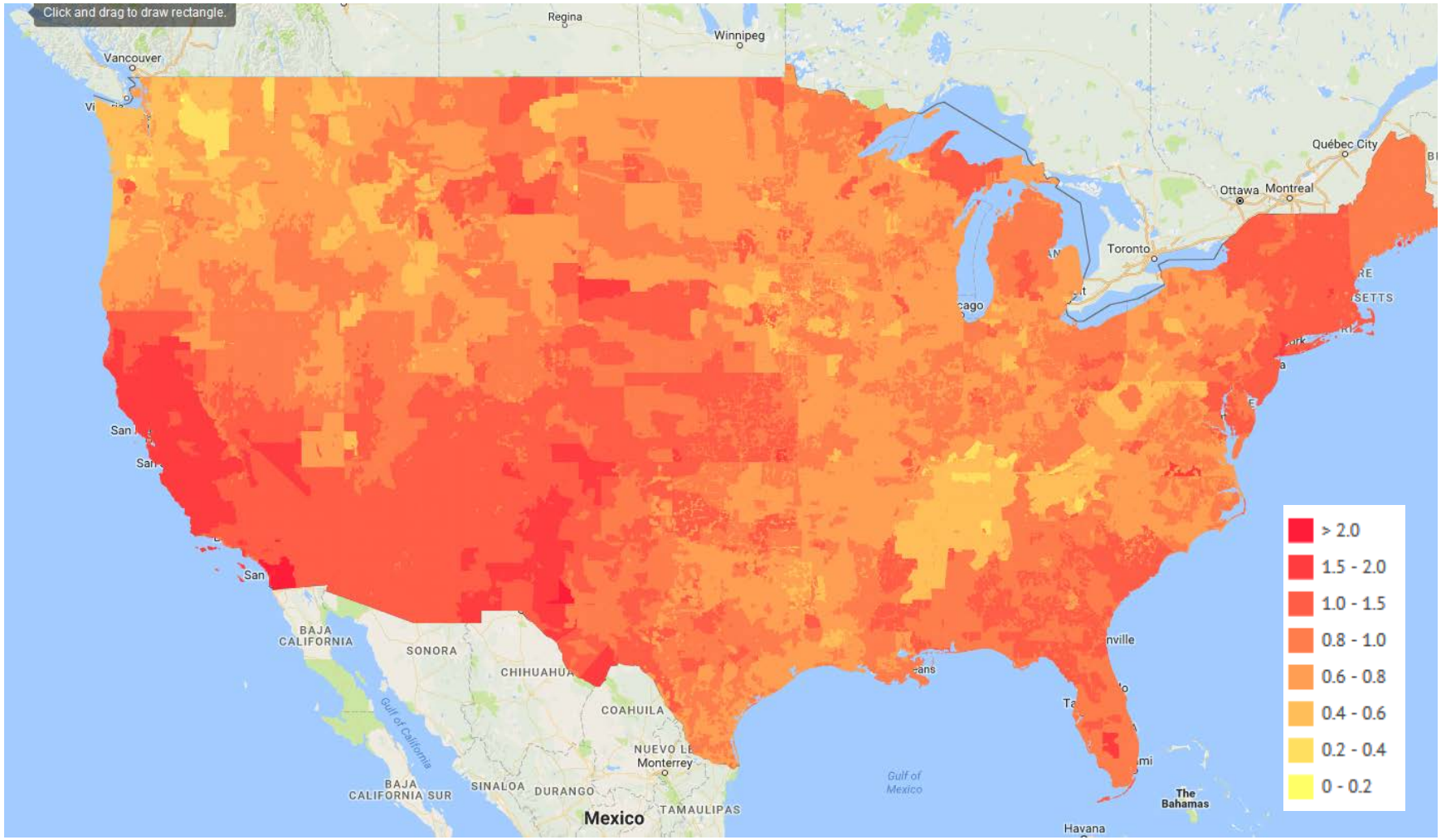
- NREL renewable energy resource maps
- FEMP renewable energy financial analysis maps
- Levelized Cost of Energy (LCOE) Calculator tool
- PVWatts

Resource Maps



http://www.nrel.gov/gis/images/eere_pv/national_photovoltaic_2012-01.jpg

FEMP Financial Maps
Savings to Investment Ratio (SIR)

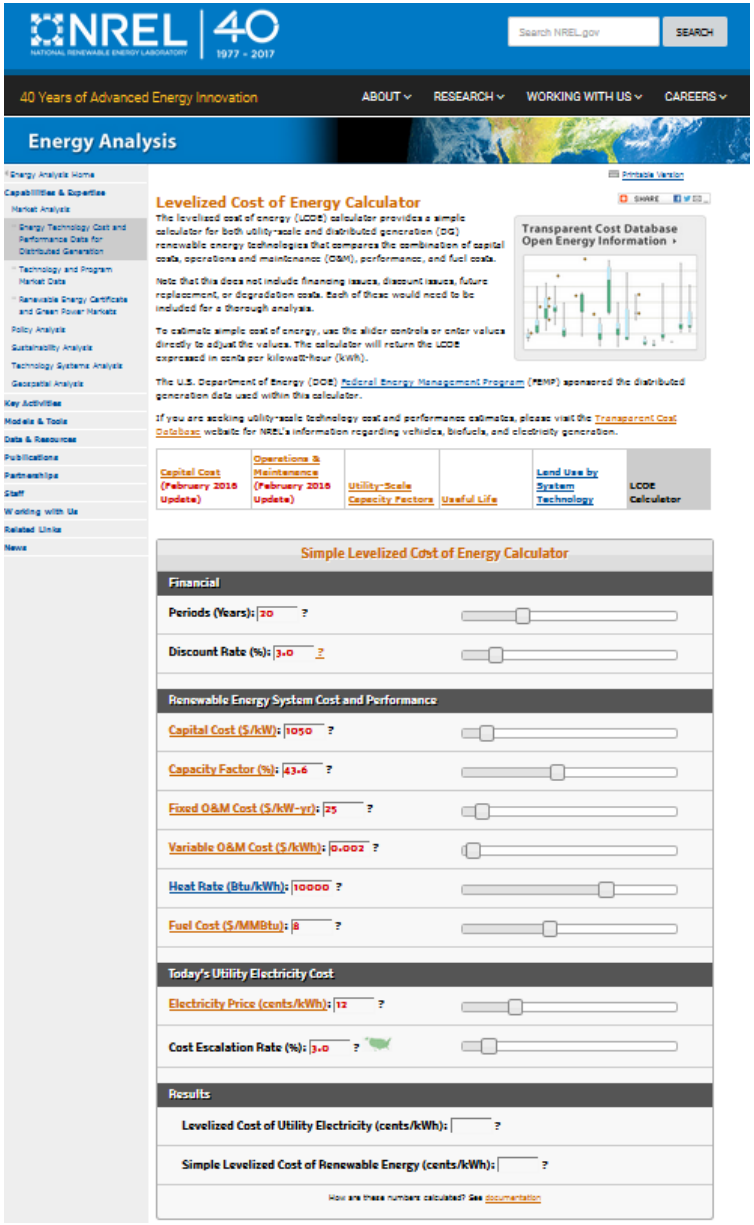


https://maps.nrel.gov/femp/

LCOE Calculator

- Levelized Cost of Energy (LCOE)
  - Common metric for renewable energy electricity generating technologies
  - LCOE facilitates comparison of the combination of capital cost, O&M, performance and fuel cost

- The calculator determines if the LCOE of the RE system is less than current or expected utility energy costs over the life of the system; if so, it's a good investment



www.nrel.gov/analysis/tech_lcoe.html

PVWatts

PVWatts uses solar resource data and energy production models to estimate energy production from PV systems in a given location

Users enter their location and PV system size in a simple interface

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)	Energy Value ($)
January	3.57	4,666	516
February	4.21	4,881	539
March	5.61	7,108	785
April	6.15	7,342	811
May	6.46	7,791	861
June	6.74	7,671	848
July	6.60	7,578	837
August	6.44	7,397	817
September	5.99	6,791	750
October	4.99	6,044	668
November	3.80	4,692	518
December	3.38	4,431	490
Annual	5.33	76,392	$ 8,440

http://pvwatts.nrel.gov/

Screening Tools

- Estimates are made of economic and technical performance. This includes system capacities, incentives, and interconnection limits.

- During the screening step, an expert makes complex calculations to identify best opportunities. This step usually does not require a site visit.

- Screening results can later be used in RFPs, budgeting, and engineering studies.

RETScreen

RETScreen:

- Excel-based software analysis tool
- Determines the technical and financial viability of potential renewable energy projects
- Includes databases for:
  - Product
  - Project
  - Benchmark
  - Hydrology
  - Climate

www. ***CLICK HERE for the RETScreen software suite and user manual***

Technologies include PV, solar thermal, wind, small hydro, biomass, ground source heat pump, combined heat & power (CHP), energy efficiency

System Advisor Model

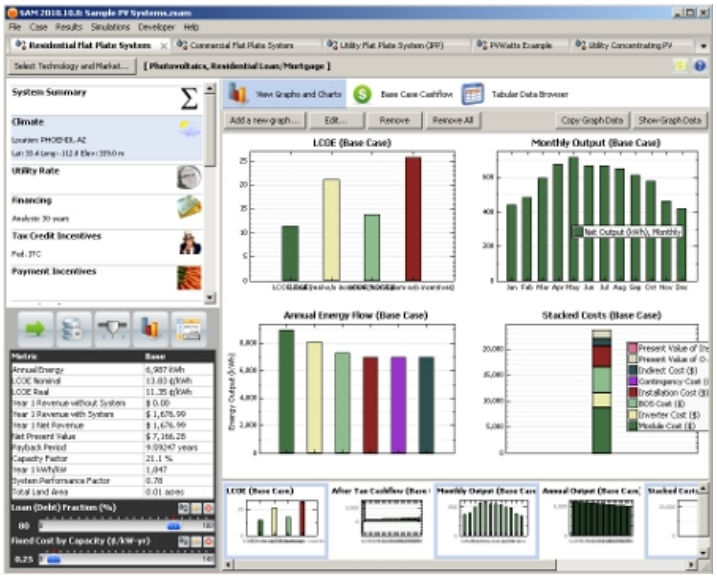
Sophisticated software tool that can run very detailed RE models

- Photovoltaics
- Solar Hot Water
- Concentrating Solar Power
- Small Wind
- Large Wind
- Geothermal Power

Detailed Economic Models

- Cost of generating electricity (LCOE)
- Type of financing
- Applicable tax credits and incentives
- Can model variety of rate structures

https://www.nrel.gov/analysis/sam/

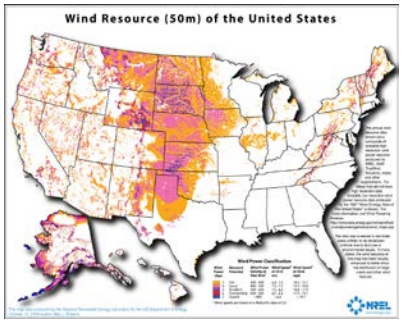


Renewable Energy Optimization (REopt)

Planning tool to evaluate RE, EE, microgrid, and operational energy opportunities

Recommends a mix of technologies and an operating strategy that meets client goals at minimum lifecycle cost

- Considers interactions between multiple technologies
- Estimates costs and energy savings



Draws on site data, NREL GIS resource data, DSIRE incentive database, and RE technology info

Has been used to assess opportunities at 8,000+ sites

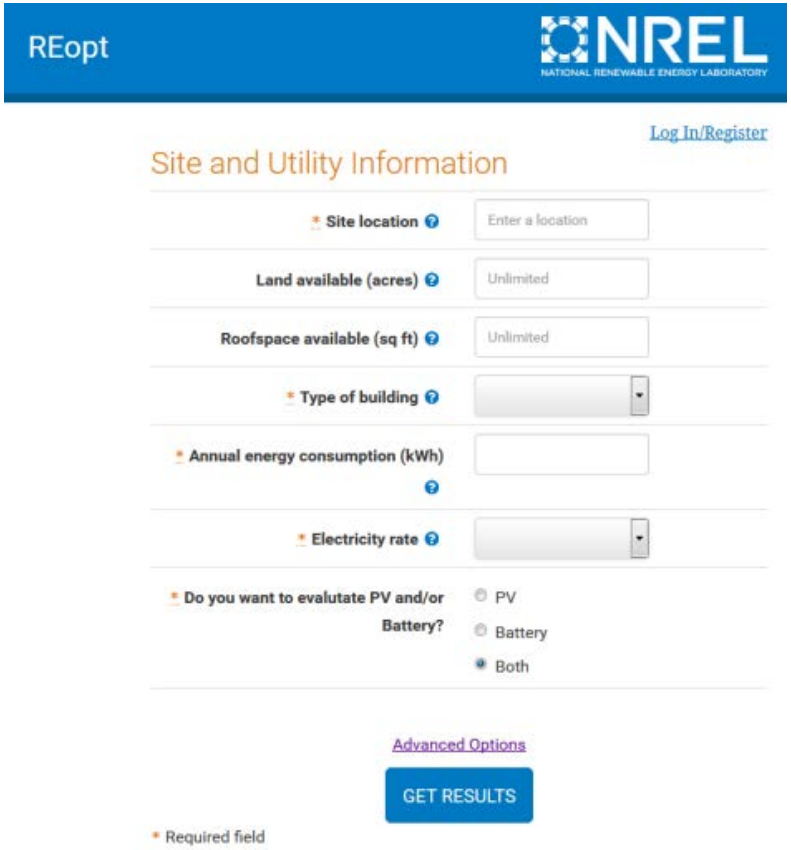
Technologies currently modeled:

- PV
- Wind
- Solar hot water
- Solar vent preheat
- Biomass
- Waste to energy
- Landfill gas
- Diesel and natural gas generators
- Battery storage

Provided as a service by NREL (not available for download)

REopt Web Tool – Coming Soon!

- Estimates the optimal size of PV and battery that minimizes the cost of energy to a site.
- Allows homeowners, building owners, and installers to evaluate the economics of PV and battery storage.

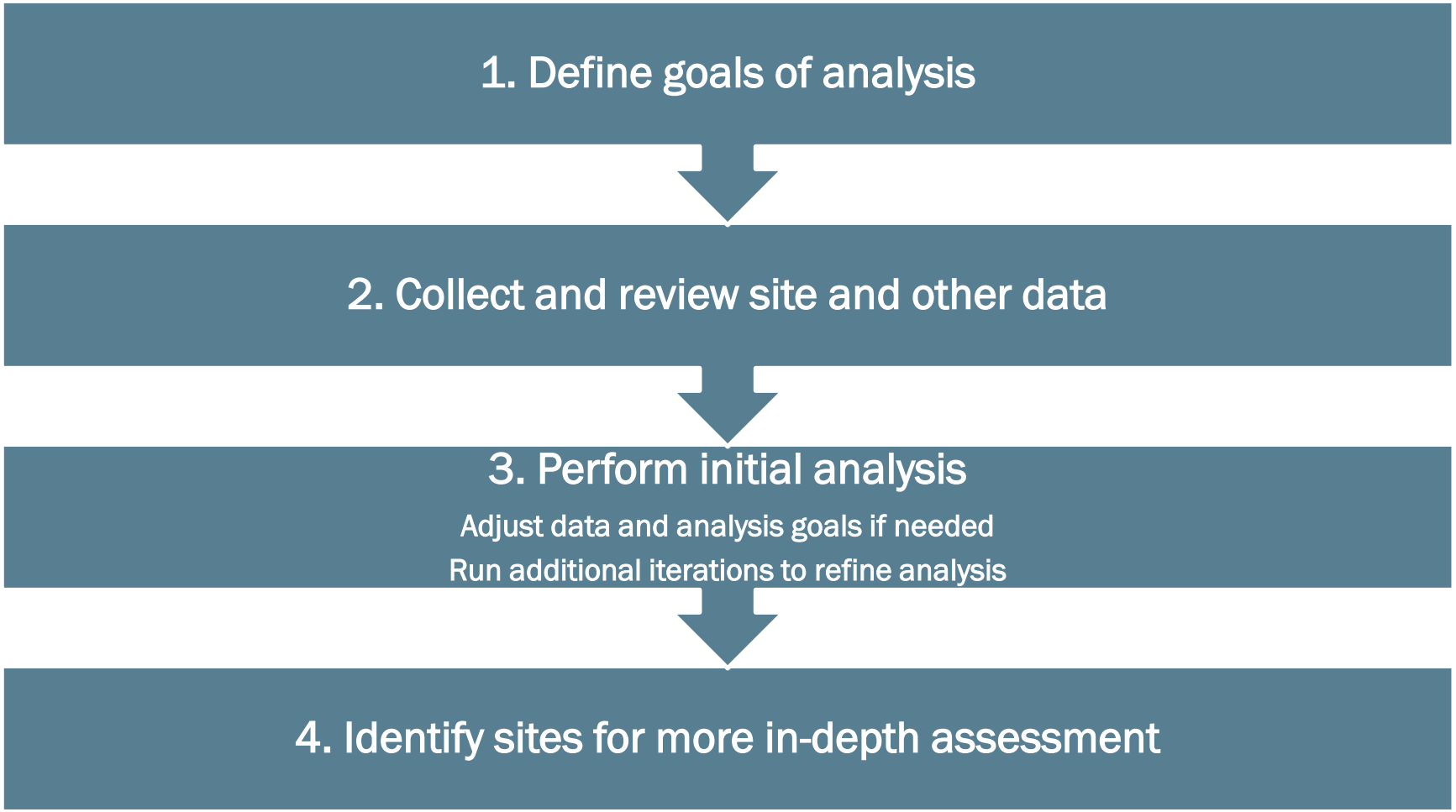


Web REopt
Integration and Optimization

Mission: *Provide access to site-specific, optimized, and integrated renewable energy decision analysis*

Vision: *Advance data-driven decision-making and deployment of renewable energy and energy storage technologies*

Renewable Energy Screening Process



Resource for Renewable Energy Screenings

- Technology Cost and Performance Matrix
  - http://www.nrel.gov/analysis/tech_cost_dg.html
- Resource Data
  - http://maps.nrel.gov/femp
- Incentives and Utility Policies:
  - http://www.dsireusa.org/

- REopt
  - http://www.nrel.gov/tech_deployment/tools_reopt.html
- PVWatts
  - http://pvwatts.nrel.gov/
- System Advisor Model (SAM)
  - https://sam.nrel.gov/

For questions contact:

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