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Renewable Energy Transmission Initiative v2.0

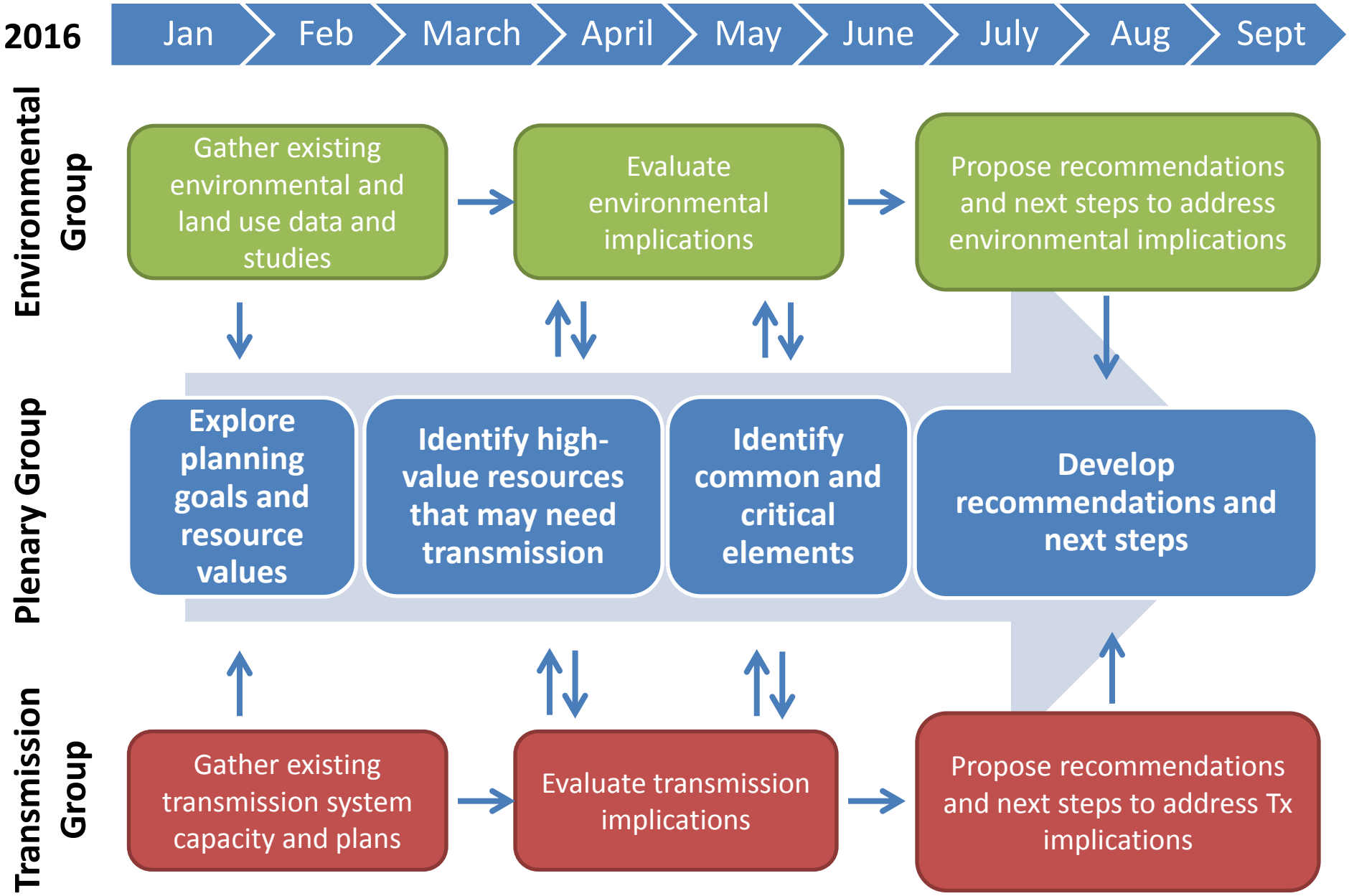
Transmission Assessment Focus Areas

Introduction, Proposed List, and Next Steps

May 2, 2016

RETI 2.0 Agency Management Team

RETI 2.0 Process and Timeline



Transmission Assessment Focus Area: Approach

Explore planning goals and resource values

1. How much renewables *might* we need?
   - Bookend scale of renewable need by 2030
   - Sources include IEPR, Pathways
2. Which resources *might* be important by 2030?
   - Review resource costs and values in 2030 context to identify resources and zones of potential value for 2030
   - Sources include industry and stakeholder comments, academic and government studies

Identify high-value resources that may need transmission

3. How much renewables *might* come from different areas?
   - Bookend range of renewable resources from specific areas that may be developed by 2030
   - Sources include comments, studies
4. *Might* this level of renewables require new transmission?
   - Match resource ranges to existing transmission capacity and identify where resource range exceeds transmission capacity
   - Sources include TPP and WECC studies, stakeholder comment

Proposed Focus Area List

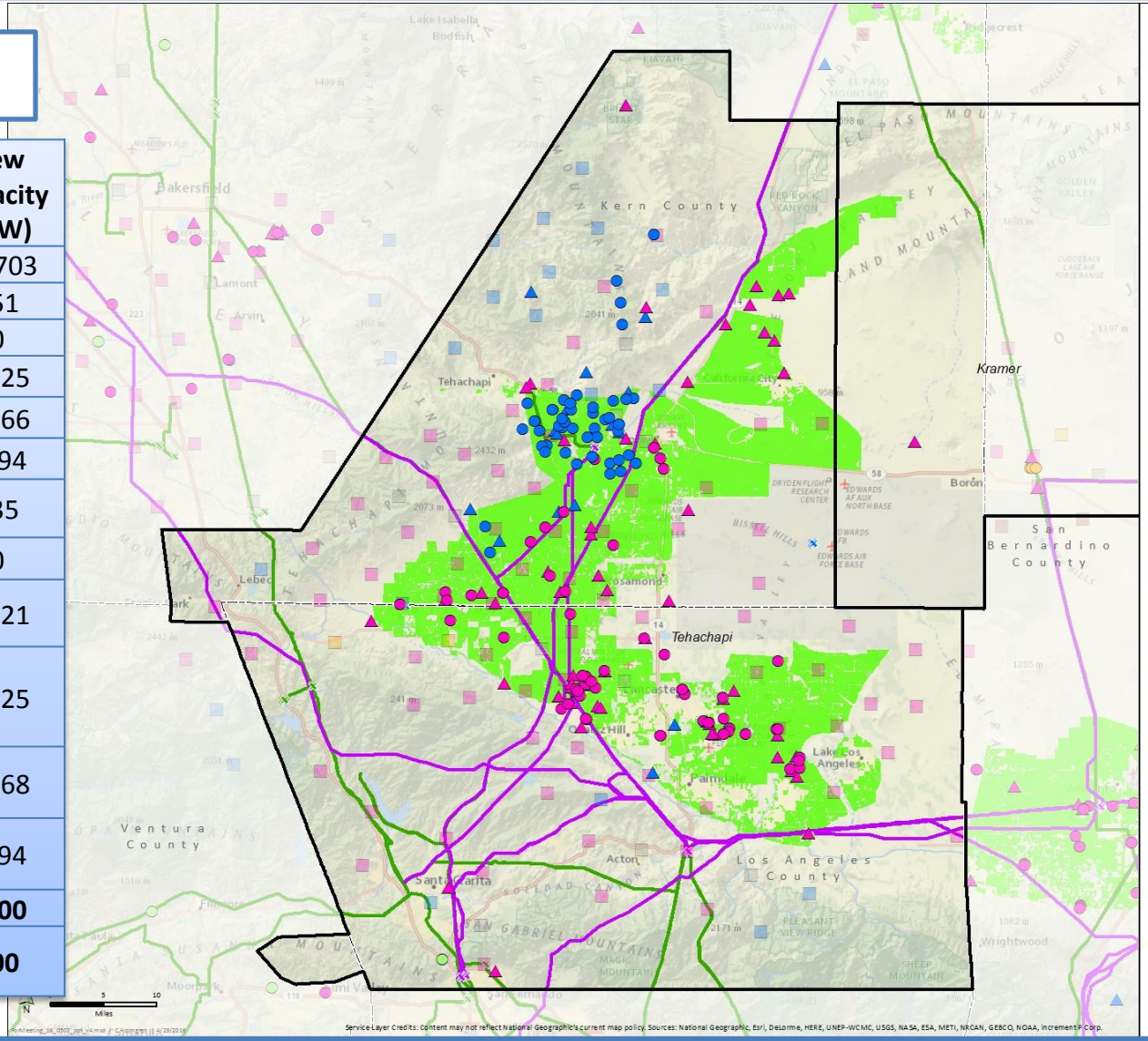
1. In-state resources
   - California Desert
     - Tehachapi
     - Victorville/Barstow
     - Riverside East
     - Imperial Valley
   - San Joaquin Valley
     - Modesto to Bakersfield
   - Northern California
     - Solano and East Bay
     - Sacramento River Valley
     - Lassen & Modoc
2. Import/Export Paths
   - Eldorado/Mead/Marketplace
   - Palo Verde/Delaney
   - California-Oregon Intertie
   - Central and Northern Sierra
3. Out-of-State Projects
   - WY and NM wind
   - NV and AZ solar
   - NV geothermal
   - NW wind and geothermal
   - OOS “Delivery” projects
   - OOS “Network” projects

California Desert

- Vast raw resource potential; substantial commercial interest
  - Thousands of MW of solar potential, several thousand MW of wind potential, some of the best geothermal resource in the world
- Building off Desert Renewable Energy Conservation Plan
  - Exhaustive environmental assessment and land use planning effort
  - September 2014 Draft DRECP identified Development Focus Areas on both private and public lands
  - October 2013 Draft DRECP Appendix K Transmission Technical Group report identified "tinker toy" conceptual transmission infrastructure needs
- Propose focusing on four clusters within and around 2014 DFAs
  - Tehachapi/Lancaster
  - Victorville/Barstow
  - East Riverside
  - Imperial Valley

Tehachapi

Data Source		New Capacity (MW)
Technical Potential (RPS Calc)	Solar PV	90,703
	Wind	551
	Geo	0
CAISO Queue		4,025
CEC Database		5,066
Draft DRECP assumptions (LA and Kern Cnties)	Solar	3194
	Wind	635
	Geo	0
RPS Calculator v6.2 Selections	California	1,721
	California Env Pref	3,625
	WECC Wide	1,568
Existing Energy-Only Tx Capacity		3794
Proposed Study Range	**Solar**	**4500**
	Wind	**500**



Tehachapi

Tehachapi & Kramer SuperCREZ(s)

RPS Calculator 6.1 PPA
- Bioenergy
- Geothermal
- Solar PV
- Solar Thermal
- Wind
- Various

CEC Projects In Development 2016
- Biomass/Landfill Gas
- Geothermal
- Solar PV
- Solar Thermal
- Wind

CAISO 2016 (locations appx)
- Biomass
- Geothermal
- Solar PV
- Solar Thermal
- Wind
- Other

Existing Substations
- 230 kV
- 345 kV
- 500+ kV

Existing Transmission
- 230 - 344 kV
- 345 - 499 kV
- 500+ kV
- DRECP DFA Boundaries

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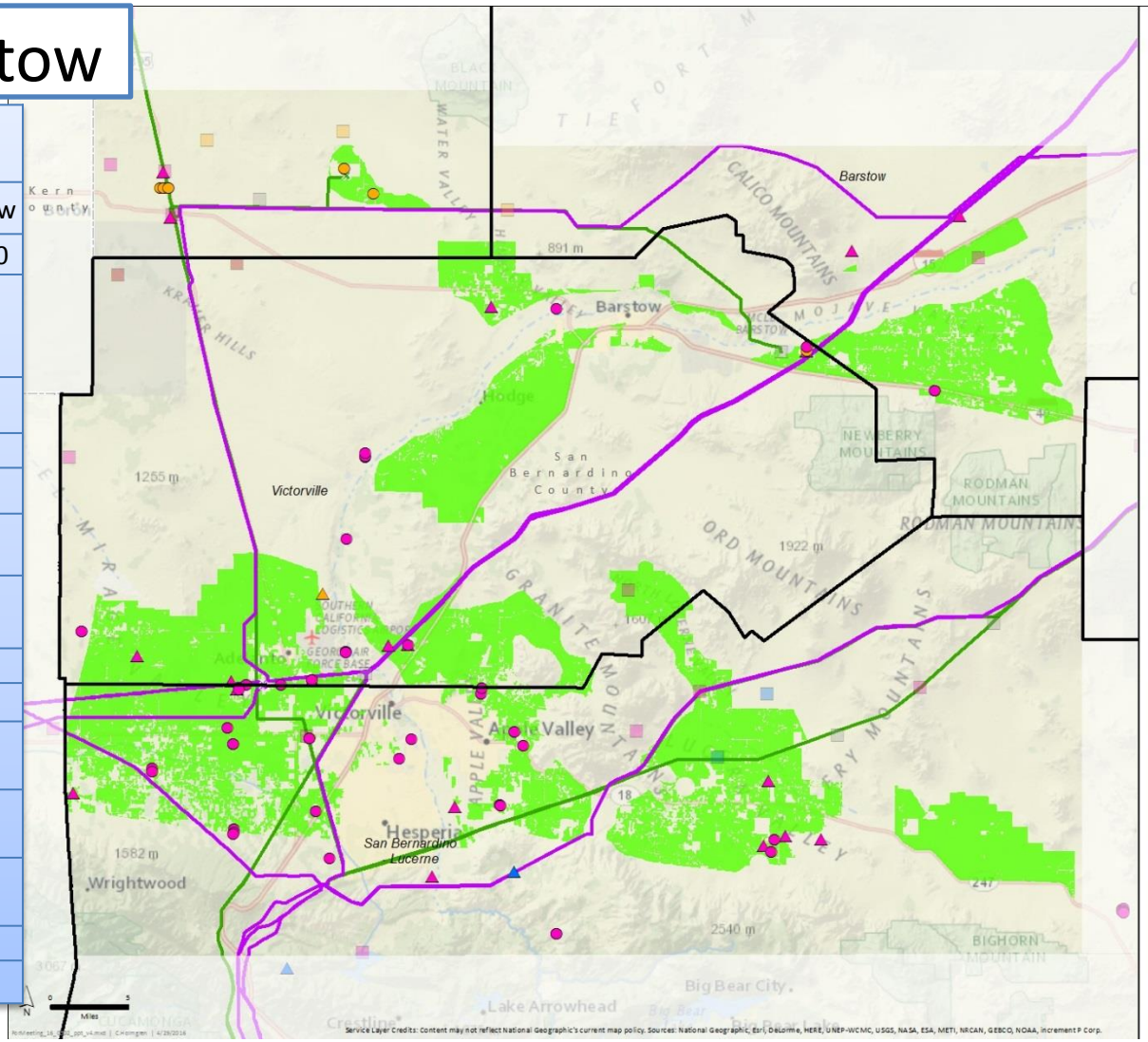
Victorville/Barstow

Data / Studies		New Capacity (MW)	
		Victorville	Barstow
Technical Potential (RPS Calc)	Solar PV	23,701	11,480
	Wind	1,092	208
	Geo	0	
CAISO Queue		67	0
CEC Project Database		256	522
Draft DRECP assumptions (San Bernardino County)	Solar	2717	
	Wind	969	
	Geo		
RPS Calculator v6.2 Selections	Calif	31	17
	Cal Env Pref	31	17
	WECC Wide	31	17
Existing Energy-Only Tx Capacity		412	
Proposed Study Range	**Solar**	**4500**	
	Wind	**500**	



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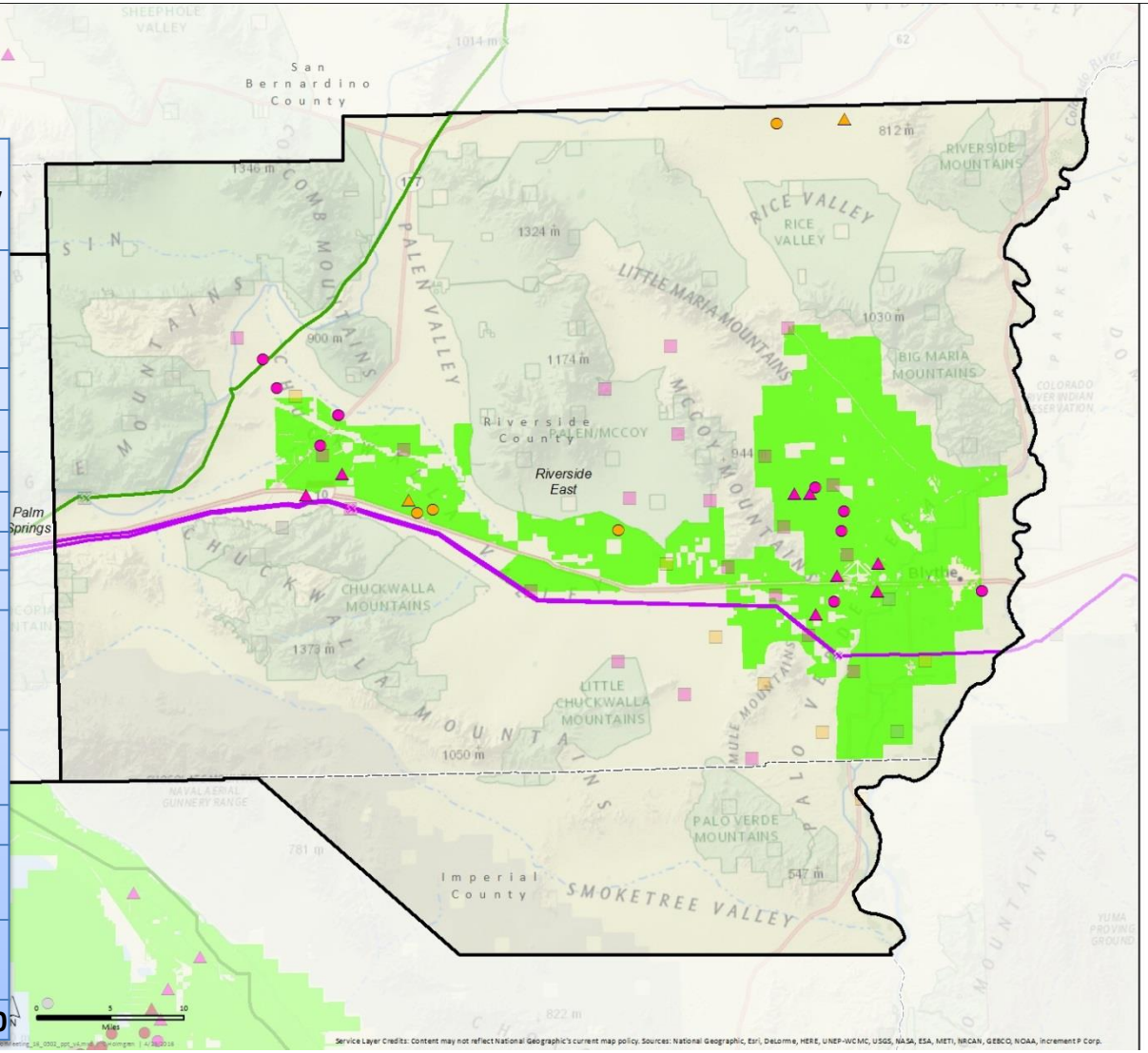
Riverside East

Data Source		New Capacity (MW)
Technical Potential (RPS Calc)	Solar PV	63,711
	Wind	522
	Geo	0
CAISO Queue		3,900
CEC Database		2,980
Draft DRECP assumptions (Riverside Cnty)	Solar	3,572
	Wind	1,355
	Geo	0
RPS Calculator v6.2 Selections	California	833
	California Env Pref	1,069
	WECC Wide	682
Existing Energy-Only Tx Capacity		4,754
Proposed Study Range	**Solar**	**2-4,000**
	Wind	**500-1000**



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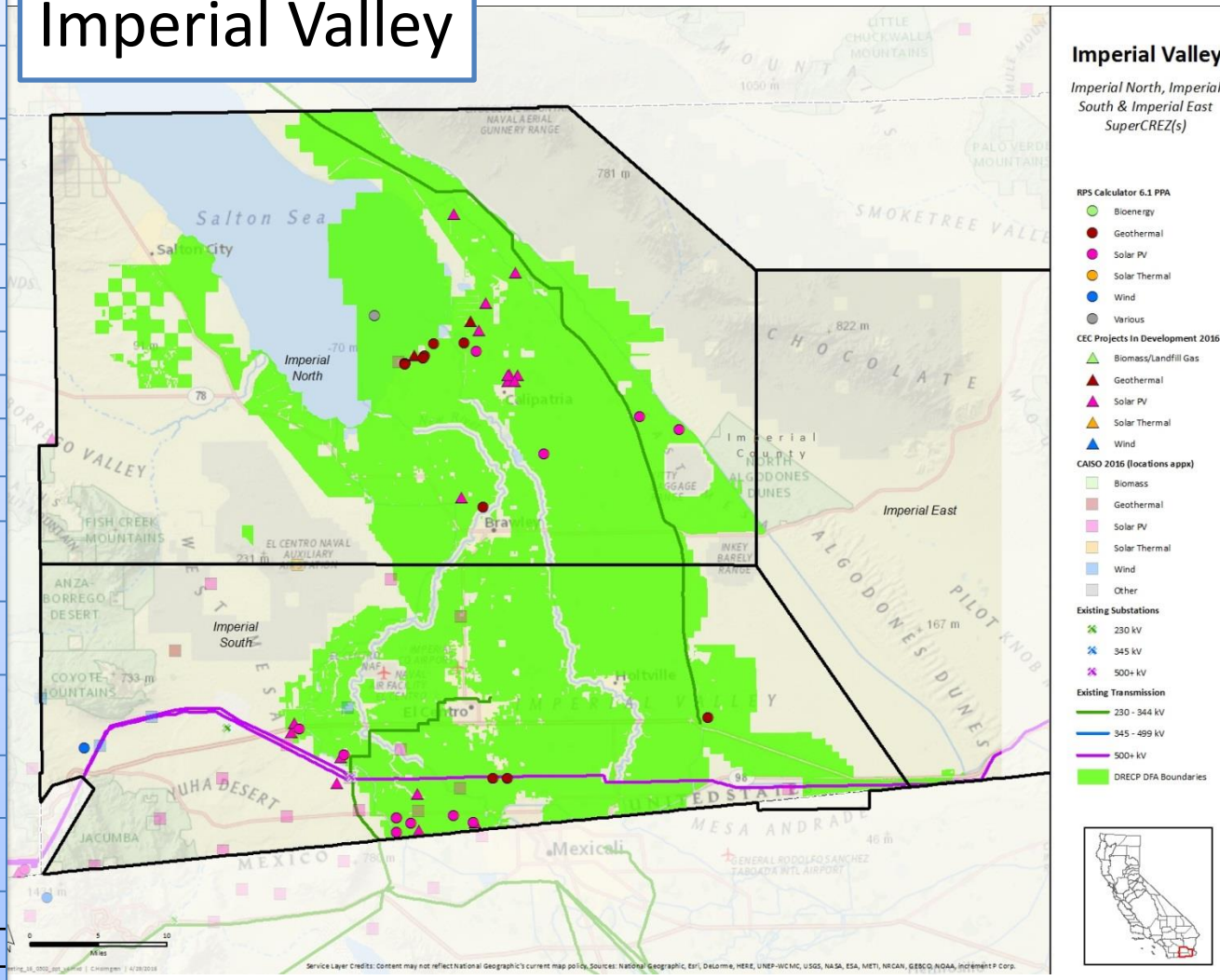
Imperial Valley

Data Source		New Capacity (MW)	
Technical Potential (RPS Calc)		RPS Calc	NREL
	Solar PV	131,961	32,000
	Wind	753	
	Geo	1,384	2,940
CAISO Queue		3,052	
CEC Database		2,140	
Draft DRECP assumptions (Imperial Cnty)	Solar	4,459	
	Wind	111	
	Geo	2592	
RPS Calculator v6.2 Selections	Cal	304	
	Cal Env Pref	829	
	WECC Wide	246	
NREL study by 2030	Solar	1300 to 1800	
	Geo	1000 to 1800	
Existing Energy-Only Tx Capacity		1849	
Proposed Study Range	**Solar**	**3500**	
	Wind	**500**	
	Geo	**1000**	



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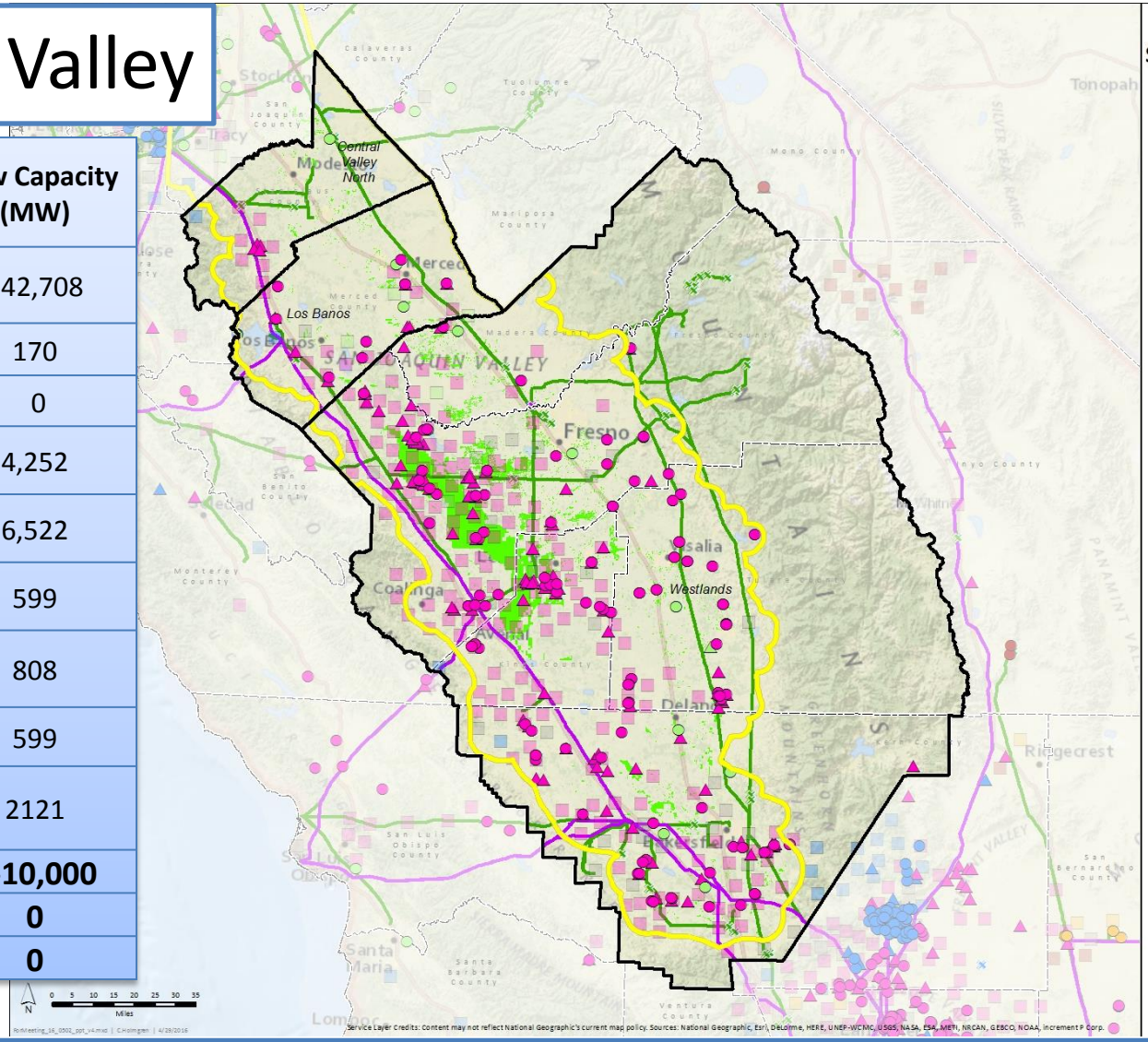
San Joaquin Valley

- From Modesto south to Bakersfield
  - Central Valley North, Los Banos, and Westlands CREZs
- San Joaquin Solar Initiative
  - Identified 450,000+ acres of “least conflict lands” (LCL)
  - Some transmission analysis done but more to do
- Raw resource potential
  - 45,000 MW+ solar potential in LCL
- Large commercial interest inside & outside of LCL
- Overlap with “CA backbone” transmission issues

San Joaquin Valley

Data Source		New Capacity (MW)
Technical Potential (RPS Calc)	Solar PV	342,708
	Wind	170
	Geo	0
CAISO Queue		4,252
CEC Database		6,522
RPS Calc v6.2 Scenario Selections	Cal	599
	Cal Env Pref	808
	WECC Wide	599
Existing Energy-Only Tx Capacity		2121
Proposed Study Range	**Solar**	**5-10,000**
	Wind	**0**
	Geo	**0**



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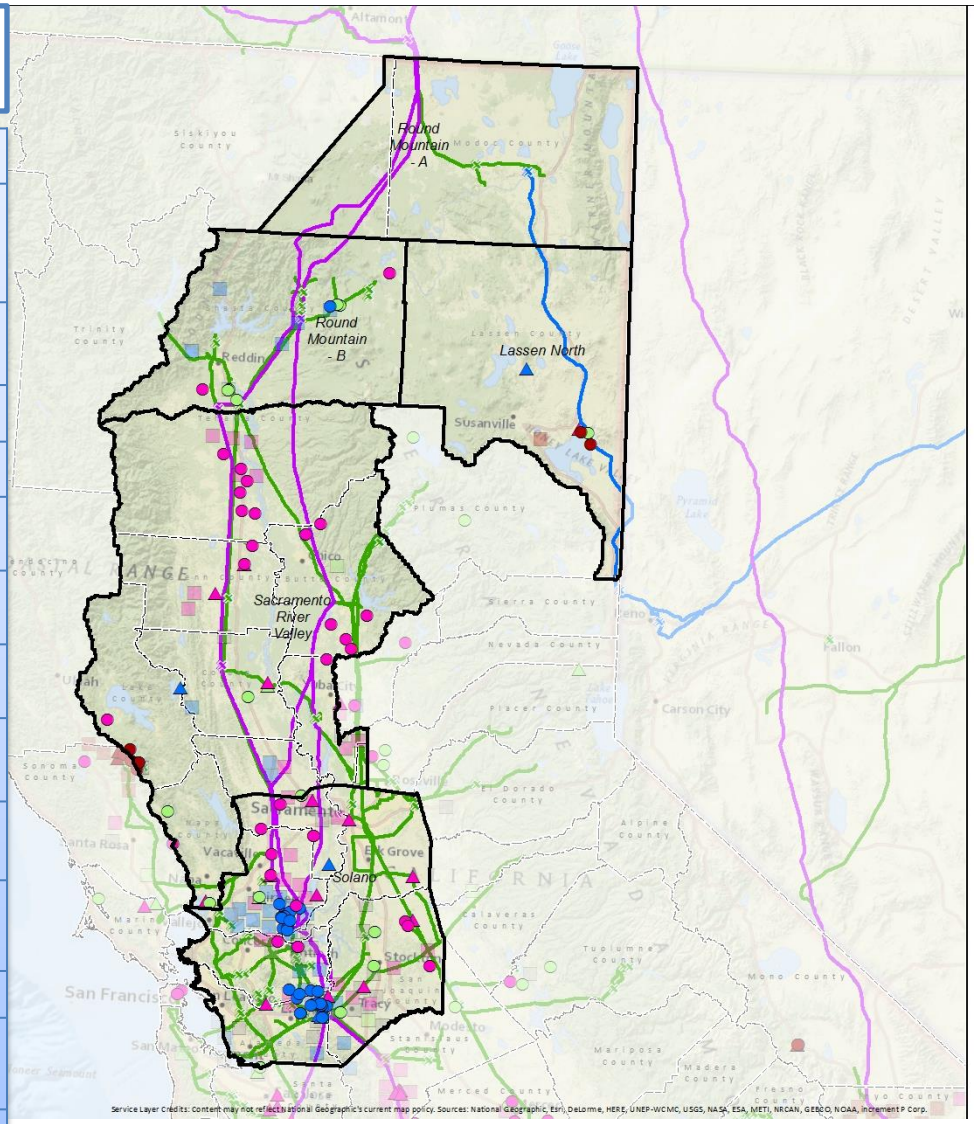
Northern California

- East/North Bay, Sacramento River Valley, and Northeast CA
  - Solano, Sacramento River, Lassen, and Round Mountain CREZs
- Raw resource potential
  - High solar potential
  - Wind: B&V data show more than 5,500 MW capacity
  - Geothermal: up to 450 MW potential
  - Biomass potential?
- Significant overlap with CA-OR Intertie issues & access to Northwest renewables
- Little environmental information; much skepticism
- Little transmission information; EO data speculative
- Low commercial interest to date

Northern California

Data Source		New Capacity (MW)		
		Solano	Sac River	Lassen and Round Mountain
Technical Potential (RPS Calc)	Solar PV	122,935	228,938	357,435
	Wind	1,136	2,693	1,900
	Geo	0	0	435
CAISO Queue		242	0	0
CEC Database		183	167	56
RPS Calc v6.2 Scenario Selections	Cal	725	746	571
	Cal Env Pref	1,500	1,536	0
	WECC Wide	71	71	0
Existing Energy-Only Tx Capacity		879	2,099	1,250
Proposed Study Range	Solar	1-2,000	1-2000	500-1,000
	Wind	500-1000	500-1000	500-1000
	Geo			450



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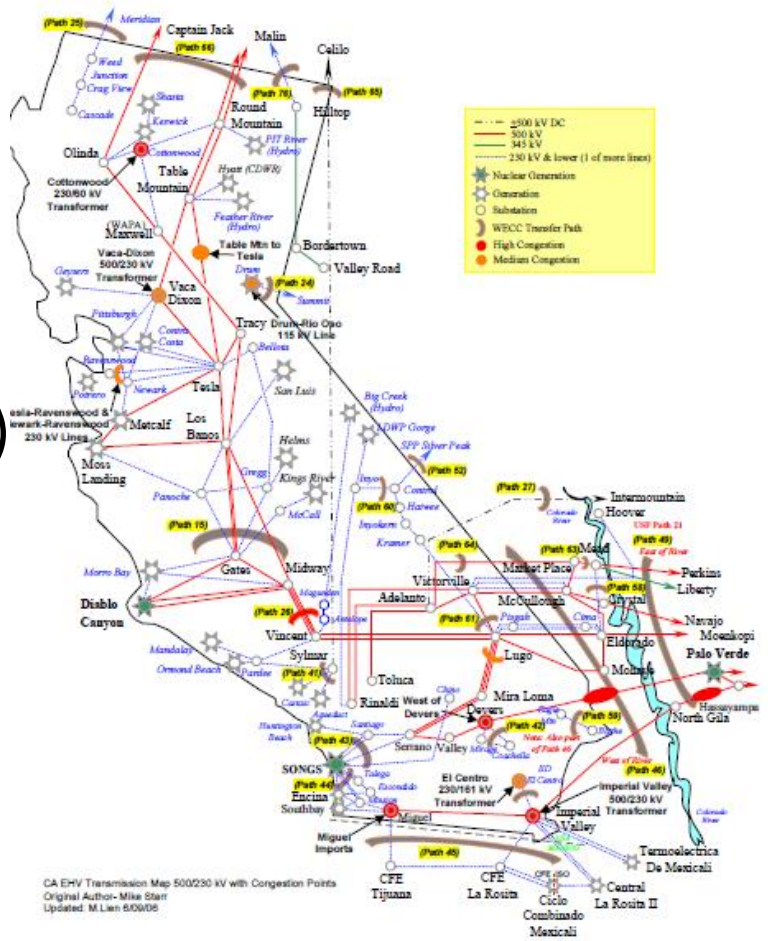
Import/Export Paths

- Future expanded renewable resource procurement and sales to out-of-state (OOS) will pass through a few major interconnection points
  - OOS “delivery” projects aim to deliver large-scale low-cost renewables to market hubs at California’s borders
  - OOS “network” projects may strengthen capacity for increased trade (imports and exports) across the West
  - Resource changes on existing transmission lines (e.g. coal retirements, hydro reduction, line or ratings expansion) may increase California renewable import and export opportunities

Import/Export Paths

- Identified Import/export Paths
  - Eldorado/Mead/Marketplace
    - Study Range: add 3000-6000 MW
  - Palo Verde and/or Delaney
    - Study Range: add 3000-6000 MW
  - California-Oregon Intertie (Path 66)
    - Study Range: add 2000-4000 MW
  - Central Sierra
    - Path 76 and/or Drum-Summit Path 24 and/or Silver Peak-Control Path 52 and/or Dixie-Oxbow line
    - Study range: add 500 MW



Out of State Projects

- Developments elsewhere in the West could have substantial effect on accessibility of other resources
  - Out-of-State (OOS) renewables development proposals and projects
    - WY and NM wind; AZ and NV solar; NW wind and geothermal
  - "Delivery" transmission projects that deliver of WY and NM wind to California interconnections points
    - E.g. Transwest Express; Zephyr; Sunzia; Southline
  - "Network" transmission that can increase access to a variety of renewables and export markets
    - Gateway projects; SWIP North
  - Resource changes in other states (coal plant retirements; reduced hydro export)
- Broader assessment approach planned
  - CA TTIG will not perform technical assessment of OOS projects
  - Seeking broader regional engagement; workshop(s) planned

Next Steps:
Plenary Group

- Plenary Group will accept comments on these Focus Areas for two weeks and will refine the areas, study ranges, and approach accordingly
- Staff will actively engage stakeholders, including local communities, military, and tribes, to further refine the Focus Areas and to make sure appropriate issues and perspectives are captured in the Focus Area study ranges and the ELUTG and TTIG assessments.
- Staff is preparing to work with an appropriate third party to gather regional input through out-of-state workshops

Next Steps:
Environmental and Land Use Technical Group

- ELUTG is collecting a database of available datasets and studies in a publicly-accessible online tool DataBasin
- ELUTG is preparing a standard Environmental Profile Report to summarize available data
- Working iteratively with the Plenary Group and TTIG, ELUTG will utilize these tools to evaluate the environmental and land use implications of each Focus Area, and to make recommendations for further work where necessary
- Provide initial draft reports to Plenary Group in late June

Next Steps:
Transmission Technical Input Group

- TTIG will evaluate RETI resource scenarios created by the plenary group to identify transmission implications
- The resource scenario evaluation approach will –
  - Rely upon existing planning processes adopted by various planning entities and available study results from:
    - Generation interconnection studies
    - Transmission planning studies and
    - Any specific 33% RPS or 50% renewable studies
  - Identify conceptual alternatives to accommodate the MW ranges specified in RETI resource scenarios
- Provide consolidated recommendations to plenary group

Questions, comments, suggestions?

http://www.energy.ca.gov/reti/

and click on the “Submit eComment” link