CLEAN AIR TASK FORCE

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Finding the ways that work

Building a Zero Carbon California Grid: Moving From Models to an Implementable Plan

November 2, 2021

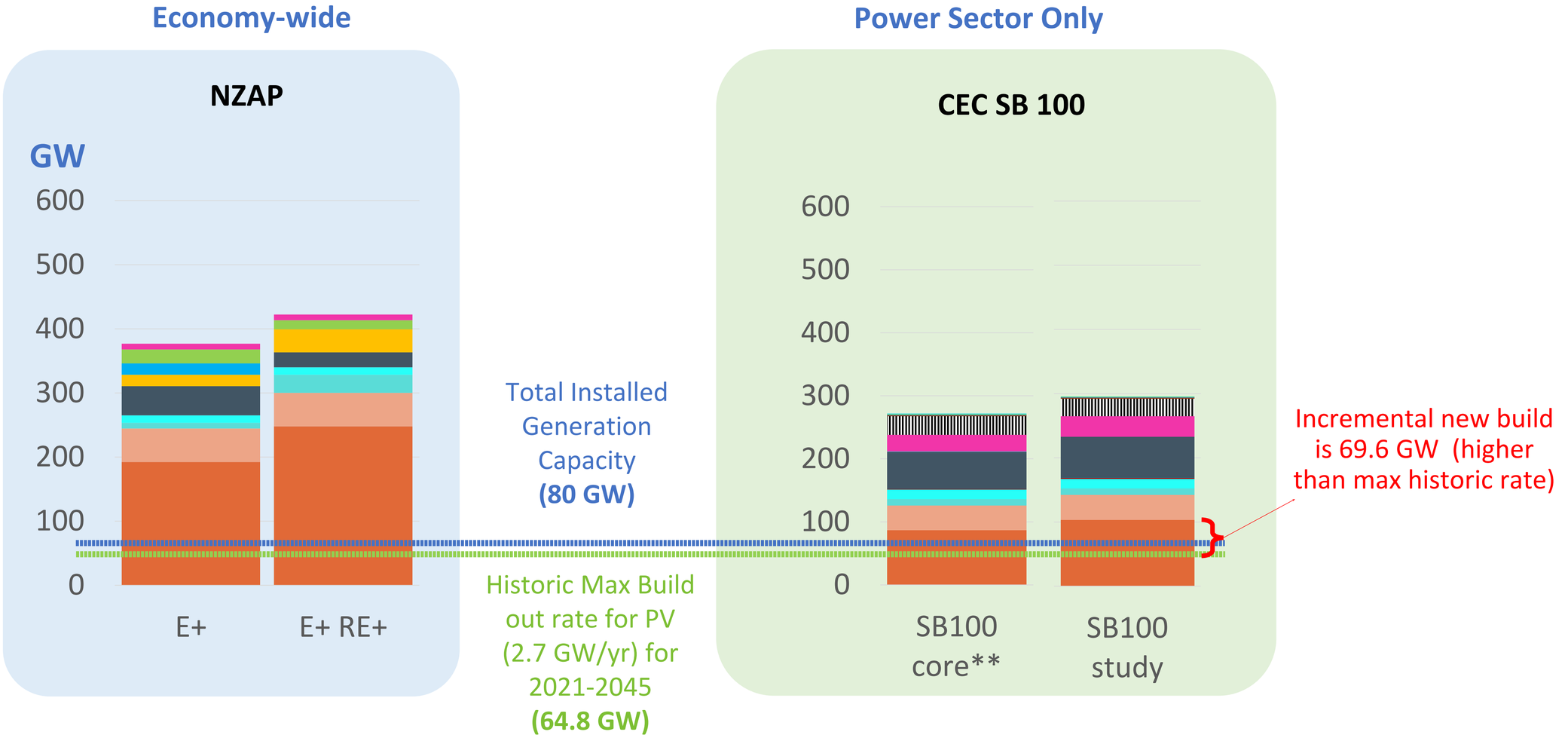
California Decarbonization Risk Management Project: Focus on Land Use for Generation and Transmission

- EDF, CATF, joined with TNC to explore constraints on decarbonizing the electric system.
- The team interviewed more than 60 stakeholders and experts on what they see as key challenges and risks to achieving this transition, and then conducted two workshops.
- Many challenges were identified, but a consensus view emerged that the state cannot meet its targets without (1) aggressive monitoring/management of RE development; (2) a commitment to build the underlying deliverability infrastructure and (3) a new process of engagement to assure developable sites do not become unobtainable, while protecting against unaffordable, inequitable costs.
- Accordingly, the team commissioned further analysis from Lucid Catalyst.

Equity, Environmental, and Social Justice Factors Are Essential for Planning

- Inclusivity is a must with all sectors and agencies
- Affordability and cost shifting need to be re-examined by agencies
- Economic and environmental costs and benefits of renewable energy and zero-carbon resources need to be added and updated in models
- Modeling improvements to ensure equitable indicators are included
- Cost and timing of fulfilling clean energy and electrification mandates are updated
- Costs and benefits of alternative scenarios should be provided to Tribes, Disadvantaged Communities, and Frontline Communities

Capacity Expansion Modeling Results



NZAP excludes imports, includes customer-sited PV

**Excludes T&D and storage losses; includes out of state wind customer-sited PV

Moving from Models to Plans

Grid Decarbonization is Achievable

- Cost is no longer the limiting factor

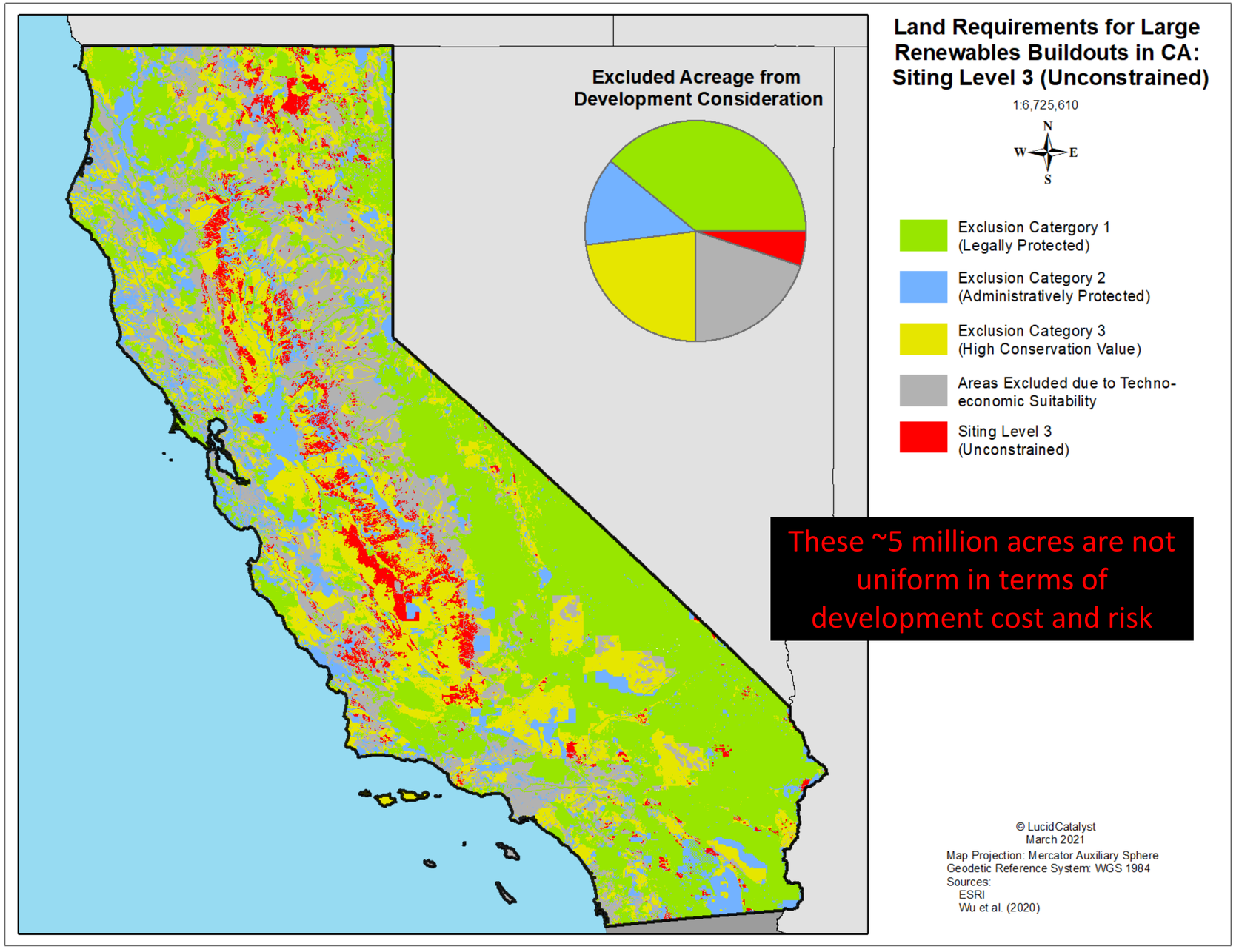
Community Engagement is Essential

At this Scale of Build out Key Factors Include

- Inclusive and Equitable
- Available Land
- Permitting
- Transmission and Generation

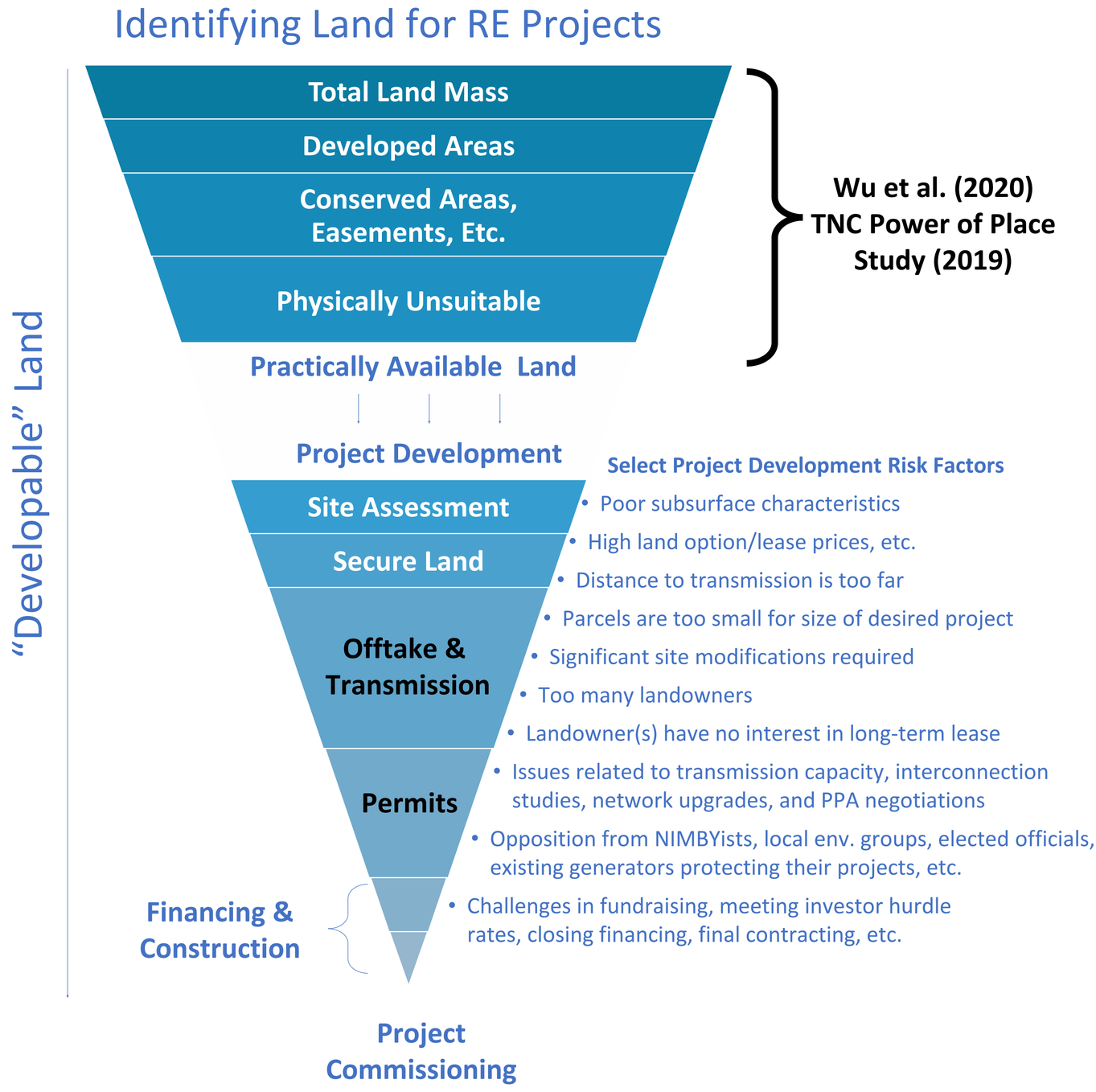
Constraint #1:

Available Land to Build Generation and Transmission is Limited

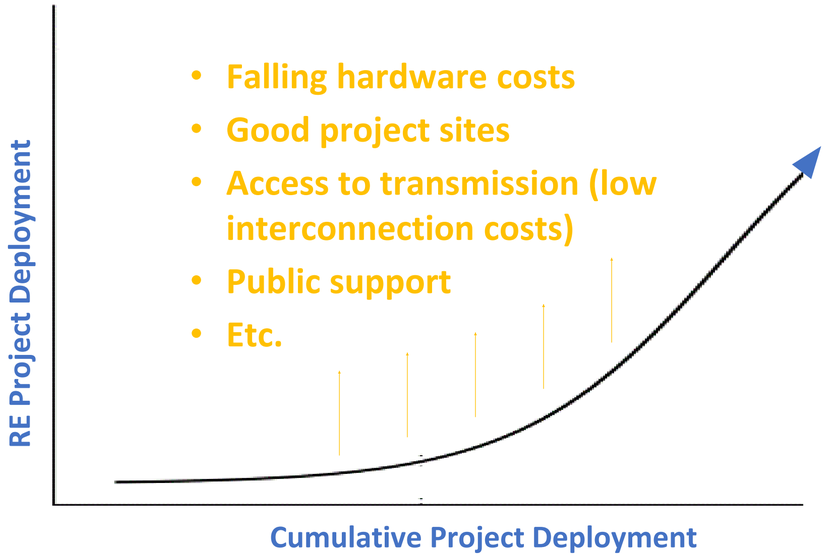


And even “Suitable” Land ≠ Developable Land

- Land exclusion is but the first step in identifying sites that are considered “developable.”
- Large areas of “available” land can be quickly dismissed for a variety of reasons:
  - Requires working with too many landowners to complete the project (including securing Right-of-Ways to interconnect project)
  - Contiguous parcels are too small
  - Etc.
- Even when attractive areas are identified, there are several reasons why projects never get built:
  - Landowners have no interest
  - Public opposition makes permitting impossible
  - Transmission studies reveal upgrades that make the project prohibitively expensive.
  - Etc.
- Each project development milestone has several risk factors and nearly all get more difficult as more projects are built in an area.



Until now, all signs have pointed to a “hockey stick” growth curve

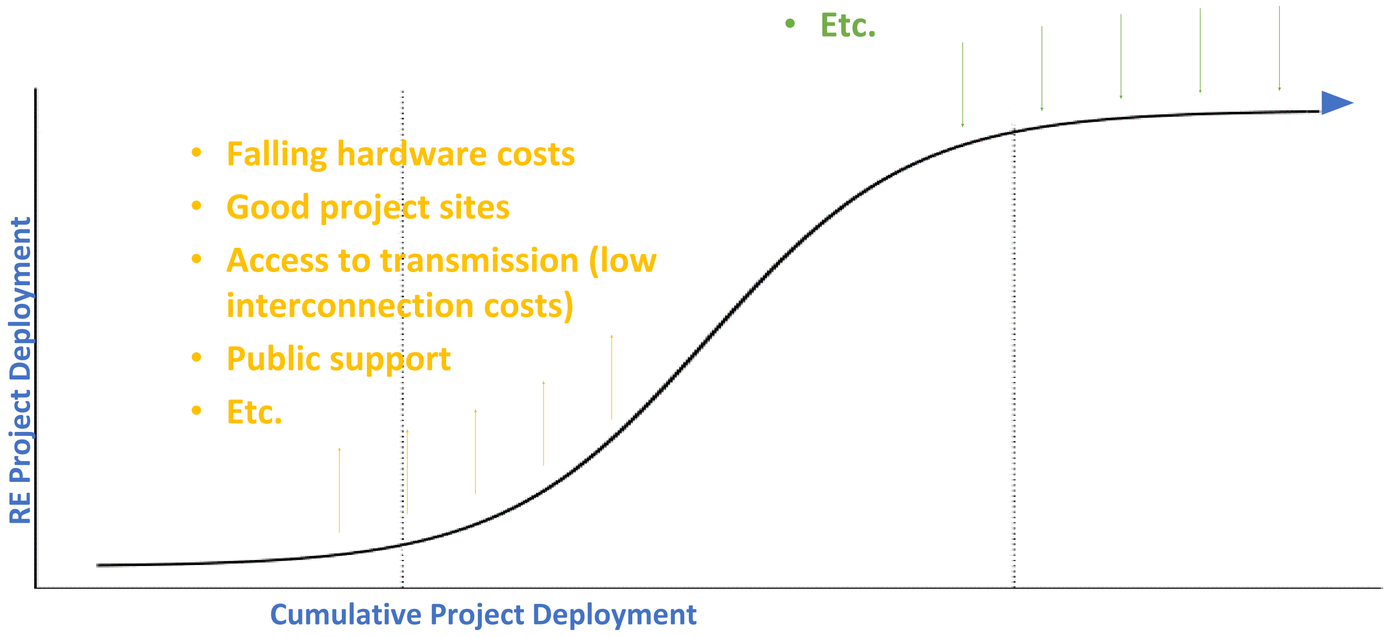


- Falling hardware costs
- Good quality sites
- Public support
- Falling financing costs
- Larger projects
- Technology/ Efficiency improvements
- Etc.

(Based on interviews with utility-scale PV developers)

As more projects are deployed in a region, the “hockey stick” is very likely to turn into a S-curve

- Increasing land costs & competing needs
- Fewer amenable landowners
- Further from transmission
- Lower capacity factors/ poorer resource
- Public opposition
- Interconnection queue
- Increasing # of gen tie Right-of-Ways
- Transmission Availability/ Capacity
- Etc.



- Falling hardware costs
- Good project sites
- Access to transmission (low interconnection costs)
- Public support
- Etc.

- Sites are increasingly difficult,
- Therefore, expensive and risky to develop over time.
- Most decarbonization scenarios show accelerating deployment over time.

(Based on interviews with utility-scale PV developers)

As more projects are deployed in a region, the “hockey stick” is very likely to turn into a S-curve

These are OCCURRING AT THE SAME TIME, compounding cost & risk

- Increasing land costs & competing needs
- Fewer amenable landowners
- Further from transmission
- Lower capacity factors/ poorer resource
- Public opposition
- Interconnection queue
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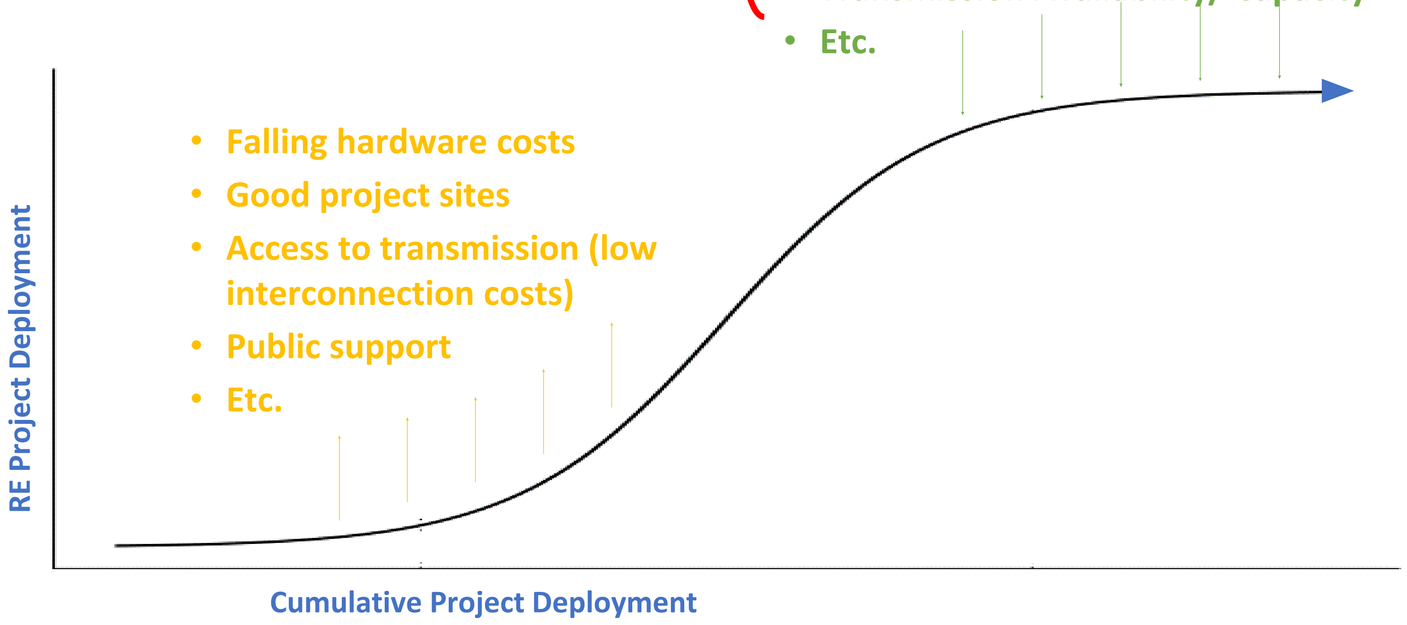
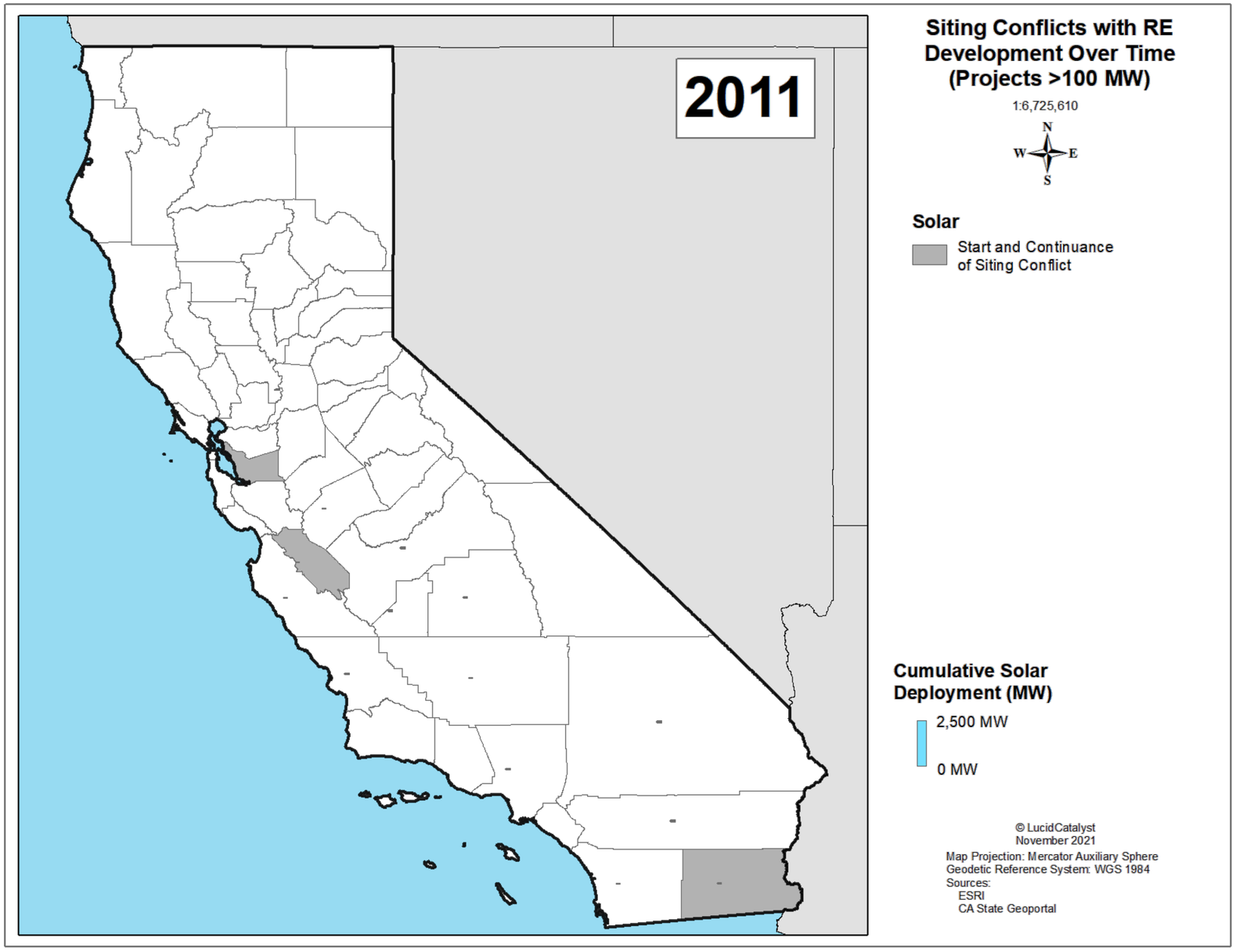


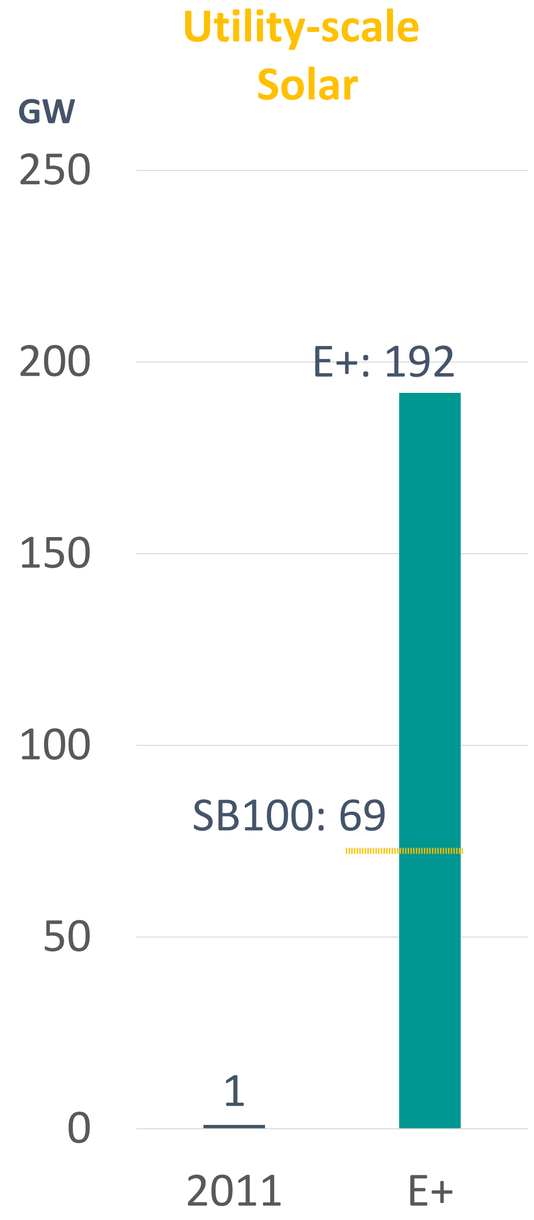
- Falling hardware costs
- Good project sites
- Access to transmission (low interconnection costs)
- Public support
- Etc.

- The best sites are developed first.
- Interconnection Process is more Taxed
- Therefore, sites are increasingly difficult, expensive and risky to develop over time.
- Most decarbonization scenarios show accelerating deployment over time.

(Based on interviews with utility-scale PV developers)

Constraint #2: Permitting - Siting Restrictions are Becoming Widespread





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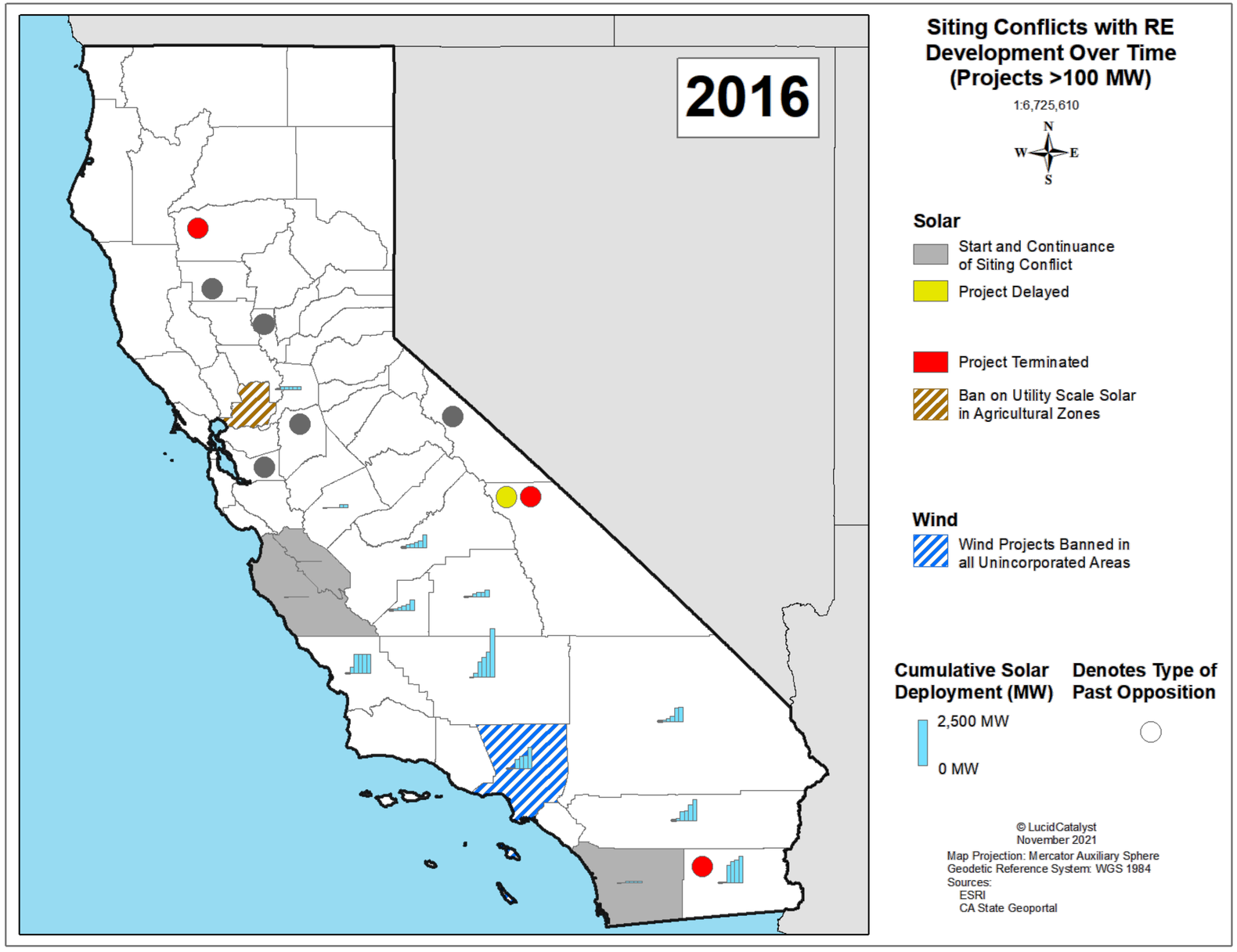

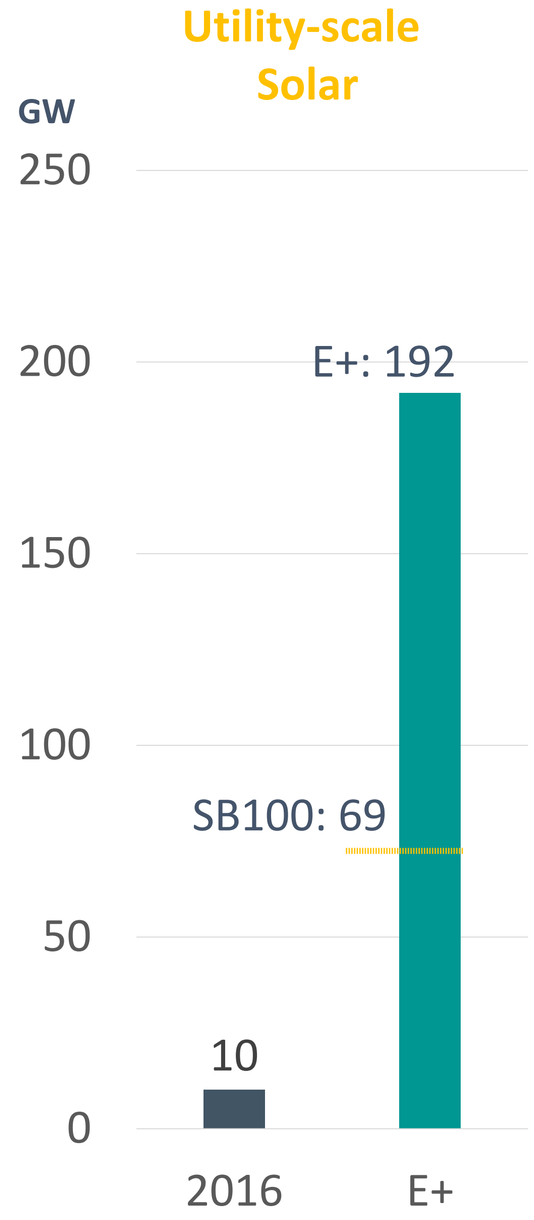

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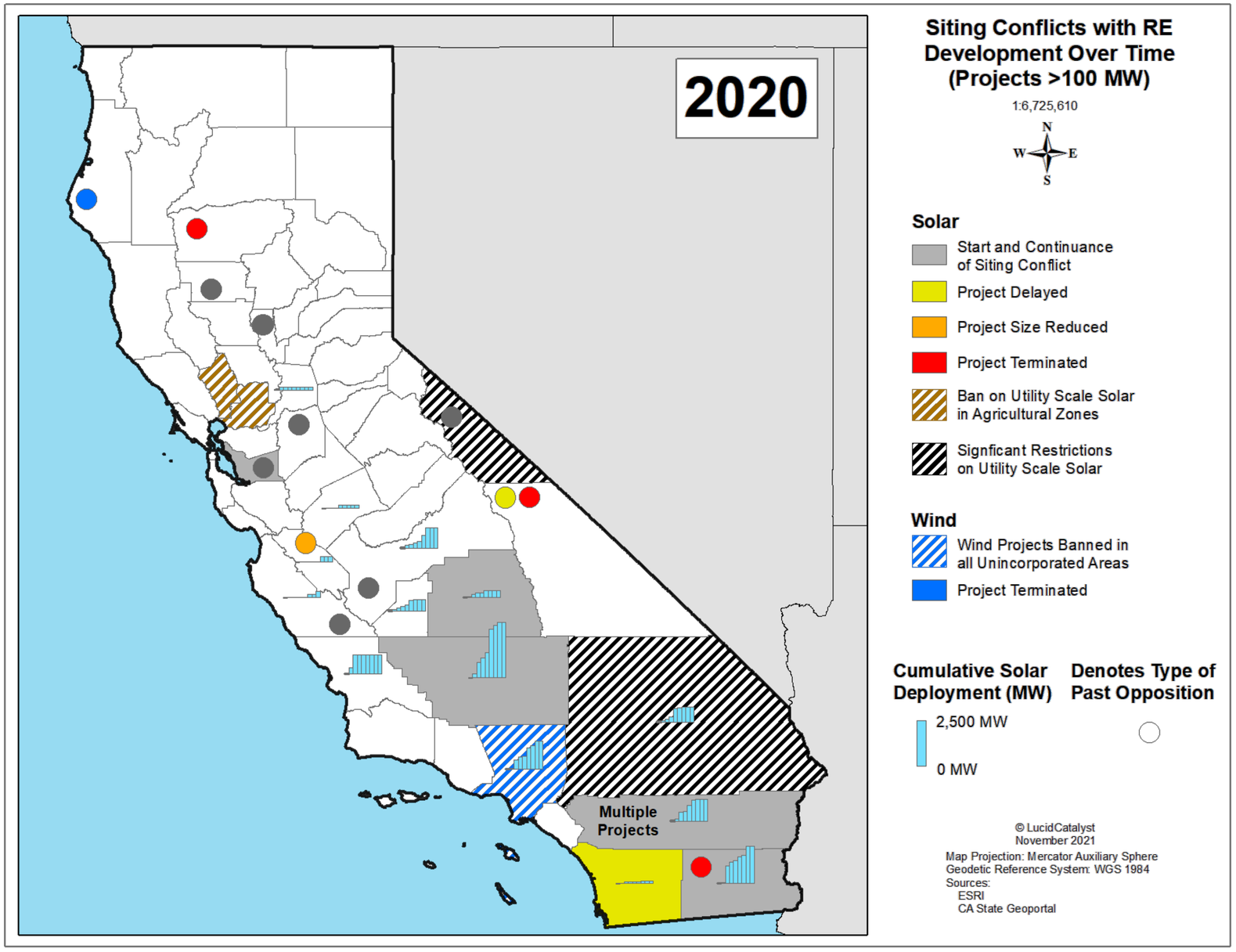
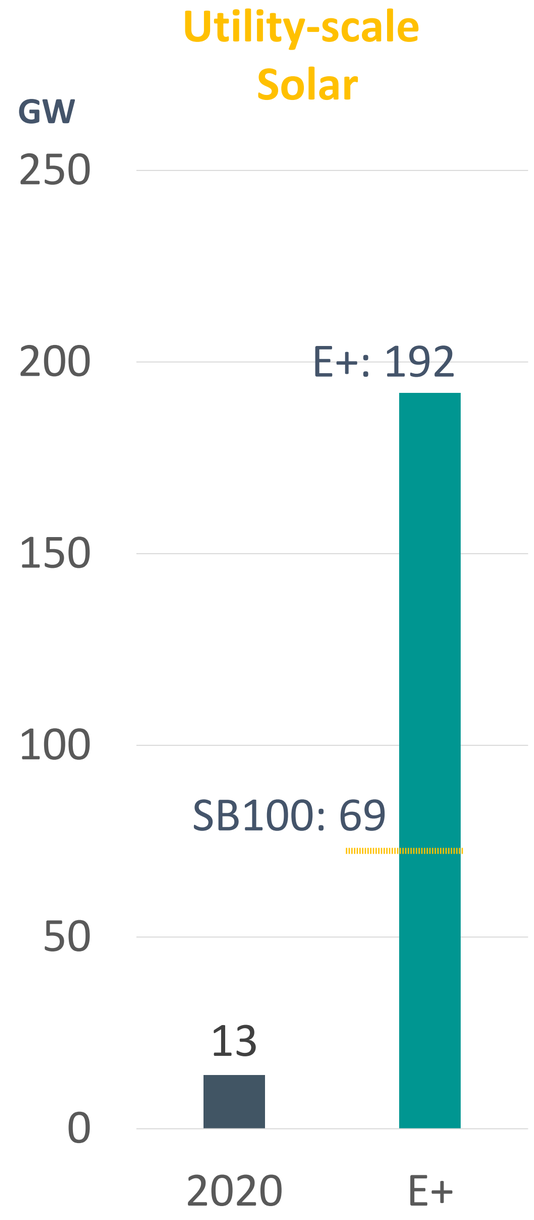
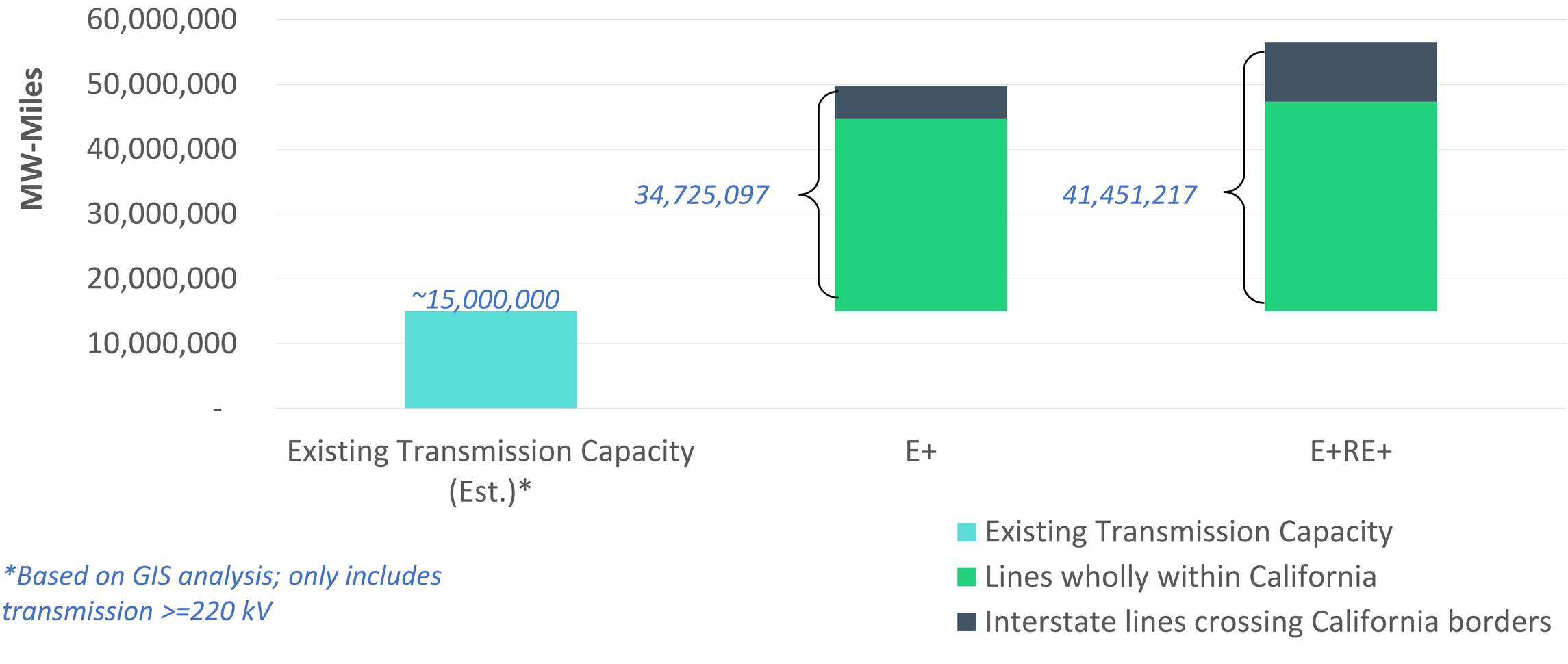




Constraint #3: Three-fold increase in CA transmission Capacity Needed



**Based on GIS analysis; only includes transmission >=220 kV*

***Assumes all MW-miles are on new 500 kV double circuit lines*

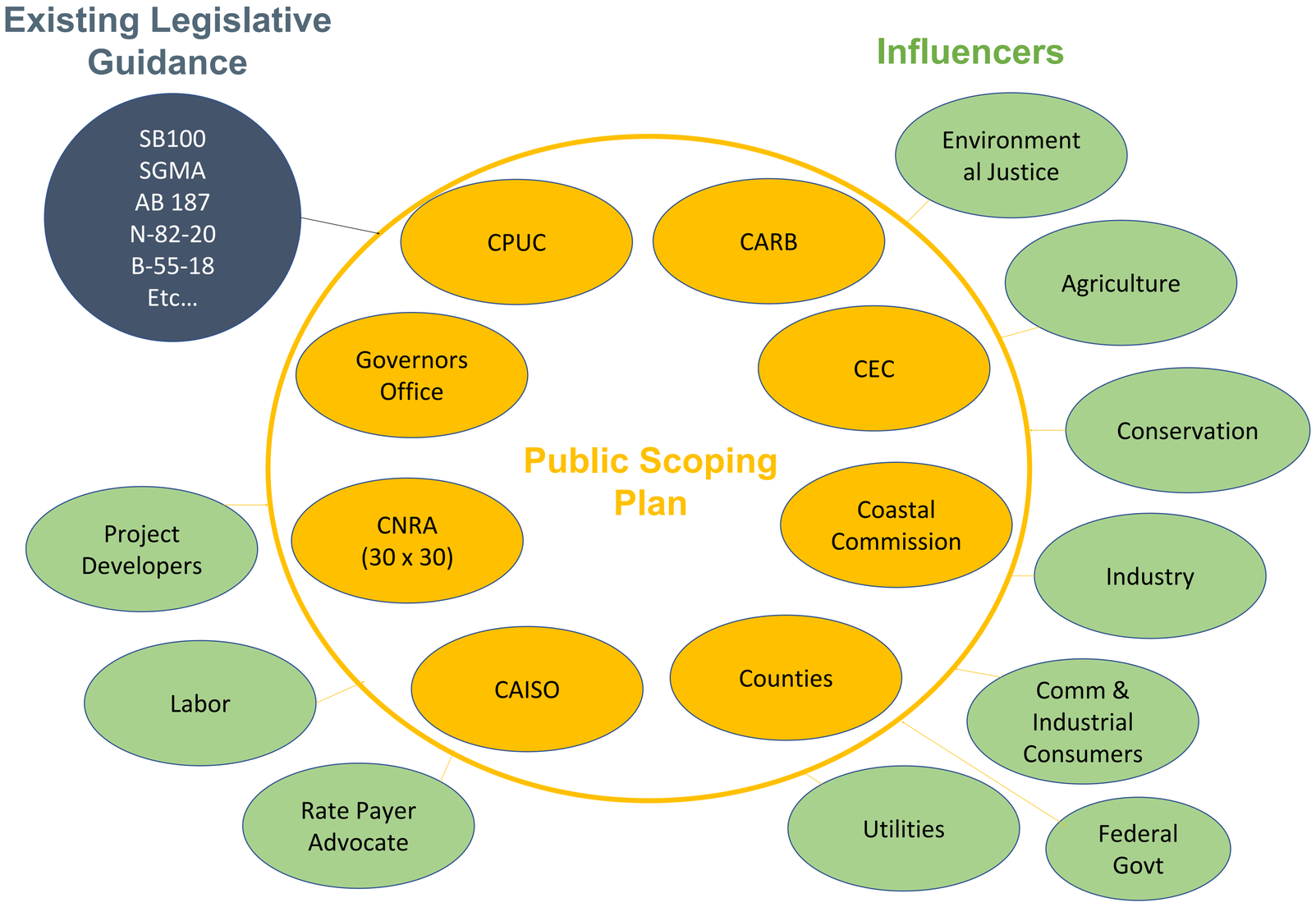
Our Dialogues Suggest We Need:

Public scoping plan is an opportunity to coordinate

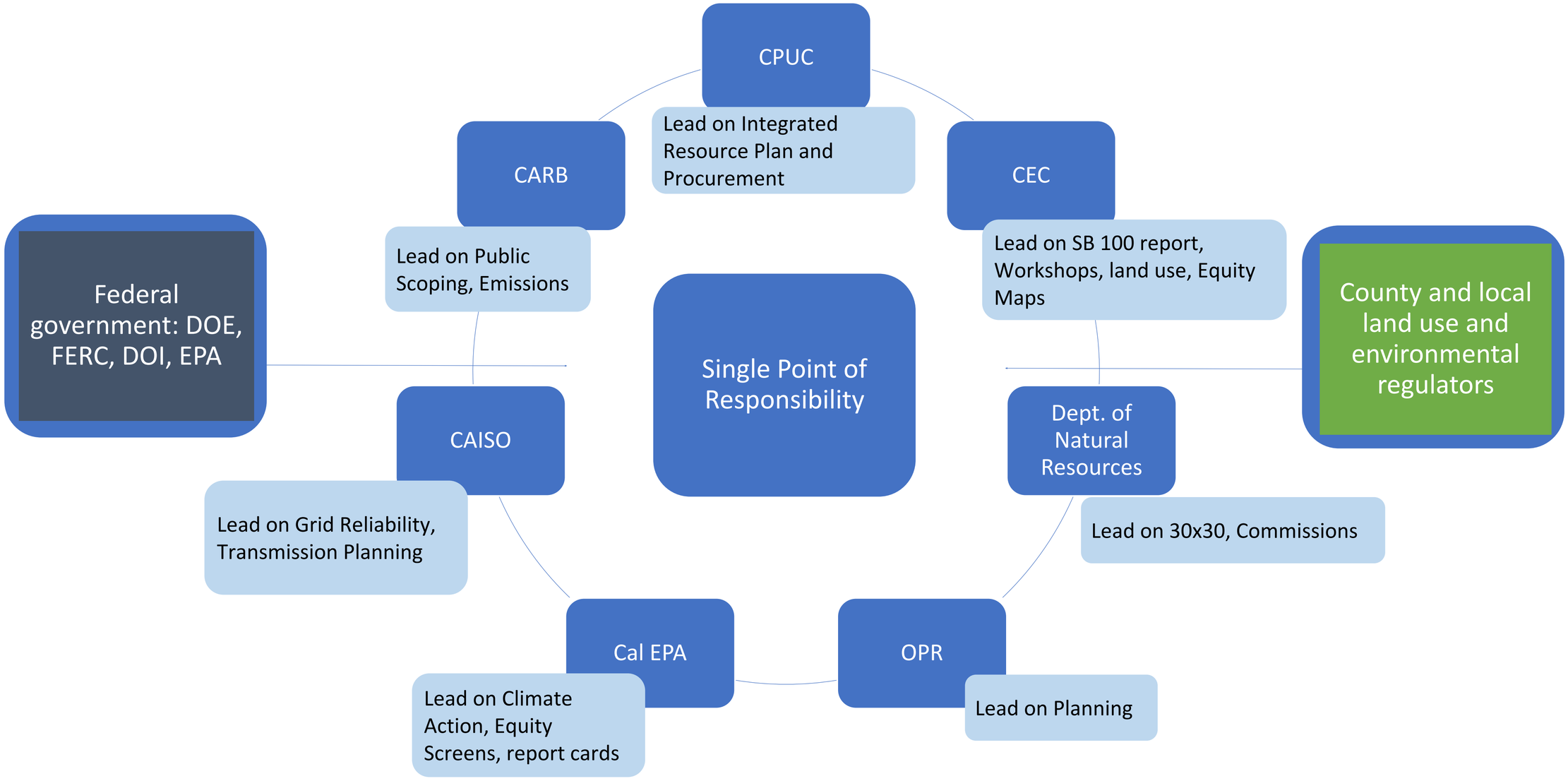
There is no individual, central organization responsible for the state's energy transition. Responsibility falls across several different organizations.

There are also several ways that outside organizations can influence the actions of "decision-makers".

Achieving SB 100 is currently dependent on the coordination among a substantial number of groups, some, of whom, do not always have aligned interests/ remits.



All Agencies Would Play Their Role but Someone Must Lead



Scoping Plan Success must Consider the Following

- Inclusion and Equity
- Available Land
- Permittable Land
- Time and Pace of Transmission Build Out Coordinated with Generation
- Inter-agency Executed Plan Removing Roadblocks

Thank you!

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