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Wind Energy Deployment Process and Siting Tools

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WINDExchange Webinar

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Background on Current Research

- **Regardless of cost and performance, some wind projects cannot proceed to completion as a result of competing multiple uses or "siting considerations."**
- **Even if wind energy projects were unquestionably competitive on purely economic grounds, developers would not build in many places in the United States due to various non-technical issues.**
- **Current methods for understanding non-technical issues facing wind developers fail to:**
  - Accurately characterize the costs to the industry from siting considerations (as a result of project delays, increased permitting times, and failed projects)
  - Define the extent of the challenges faced by the industry
  - Tell the whole story (make sure "competing uses" are given a voice).
- **Wind energy siting issues must be better understood and quantified.**

Goal: Appropriate wind energy siting

Research Questions and Method

DOE tasked NREL to depict the wind energy deployment process and to research wind energy deployment considerations. Questions:

- How much money and time do developers spend on competing uses?
- Are there some areas no longer developable due to these siting considerations: Radar, public engagement, wildlife (birds and bats)?

NREL:

- **Performed in-depth interviews with wind developers and consulting firms**
- **Aggregated developer data and used it to determine cost adders for model runs and impacts to developable land for GIS-based maps**
- **Created maps of the U.S. wind resource overlaid with different siting considerations**
- **Created supply curves based on real data**
- **Used supply curves as inputs to ReEDS scenario modeling (to 2050)**
- **Consulted with developers to make sure our conclusions match what they meant to convey**
- **Is currently finishing an NREL technical report on results.**

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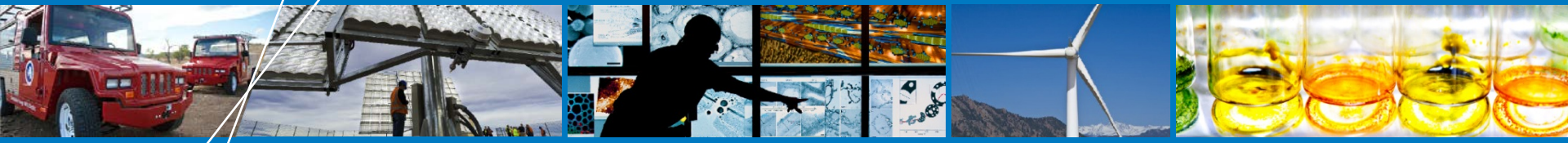
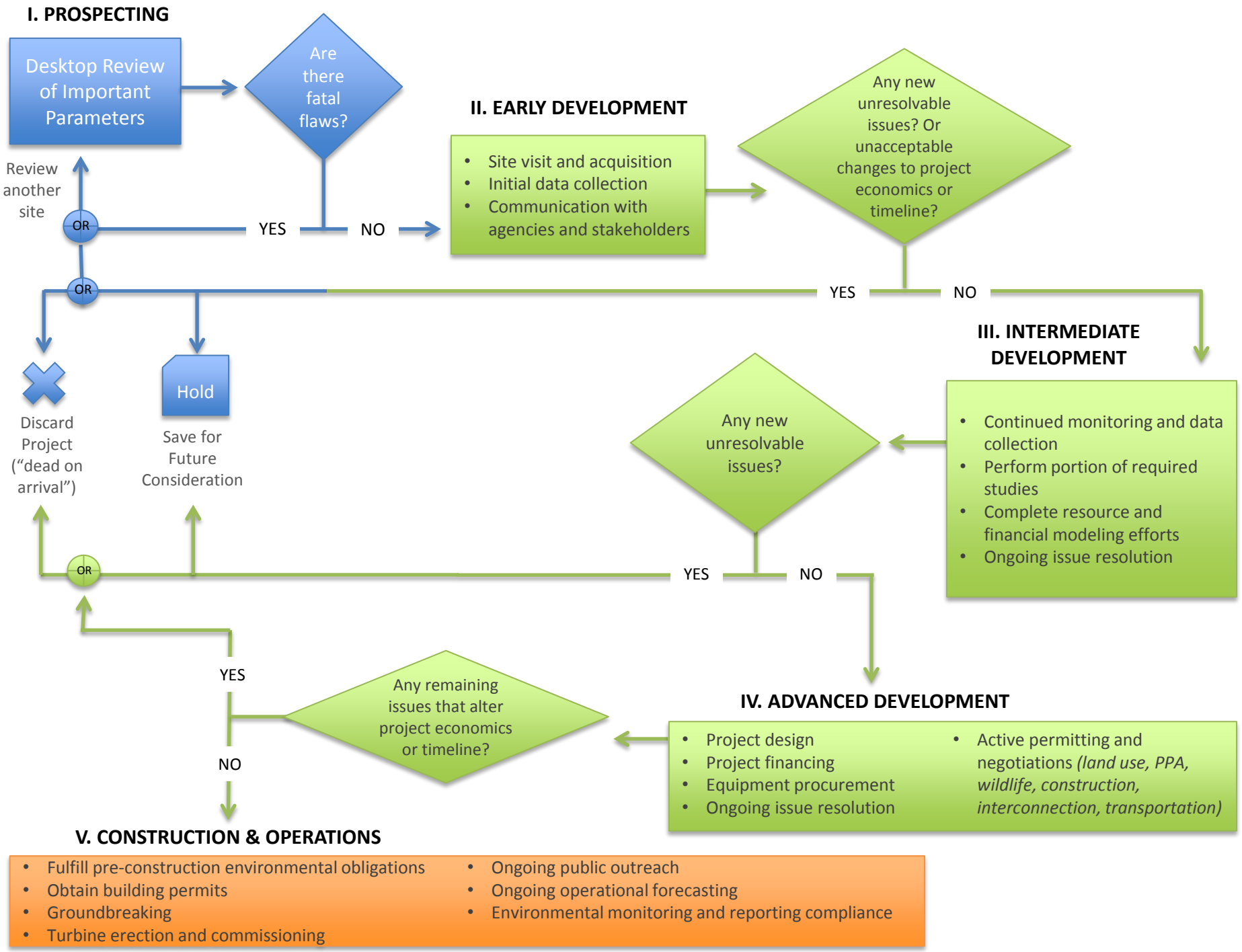


Wind Deployment Process


I. PROSPECTING
Desktop Review of Important Parameters
Are there fatal flaws?
Review another site
OR
YES
NO
II. EARLY DEVELOPMENT
Site visit and acquisition
Initial data collection
Communication with agencies and stakeholders
Any new unresolvable issues? Or unacceptable changes to project economics or timeline?
OR
YES
NO
Discard Project ("dead on arrival")
Hold
Save for Future Consideration
III. INTERMEDIATE DEVELOPMENT
Continued monitoring and data collection
Perform portion of required studies
Complete resource and financial modeling efforts
Ongoing issue resolution
Any new unresolvable issues?
OR
YES
NO
YES
Any remaining issues that alter project economics or timeline?
NO
IV. ADVANCED DEVELOPMENT
Project design
Project financing
Equipment procurement
Ongoing issue resolution
Active permitting and negotiations (land use, PPA, wildlife, construction, interconnection, transportation)
V. CONSTRUCTION & OPERATIONS
Fulfill pre-construction environmental obligations
Obtain building permits
Groundbreaking
Turbine erection and commissioning
Ongoing public outreach
Ongoing operational forecasting
Environmental monitoring and reporting compliance

Development Time Horizon Is 5+ Years

- **The typical project is planned on a 5-year time horizon.**
  - 12 years is the maximum we've heard; however, given the market, it is increasingly difficult to justify a project timeline of more than 5 years.
  - Interconnection alone can require 3 to 4 years.
  - Timelines are likely extended if:
    - Projects include post-construction work (additional 2-4 years)
    - NEPA or state processes are triggered (additional years - unknown)
    - Land management plans require revision (additional 1-2 years)
    - Litigious opponents are present (additional 1-2+ years).
- **FWS guidance indicates movement toward longer lead times and more up-front data collection. As a result, some developers are reluctant to develop on federal land.**
- **More time required for permitting = higher capital investment.**

Development timeline ranges vary greatly. Reducing project timeline uncertainty, *even without reducing the actual timeline*, could greatly benefit developers and accelerate appropriately sited wind deployment.

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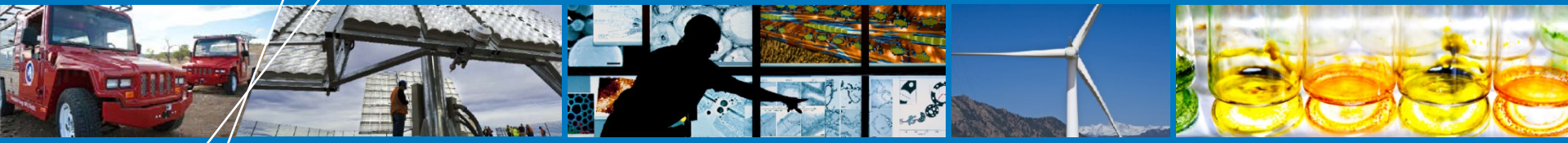


Tools and Resources for Wind Energy Siting Decisions

Wind Prospector

http://maps.nrel.gov/wind_prospector

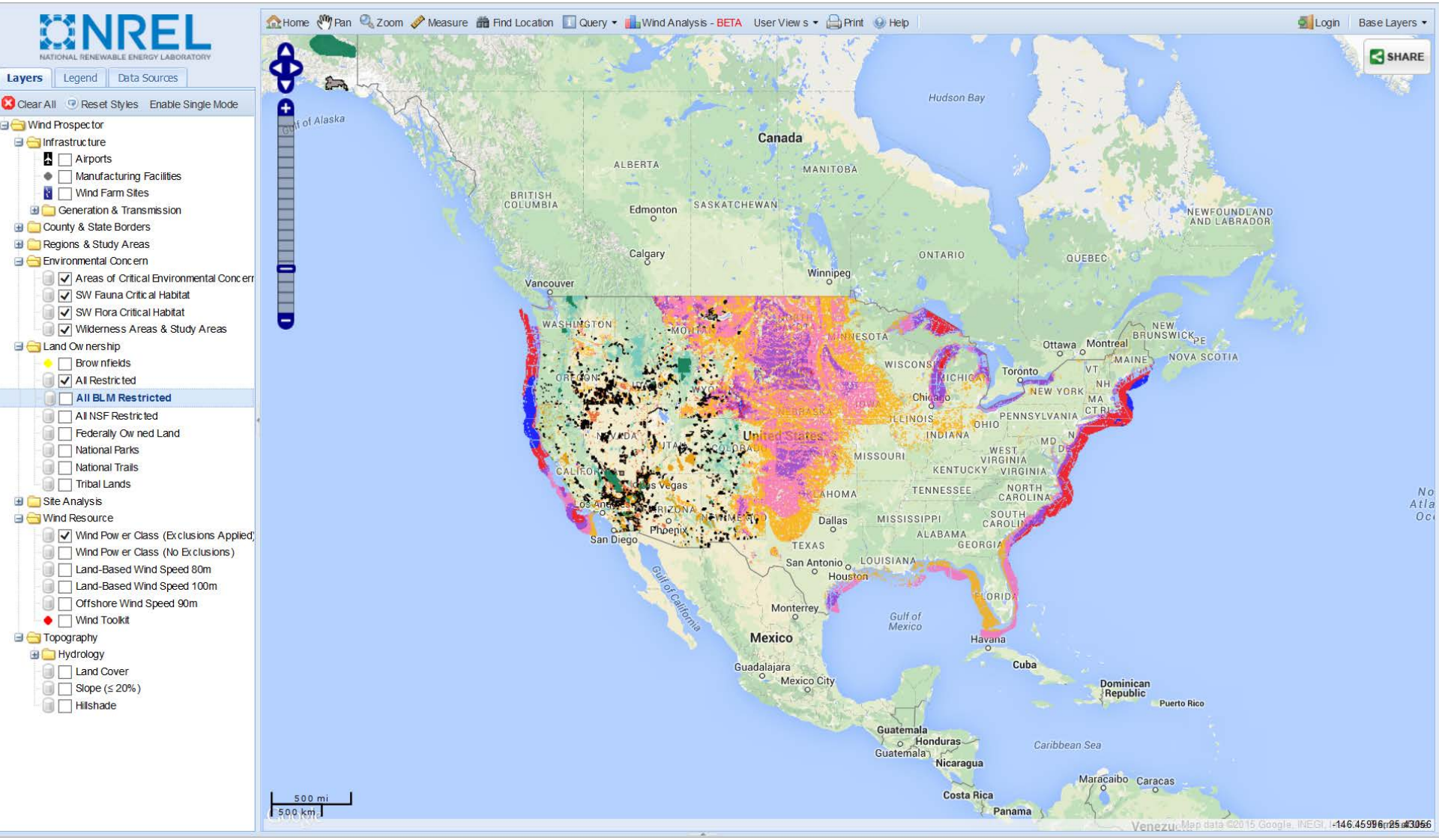
Purpose

The purpose of this work is to make GIS-based data layers available to DOE, other agencies, wind energy stakeholders, and the interested public. Data are overlaid onto wind resource maps of the United States to visually display where siting issues are located, in relation to areas with good wind energy potential.

Objective for Wind Prospector

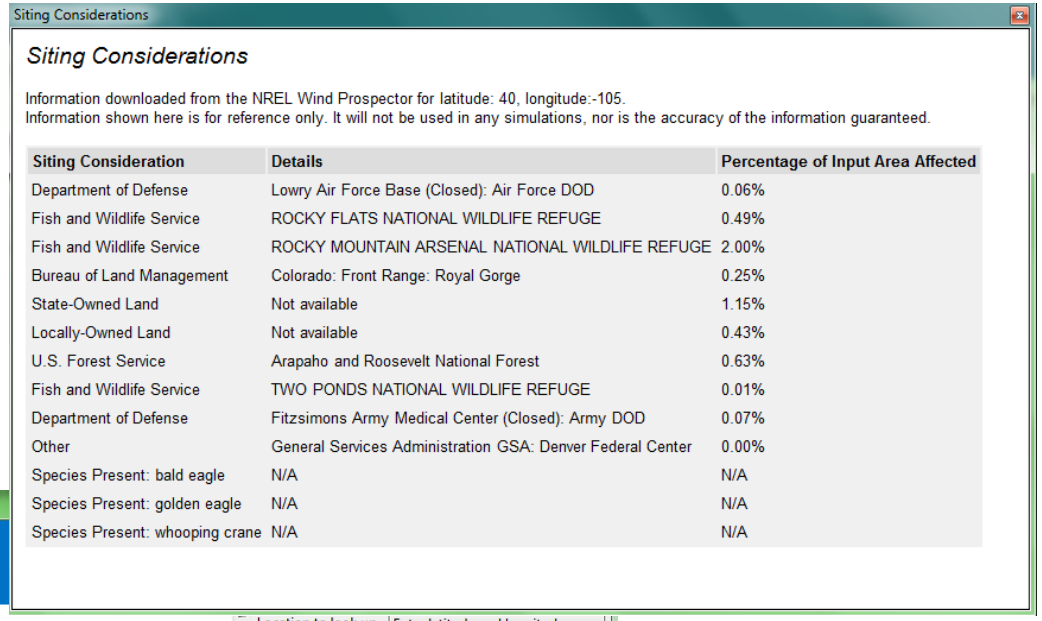
Wind Prospector provides data, visualization, querying, and analysis capabilities that allow users to explore many factors at a site that affect project development potential. Examples include land ownership, proximity of transmission lines, available wind resources, permitting stipulations, and exploration activities.

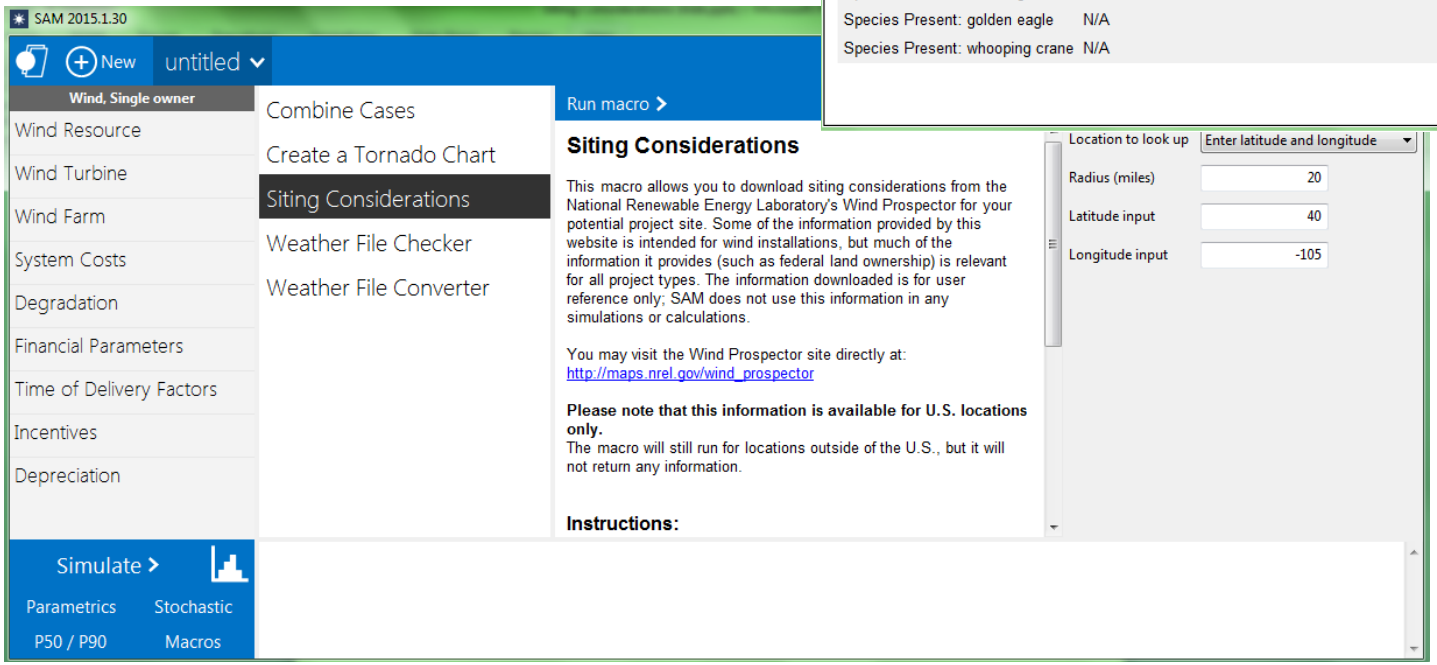
Wind Prospector



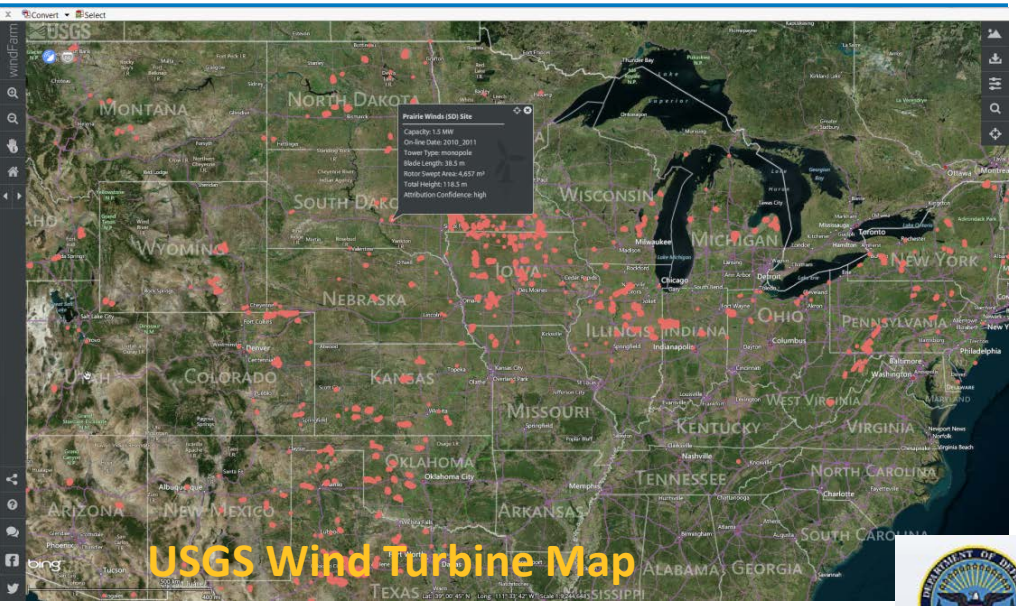
System Advisor Model (SAM)

SAM can display information from the Wind Prospector as "Siting Considerations"





Other Resources



USGS Wind Turbine Map

There are helpful sites like the USGS wind turbine map, showing almost every utility-scale turbine in the country (above):
http://eerscmap.usgs.gov/windfarm/

Argonne National Laboratory's EISPC:
http://eispctools.anl.gov

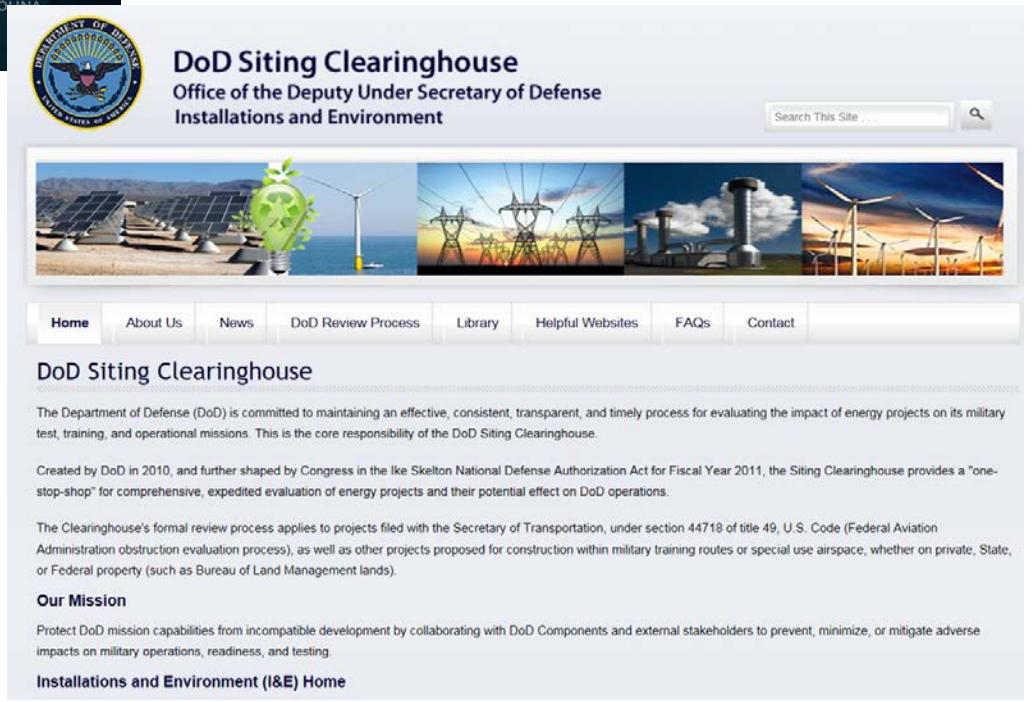
Important: It is vital to confer with all appropriate federal agencies, such as the Environmental Protection Agency and Department of Defense, when developing a project:

http://www.acq.osd.mil/dodsc/

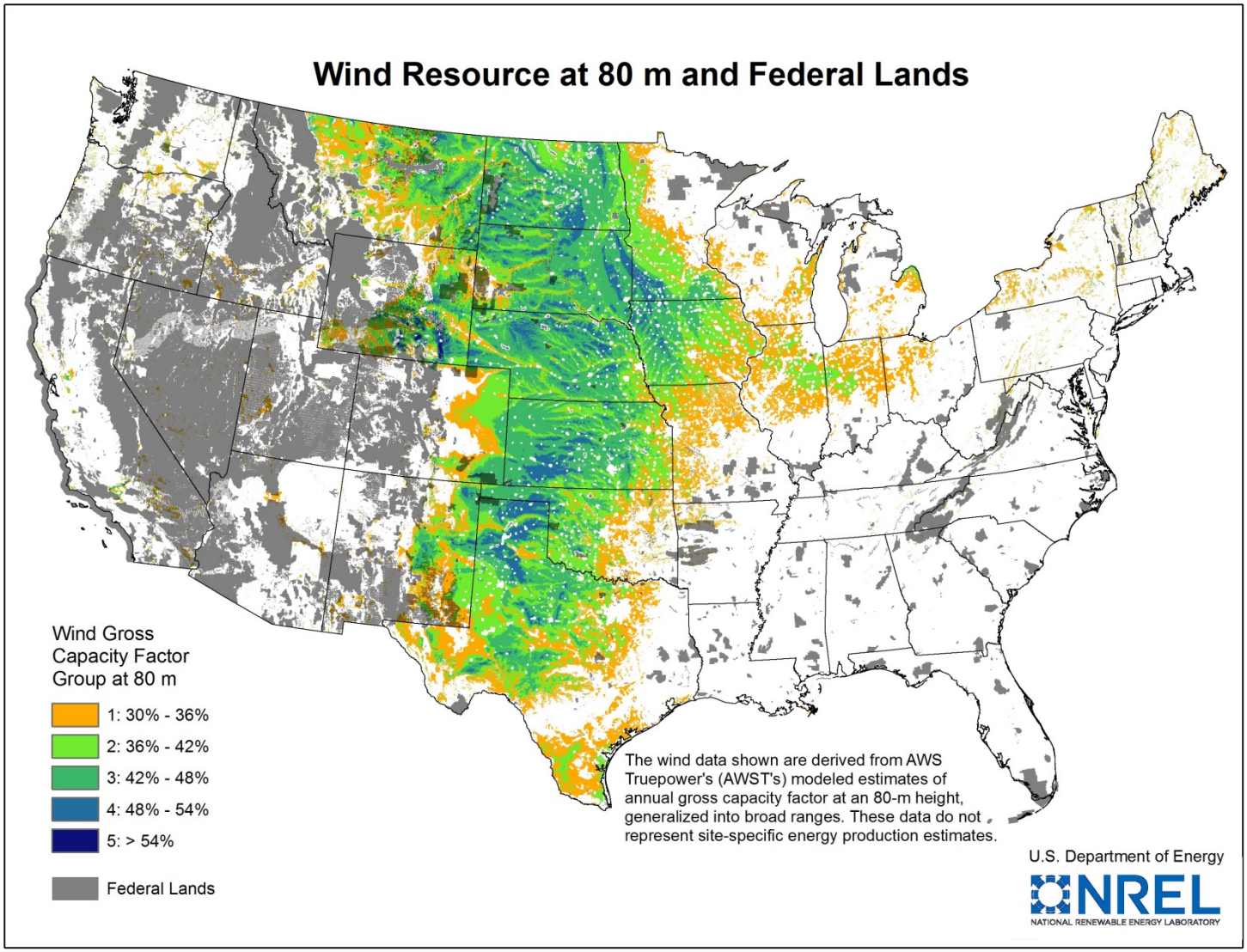
See OpenEI for Wind Project Siting Tools and Resources

http://en.openei.org/wiki/Wind_Project_Siting_Tools

http://en.openei.org/wiki/Siting_Wind_Energy



Federal Land Overlaid with Wind Resource



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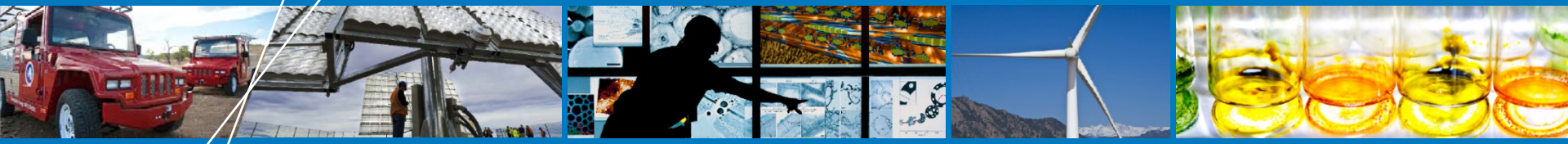

Thank you.

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