

ARRTIS

Arizona Renewable Resource and Transmission Identification Subcommittee

*Meeting #1
February 5, 2009*



Agenda

- Participant Introductions
- Regulatory Background and SWAT Activities
- Ground Rules for the ARRTIS
- State and Regional Renewable Energy Zone Identification Processes
- Proposed Tasks, Timelines and Work Products
- Action Items and Next Steps

Introductions

- Name
- Organization you are representing

Please be sure to sign in for today's meeting

Regulatory Background & SWAT Activities

- Southwest Area Transmission (SWAT) Study Group
 - Comprised of utilities and stakeholders from AZ, NM, NV, and portions of southern CA
 - Conducts collaborative planning for the regional electrical transmission system
 - Forms committees to focus on specific topics or studies

Regulatory Background & SWAT Activities

- SWAT Renewable Transmission Task Force (RTTF)
 - Committee formed within SWAT
 - Tasked with identifying renewable resource potential and existing & future transmission
 - Will conduct technical modeling of proposed renewable transmission in the SWAT footprint

Regulatory Background & SWAT Activities

- Biennial Transmission Assessment (BTA)
 - Conducted every two years to assess the existing and future transmission system in Arizona
 - Issued by the Arizona Corporation Commission (ACC)
 - 4th and 5th BTAs (2006 and 2008) have emphasized renewable resource and associated transmission development

Regulatory Background & SWAT Activities

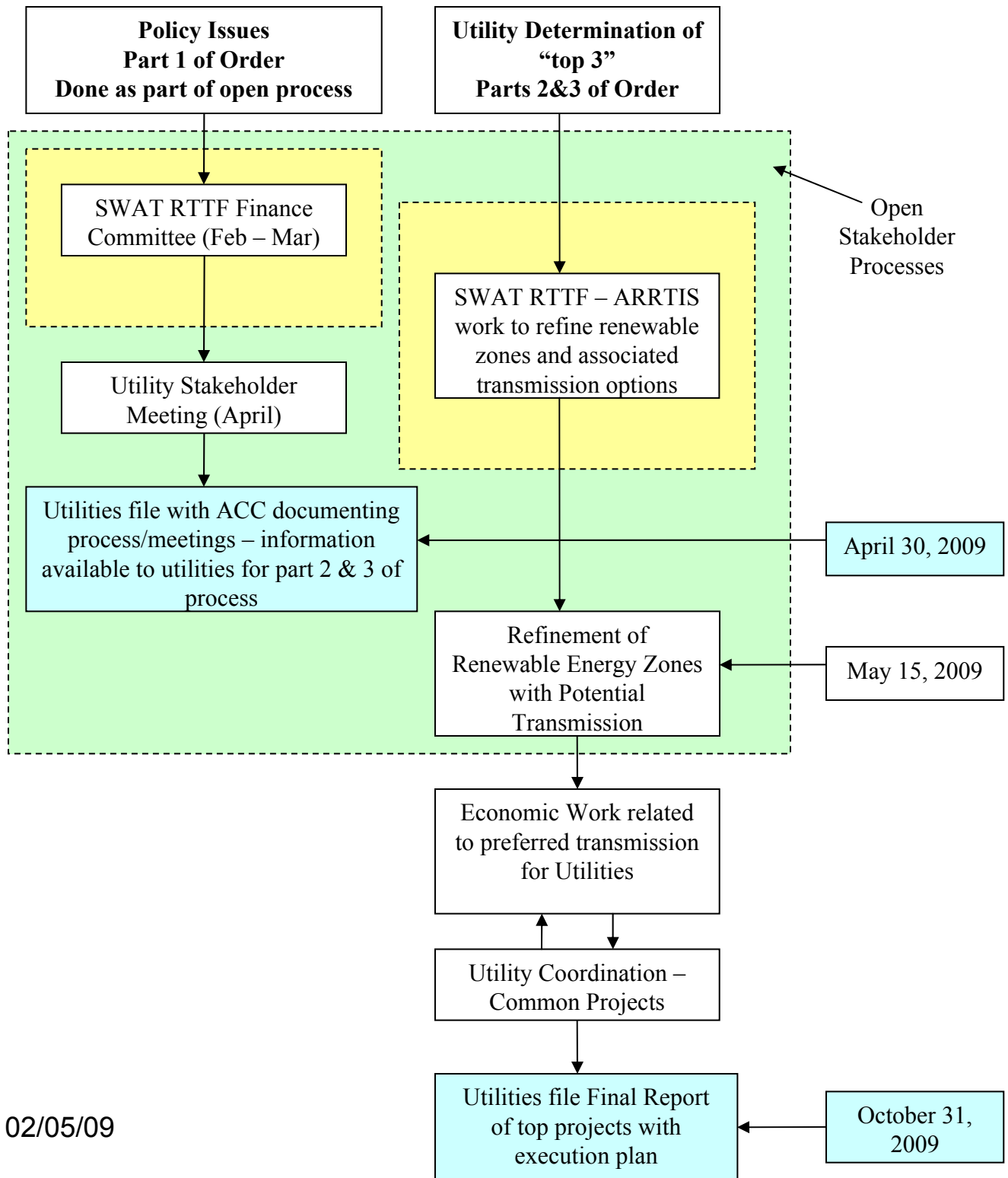
- 5th Biennial Transmission Assessment
 - Issued by ACC in December 2008
 - Provides direction regarding renewable resource and transmission development
 - “...develop ways in which new transmission projects can be identified, approved for construction, and financed in a manner that will support the growth of renewables in Arizona.”

Proposed BTA process

*Presentation by Brian Cole
APS Resource Planning*

Overall BTA Order Response Process Flow Diagram

ACC Order 70635



02/05/09

ARRTIS Ground Rules

- ARRTIS is a subset of both the RTTF and SWAT
- Emphasis will be on resource-based zone and constraint identification
- Process is intended to be open and inclusive
- To meet the timeframes in the BTA order, the mapping component of the ARRTIS (resources, transmission, costs, and capacities) must be completed by mid-May 2009

ARRTIS Ground Rules

- Multiple scenarios of resource and transmission development may be evaluated
- The electric utilities subject to the BTA order will propose transmission projects and plans to the ACC for their consideration
- Further research, study, or follow-up may continue following the BTA-ordered process

State and Regional REZ Identification Processes

*Presentation by Dr. Dave Hurlbut
National Renewable Energy Laboratory*

Overview of WGA Western Renewable Energy Zone Initiative



**Arizona Renewable
Resource and
Transmission
Identification
Subcommittee**

**Dr. David Hurlbut
Senior Analyst**

February 5, 2009

WREZ policy objectives

- Answer questions about cost-effectiveness of *regional* (interstate) delivery of renewable energy
- Identify the highest concentrations of the least-cost renewable resources, in sufficient quantity to sustain competition among potential developers
- Identify in advance the environmental and other land use issues that may limit development
- Establish an open and transparent process

Zone initiatives in western states

Texas: Competitive Renewable Energy Zones (CREZ)

California: Renewable Energy Transmission Initiative (RETI)

Colorado: renewable resource mapping, expedited transmission planning

Nevada: Renewable Energy Transmission Access Advisory Committee (RETAAC)

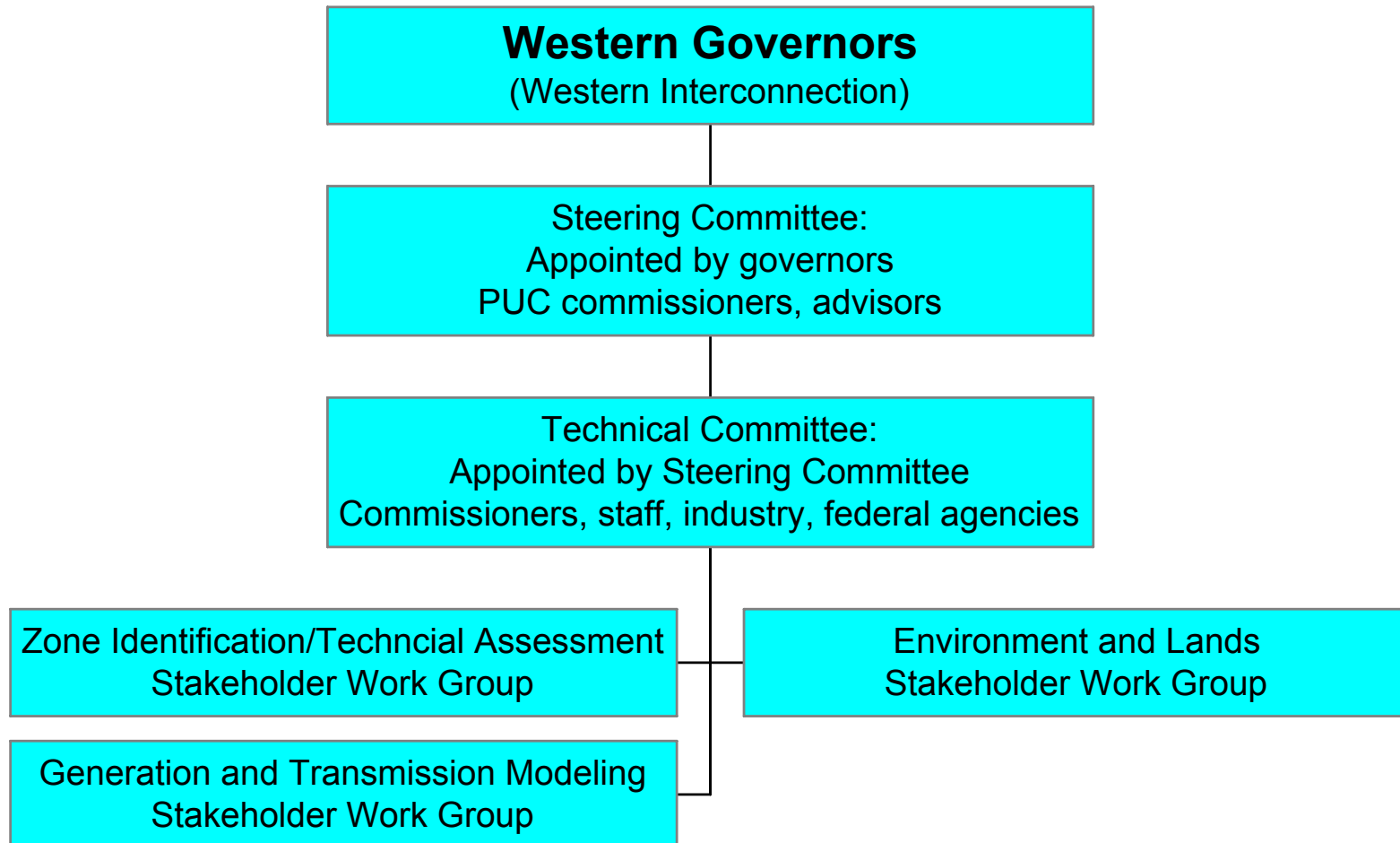
Western Governors' Association: Western Renewable Energy Zone Initiative (WREZ)

New Mexico, Utah: Efforts starting

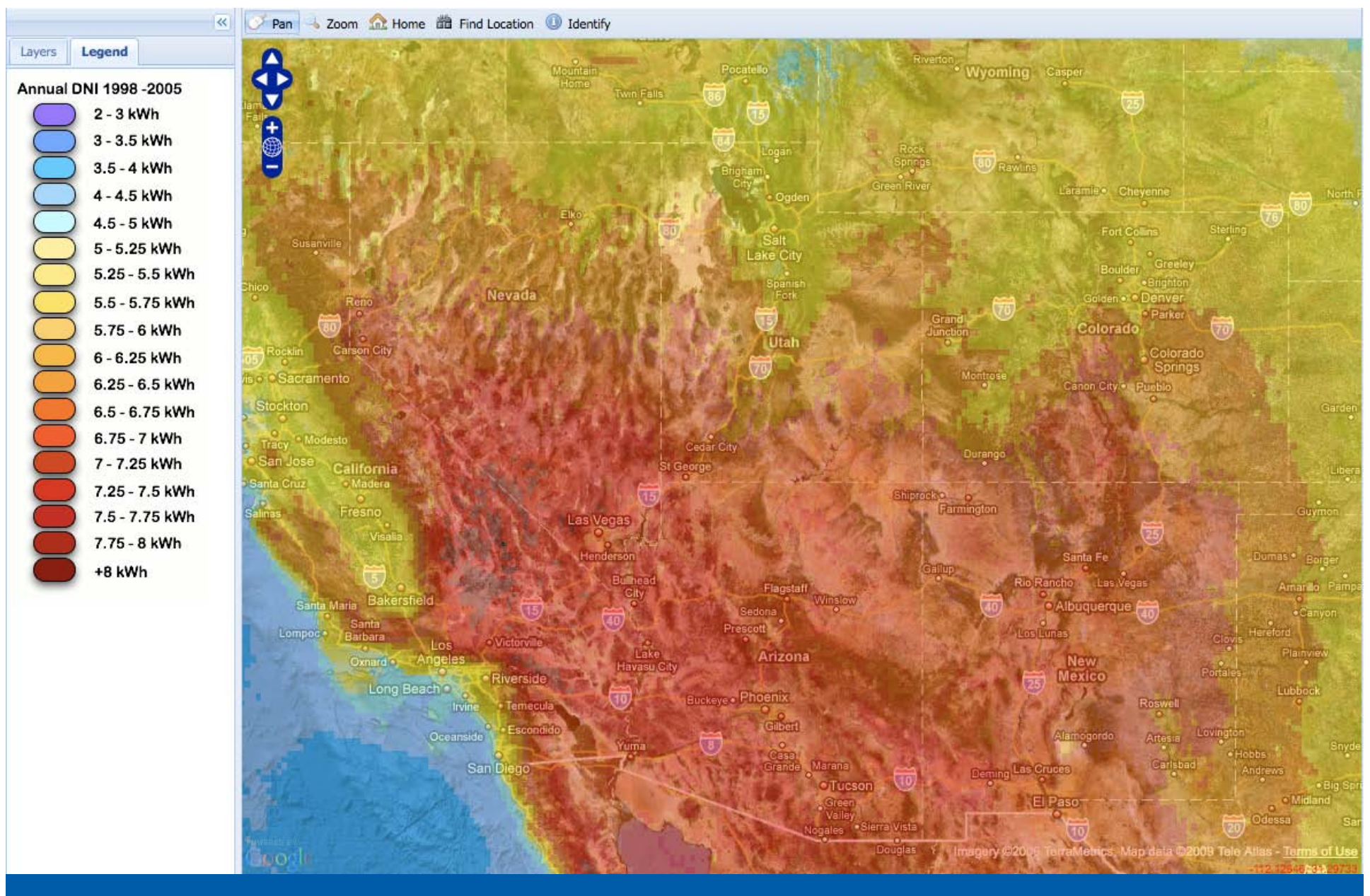
Genesis of WREZ Initiative

- September 2007 — Brainstorming group at WGA Summit on Increasing Renewable Energy in the Western Grid
 - Wanted to replicate success of Texas CREZ initiative
 - Wanted to leverage and coordinate state efforts in California, Colorado with a WECC-wide parallel initiative
- December 2007 — Request from Gov. Freudenthal (Wyoming) and Gov. Huntsman (Utah) to DOE Sec. Bodman to fund study
 - Technical assistance from NREL, Lawrence Berkeley Lab

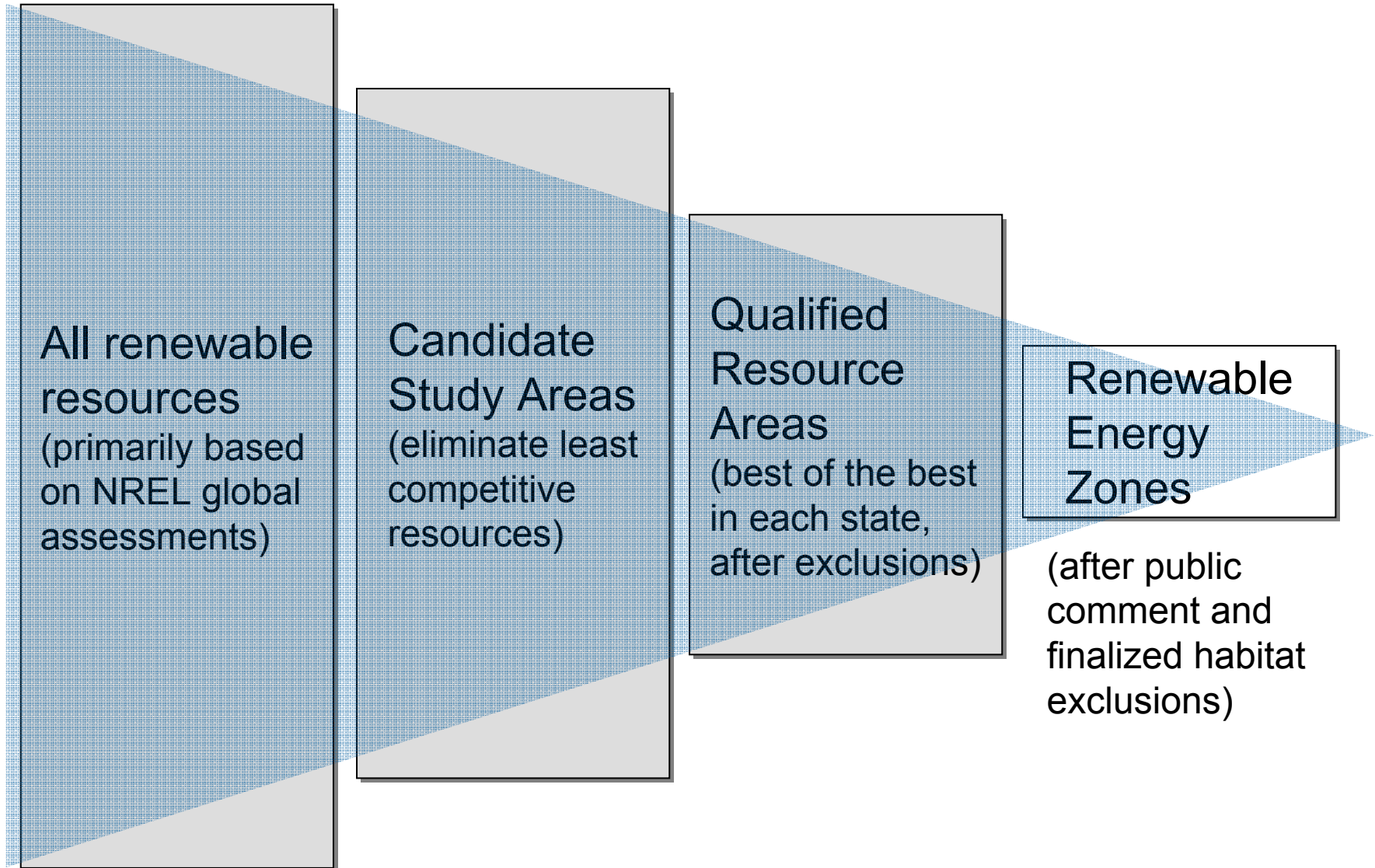
Organization



Southwest solar resources



Progression



What does being in a REZ mean?

- Purpose is to model the best scenarios for *regional* delivery of renewable energy across multiple state lines
- Many resources that don't end up in a REZ will still be economically viable for in-state demand
- Final report will also assess and quantify non-REZ resources

Filtering Qualified Resource Areas

- Develop and apply land exclusions
 - Technical exclusions
 - No development in urban areas, near airports, on wetlands
 - For wind: exclude slopes greater than 20%
 - For solar thermal (CSP): exclude slopes greater than 2%, minimum square contiguous area of 640 acres
 - Lands off limits ***by statute or policy*** (national parks, wildlife refuges, wilderness areas, etc.)

Filtering Qualified Resource Areas

- State-specific resource thresholds
 - For wind in Arizona, Class 3 and better
 - Class 5 and better: Montana, Wyoming
 - Class 4 and better: Baja California, Colorado, New Mexico, Texas
 - Class 3 and better: all other states/provinces
 - For solar thermal (CSP) in Arizona Minimum DNI of 7.25 kWh/m²/day
 - Minimum DNI of 7 kWh/m²/day: Baja California, California, Colorado, Nevada, New Mexico
 - Minimum DNI of 6.5 kWh/m²/day: Utah, Texas

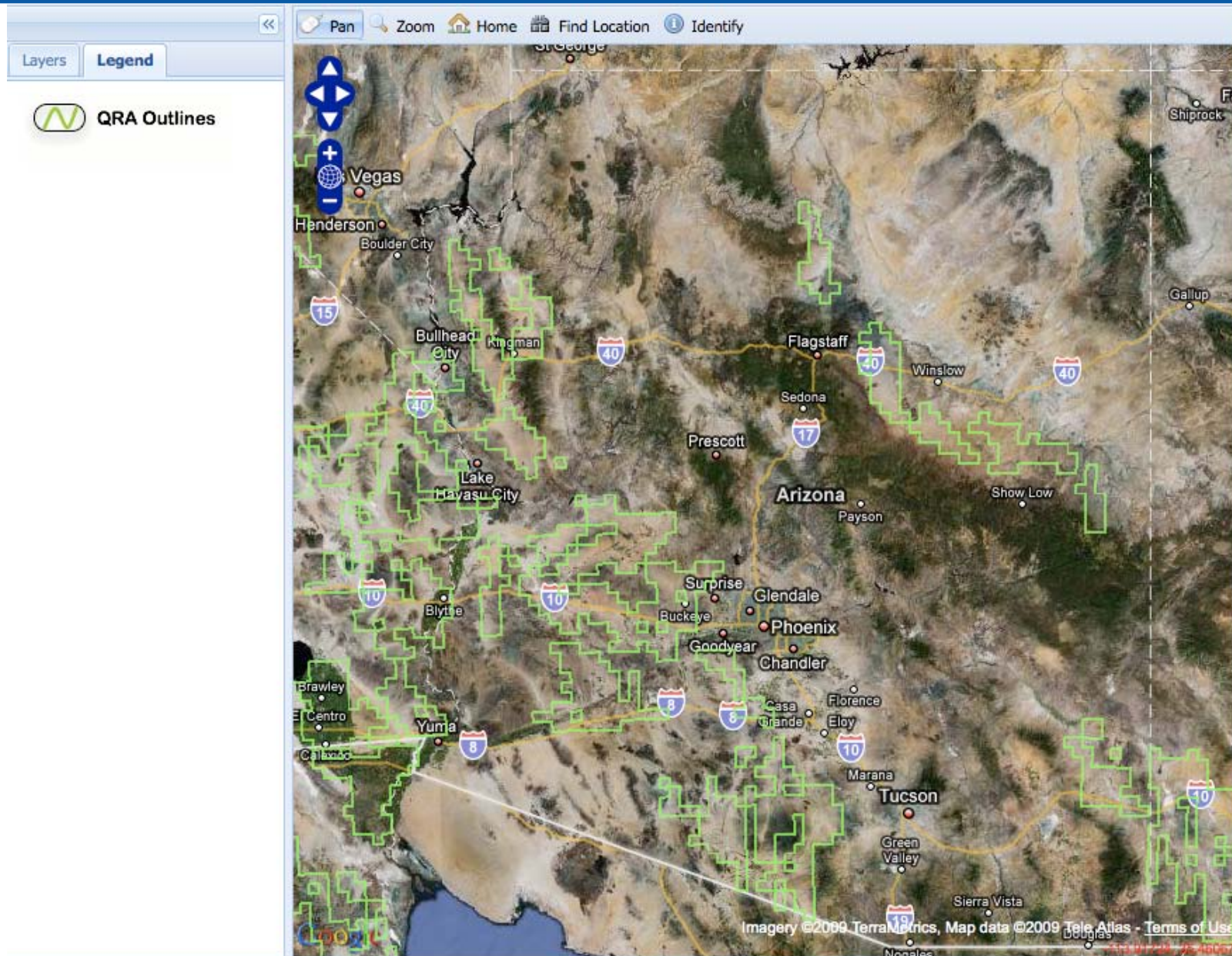
Filtering Qualified Resource Areas

- Geothermal was a qualifying resource
 - Existing projects used to identify potential, with USGS maps providing additional information on possible underground heat flows
 - Points rather than areas
- Biomass and small hydro (US) were not qualifying resources
 - Applied conclusion from Colorado study that these were local resources; zones were inapplicable
 - Would be quantified in a zone that was determined by wind, solar or geothermal potential

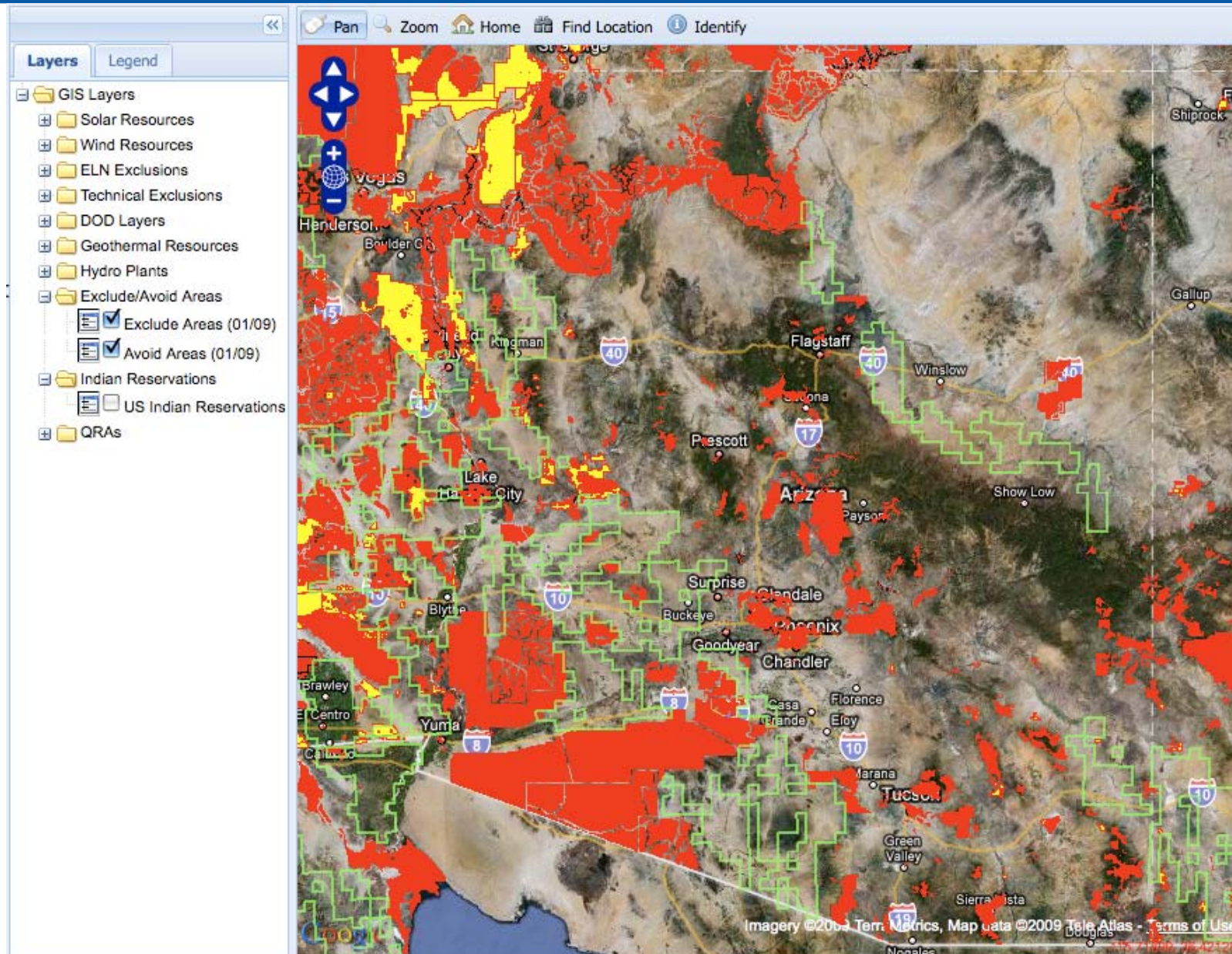
Filtering Qualified Resource Areas

- Apply reduction factors to estimate developability
 - For wind, 25% of qualifying technical potential
 - For solar, 3.5% of qualifying technical potential
 - Applied density screen to remaining qualified resources
 - Uniform grid overlay over entire Western Interconnection, each grid cell 50 km²
 - Calculate the total MW of qualifying potential in each grid
 - Eliminate cells with relatively low MW
 - Eliminate high-MW grid cells that were isolated
 - Eliminate clusters with aggregate qualifying potential less than 1,500 MW
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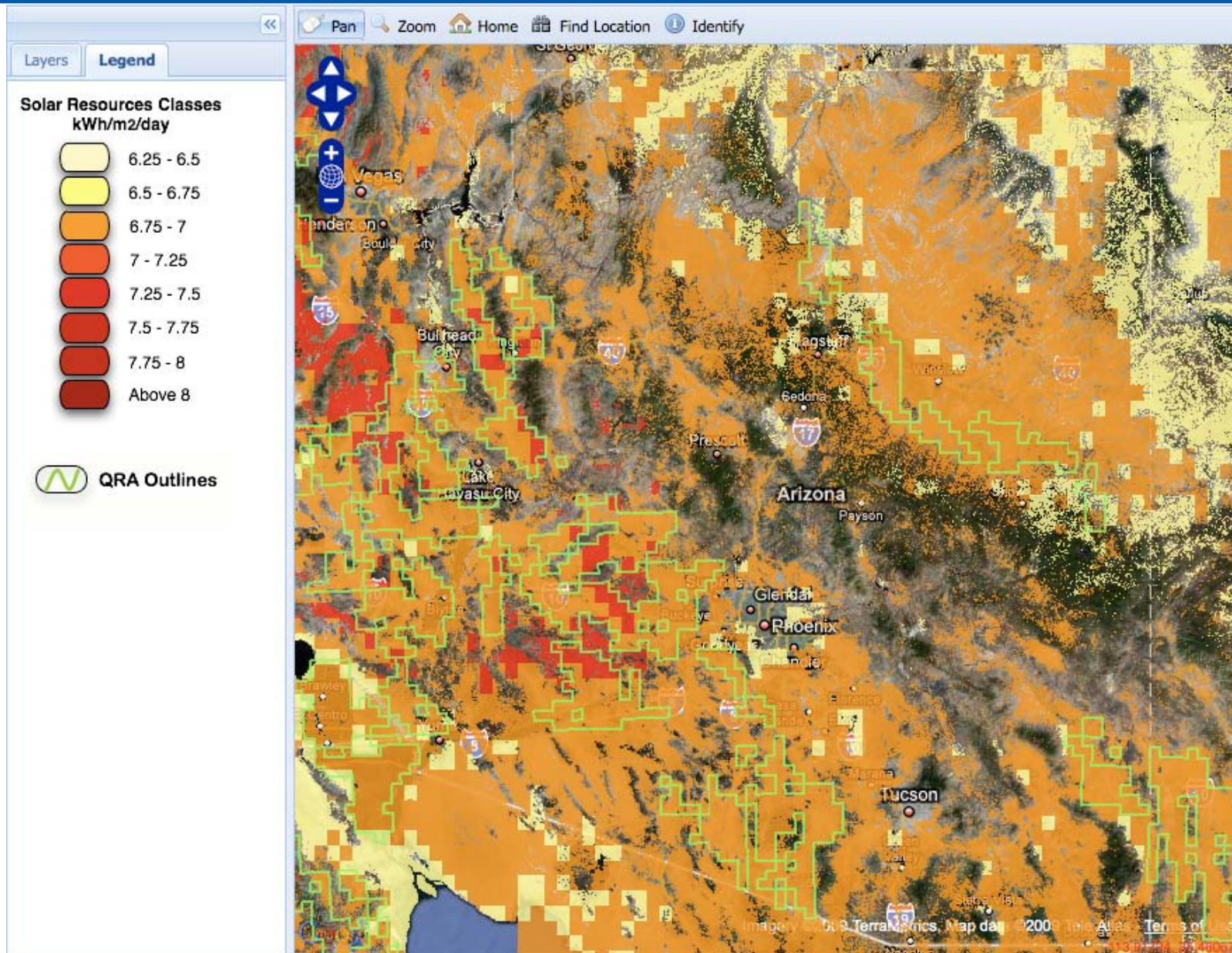
QRA boundaries



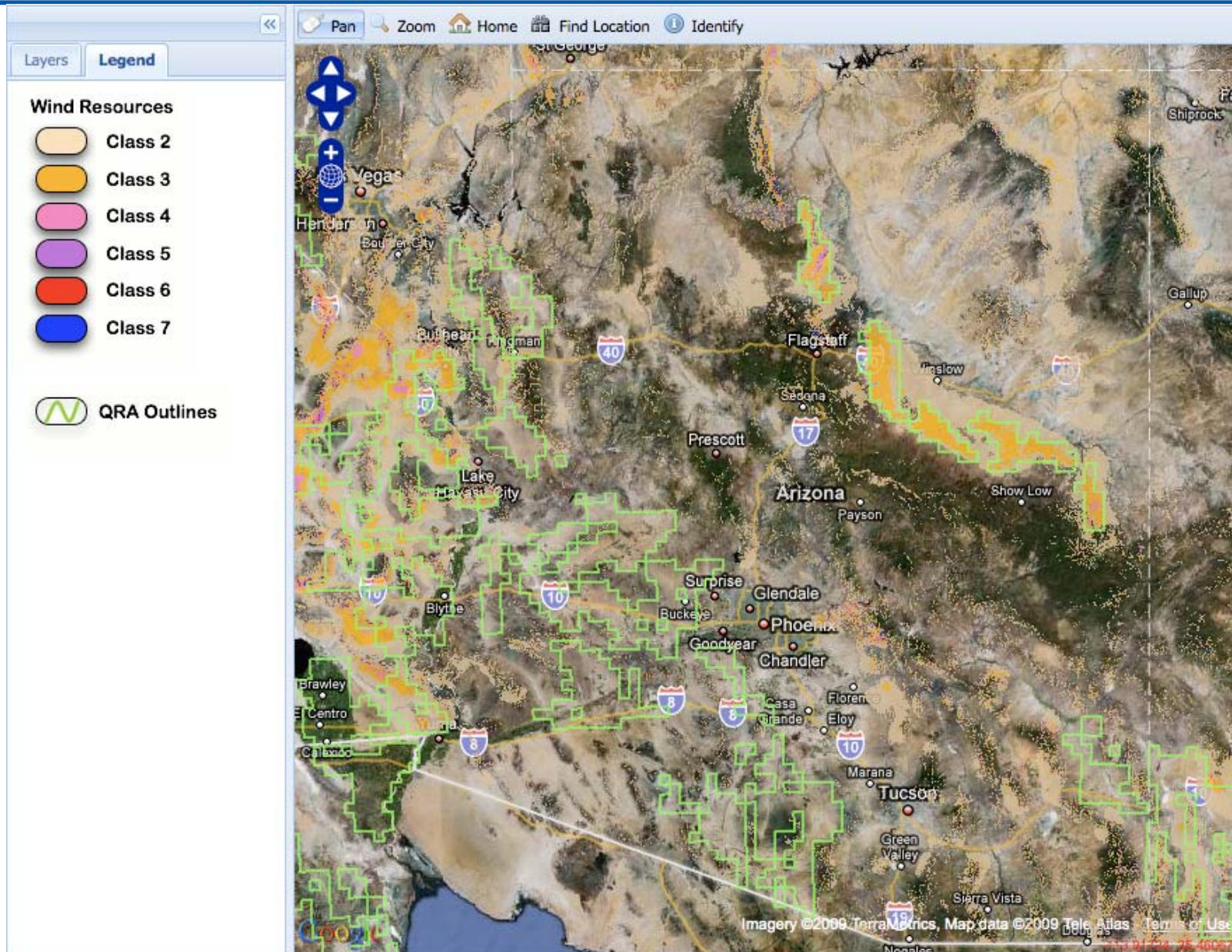
QRAs with exclusion areas



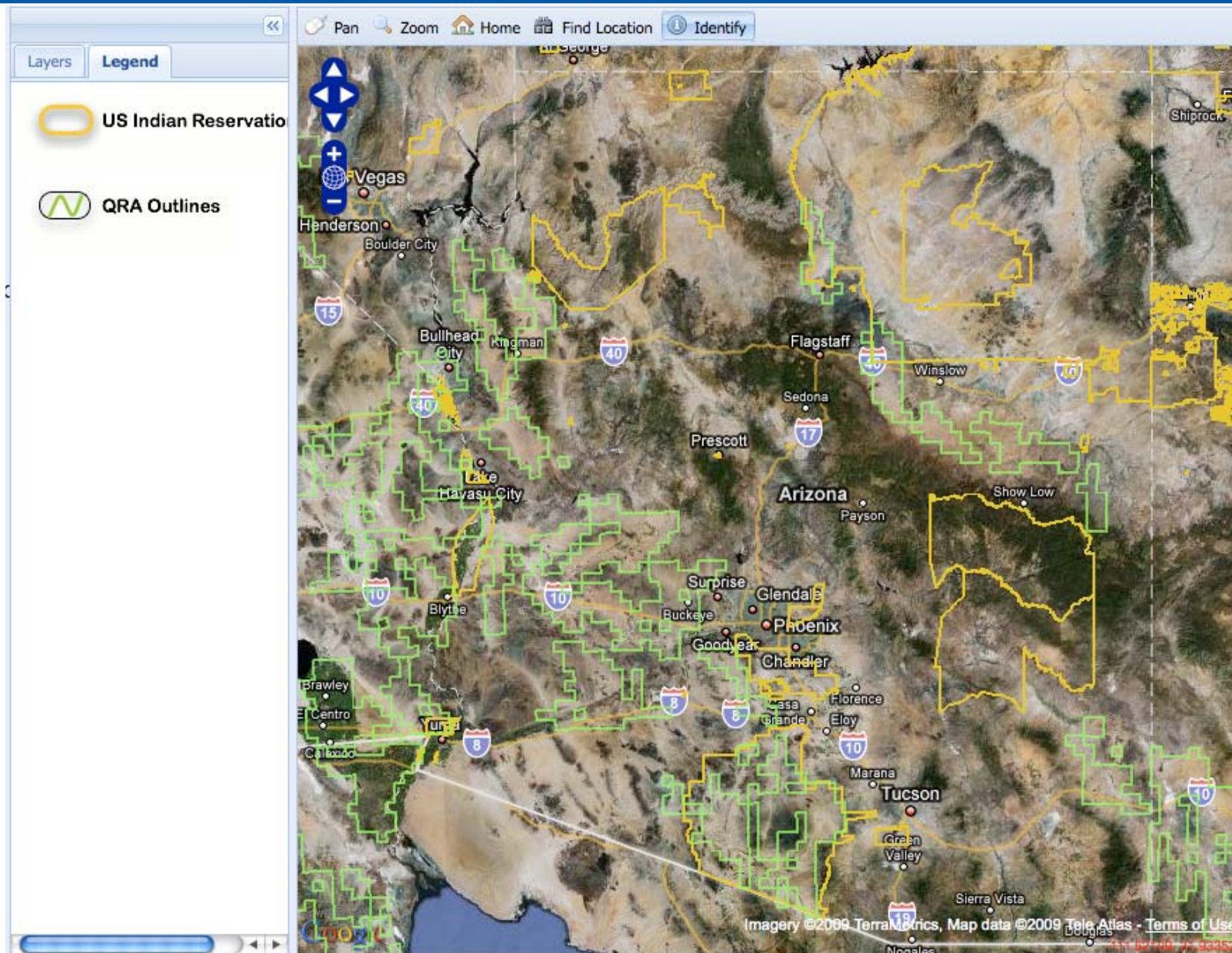
QRAs with solar potential



QRAs and wind resources



QRAs and Indian Reservations



WREZ next steps

- Gather public comment (through March 2)
 - ***Finalize habitat exclusions***
 - Eliminate, consolidate QRAs into renewable energy zones
 - Calculate supply curves based on busbar cost of energy (levelized \$/MWh)
 - Will apply generic technology assumptions to each resource category
 - Levelized cost of energy will vary primarily on the basis of anticipated capacity factor
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Next steps

- REZs and supply curves will go into a high-level conceptual transmission model to estimate delivered cost from REZs to major load centers
 - Concurrent request to WECC for more detailed studies on REZ scenarios
 - Final report to Western Governors in May
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Western Renewable Energy Zones

WREZ web site--

<http://www.westgov.org/wga/initiatives/wrez/>

WREZ GIS portal--

<http://mercator.nrel.gov/wrez/>

Login “wrez”

Password “guest”

Tasks, Timelines, and Work Products

1. Identify key stakeholders and Subcommittee members
2. Gather and evaluate available information for renewable resource potential in Arizona
3. Identify constraint criteria that will be applied to filter appropriate lands from non-appropriate land for development

Tasks, Timelines, and Work Products

4. Screen resource potential against constraint criteria to identify optimal resource zones
5. Identify additional transmission needed to link resource zones to existing transmission
6. Finalize maps and recommendations

Task One

Identify key stakeholders and Subcommittee members

- Identify key stakeholders from federal and state agencies, utilities, renewable energy developers and technology companies, environmental and conservation organizations, and other interested parties
- Kick-off meeting to provide an overview of the process, expected deliverables, and a proposed schedule of activity
- *Task 1 Timeframe – Complete by February 5, 2009*

Task Two

Gather and evaluate available information for renewable resource potential in Arizona

Gather available GIS information from:

- National databases
- The WREZ process
- State agency information
- Interconnection queues
- Land applications
- Conservation and wildlife organizations
- Other sources

This task may also include briefings of federal and state agencies not represented on the ARRTIS to provide information on the process and solicit input during the initial stages of development

Task 2 Timeframe – Ongoing through early March 2009

Task Three

Identify constraint criteria that will be applied to filter appropriate lands from non-appropriate land for development

- Identify criteria that could be constraints to utility-scale renewable generation development and will serve as filters to the renewable resource potential data collected as part of Task 2
 - resource density/intensity, land slope, water availability, land ownership and restricted areas, plant and animal habitat, view sheds, etc.
- Provide input on the types of constraint criteria to be evaluated as well as the relative weighting of these considerations in the analysis
- *Task 3 Timeframe – Ongoing through late March 2009*

Task Four

Screen resource potential against constraint criteria to identify optimal resource zones

- Evaluate the initial results of merging the renewable resource potential with the screening criteria and solicit comment on any necessary refinements
- Task will include one or more ARRTIS meetings to provide input and review any updated information.
- *Task 4 Timeframe – Ongoing through mid April 2009*

Task Five

Identify additional transmission needed to link resource zones to existing transmission

- With input from the RTTF, identify new transmission needed to strategically connect core or aggregated renewable resource potential areas to load areas in the state
- Overlay of existing and planned transmission system (based on utility Ten Year Plans filed in 2009) as well as evaluation of potential Available Transmission Capacity (ATC) as needed
- Estimate costs of transmission options, as well as estimates of scheduling capability, for each of the transmission options
- *Task 5 Timeframe –Ongoing through late-April to early-May 2009*

Task Six

Finalize maps and recommendations

- Final map products and options for the resource zones and associated transmission will be developed
- No recommendations about the relative ranking of the proposed zones or electrical connections will be made by the ARRTIS
- *Task 6 Timeframe – Completion by mid-May 2009*

Action Items / Next Steps

- Additional outreach / stakeholder identification
- Gathering of resource data
- Establishing a location to archive ARRTIS information
- Documentation of initial filtering criteria
- Next meetings
 - February 19
 - March 5

Questions / Comments

ARRTIS

Arizona Renewable Resource and
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Subcommittee

Thank you for your participation!

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