Problems with RDF treatment of rooftop/parking lot solar

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FINAL3

RDF uses the wrong transmission cost to assert that remote wind and solar is least-cost

source: Final RDF, Table 2.F (Transmission Upgrade Options and Costs), p. 63; and Table 7.1 (Electricity Generation), p. 267 ("CAISO estimates necessary transmission network upgrades for San Diego - Imperial - Baja - Arizona to be $3.9 billion . .")

The RDF identifies two transmission expansion projects needed to support decarbonization:

- $89 million - internal San Diego reconductoring primarily to support expanded energy storage in the local area
- $3.9 billion – transmission line(s) from Imperial County to enable up to ~2,000 MW of solar/wind imports

However, only the $89 million transmission cost is used in the RDF to calculate a minimal transmission cost adder for remote solar and wind imports.

Use of correct RDF transmission cost would add ~$0.13/kWh to remote solar and wind power

source: Final RDF, Table 2.F (Transmission Upgrade Options and Costs), p. 63; and Table 7.1 (Electricity Generation), p. 267 ("CAISO estimates necessary transmission network upgrades for San Diego - Imperial - Baja - Arizona to be $3.9 billion . .")

Capital cost: $3.9 billion ($3,694 MM/transmission + $200 MM/transformer)

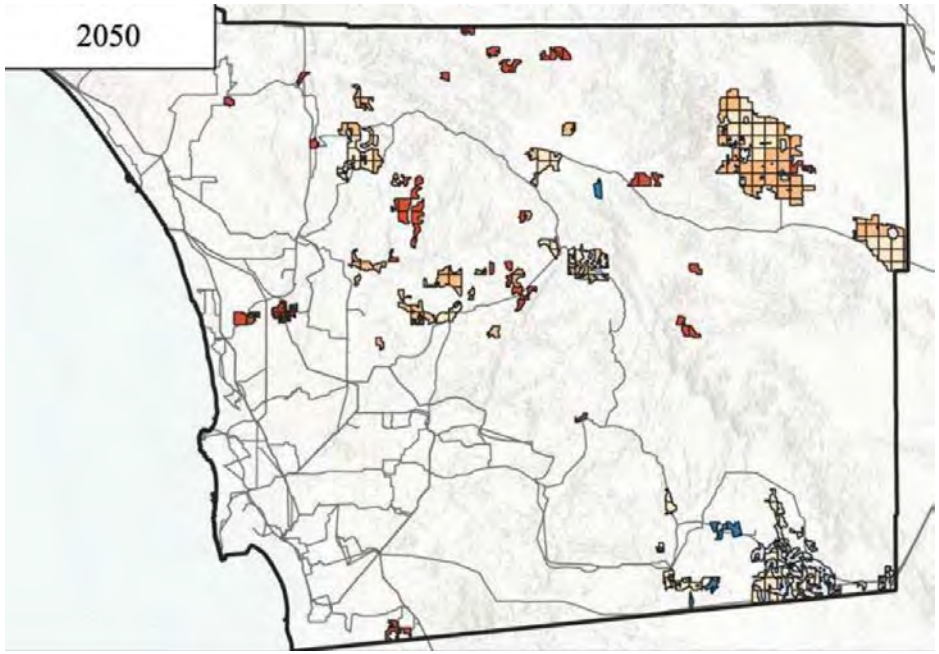
- Final annualized cost: $525 million/yr

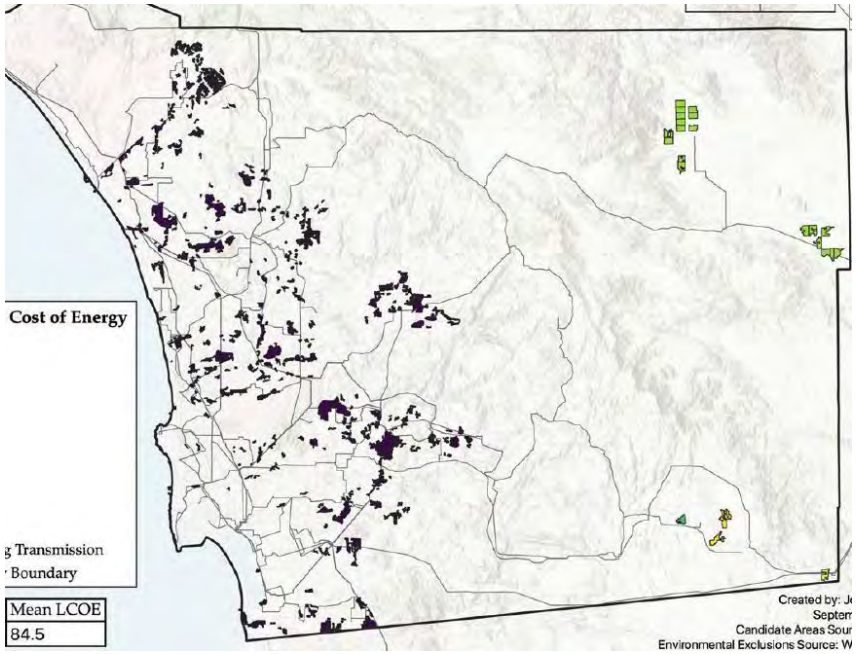
  (extrapolated from SPL data – see Attachment)

- Increase in renewable transmission capacity, 1,812 MW:
  - 500 kV Imperial-to-Serrano transmission line = 1,412 MW
  - Imperial Valley transformer bank = 400 MW
- Total renewables annual production, 1,812 MW capacity: 4,119,351 MWh/yr (extrapolated from SPL data – see Attachment)
- Cost premium of new transmission to support RDF: $0.127/kilowatt-hr ($127/megawatt-hr)

RDF: 1) lowest-cost solar & wind development & 2) avoiding lands with high conservation value

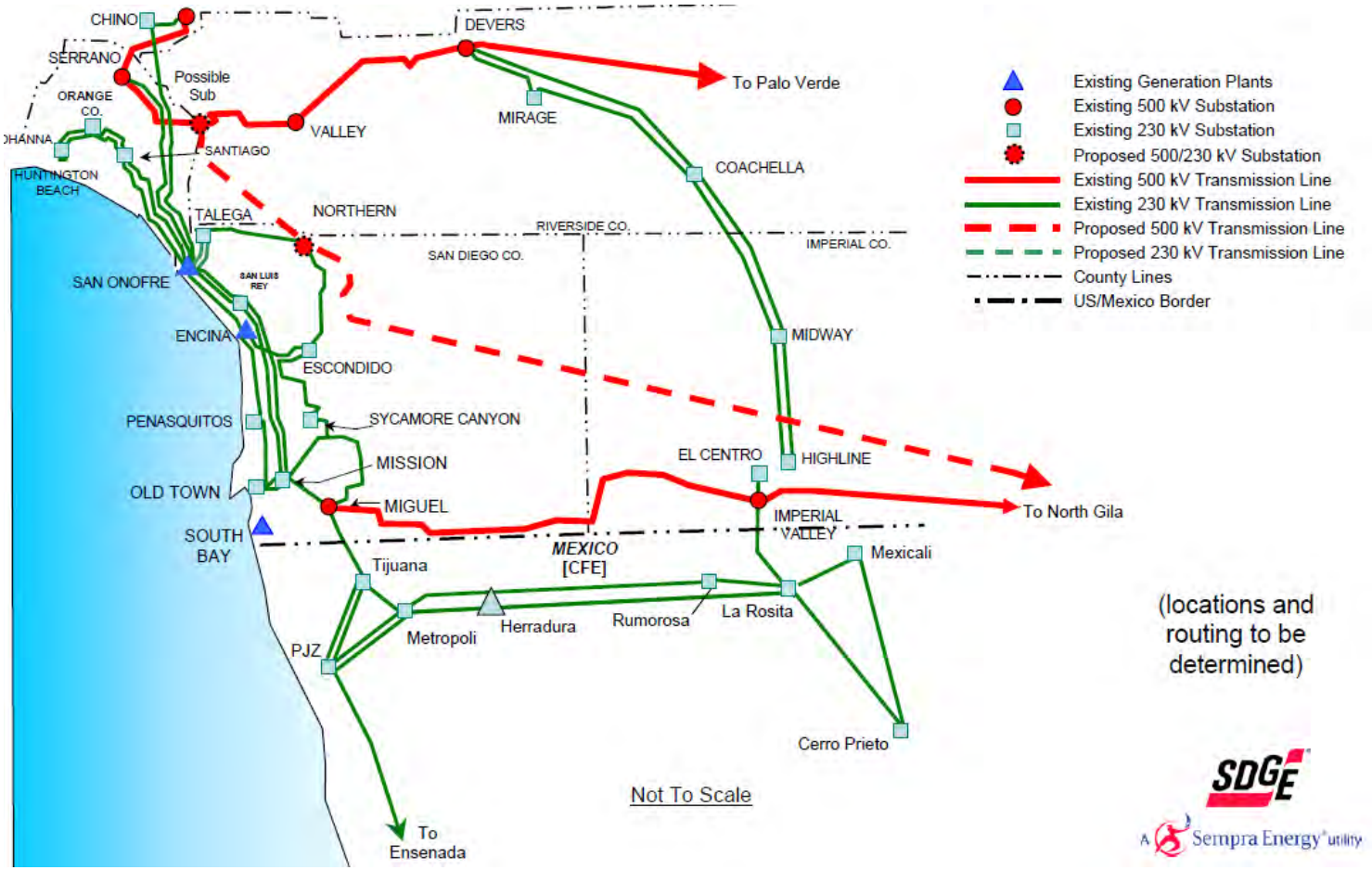
source: 1) RDF, p. 42 and p. 44.





The $3.9 billion transmission line (dashed line)

source: SDG&E, *SDG&E Transmission Comparison Study*, North Gila-Northern-Serrano/Valley 500 kV transmission line (map), December 8, 2004, p. 9.



Traditional model does not accommodate rooftop solar & batteries at customer site

- **Edison Electric Institute (EEI), IOU trade association**

  EEI on distributed solar, 2012/2013:[1] "*prospect of declining (1) retail sales and earnings; (2) financing of major investments in T&D [transmission and distribution] . . . potential obsolescence of existing business and regulatory models . . adverse impact to utility investors*."

- EEI is architect of the NEM solar cost shift attack strategy.
- CA's IOUs each give about $2 million/yr to EEI.[2]

1) Environment America, *Blocking the Sun - 12 Utilities and Fossil Fuel Interests That Are Undermining American Solar Power*, October 2015, p. 12: https://publicinterestnetwork.org/wp-content/uploads/2015/10/EA_BlockingtheSun_scrn_0.pdf.
2) Most recent IOU GO-77 executive compensation and contribution reports on dedicated CPUC webpage, accessed June 13, 2021: https://www.cpuc.ca.gov/General.aspx?id=6442454119. SDG&E 2019 GO-77, p. 38 and p. 56, SDG&E paid EEI $1.843 million in dues and contributions in 2019; PG&E 2018 GO-77, p. 118, PG&E paid EEI $2.263 million in dues and contributions in 2018; SCE 2018 GO-77, p. 92, SCE paid EEI $1.871 million in dues and contributions in 2018.

RDF identifies large rooftop solar potential but uses much smaller value for calculations

sources: 1) RDF, pp. 35-36 ["Using publicly available building footprint spatial data published by Microsoft, the GIS analysis of public and private rooftops in the San Diego region identified approximately 2.7 billion square feet (61,000 acres) of usable roof area."]; and Southern California Edison, California Public Utilities Commission A.08-03-015, Solar Photovoltaic (PV) Program Testimony, p. 32 ["Generally, a 1 MW array employing crystalline modules will require 125,000 square feet (2.87 acres) of roof space."].

The RDF gives two values for rooftop solar potential: 1) 61,000 acres, which translates into more than 20,000 MW, and 2) 3,360 MW, a small fraction of that. The high value is supported with documentation. The lower value is not.

Only the much lower value is used in the RDF to assert rooftop solar would at most be a minor contributor, 12 percent, to County decarbonization in 2050.

Off-the-shelf, online tools – like Google Project Sunroof – are also available to cross-check San Diego County rooftop potential

source: Google Project Sunroof ("San Diego County"): https://sunroof.withgoogle.com/data-explorer/

14,700 MW_{dc} = Google Project Sunroof estimate of San Diego County rooftop solar potential (parking lots excluded)

The Project Sunroof estimate is limited in the following ways:

- Sunlight - every included panel receives at least 75% of the maximum annual sun in the County.
- Installation size - every included roof has a total potential installation size of at least 2 kW.
- Space & obstacles - only areas of the roof with enough space to install 4 adjacent solar panels are included. Obstacles like chimneys are taken into account.

RDF uses high and obsolete commercial rooftop solar cost of $92/MWh – and fixes it for 30 years

source: RDF, p. 25, footnote 27, U.S. National Renewable Energy Laboratory (NREL). (2020). Index | Electricity | 2020 | ATB | NREL ("2020 ATB spreadsheet"): https://atb-archive.nrel.gov/electricity/2020/data.php.

- RDF relies on the respected National Renewable Energy Laboratory "Advanced Technology Baseline" (ATB) database for remote solar and wind cost, but ignores the commercial rooftop cost in the same ATB spreadsheet.

- RDF uses 2018 solar pricing for a 2022 report, even though the referenced ATB spreadsheet in the RDF includes both 2018 and 2022 solar cost forecasts.

- Solar pricing is declining steadily - the "gap" between the cost of remote solar and commercial rooftop solar is closing as well (see table in next slide).

$48/MWh is the 2022 cost of commercial rooftop solar, about one-half the value assumed in the RDF

source: RDF, p. 25, footnote 27, U.S. National Renewable Energy Laboratory (NREL). (2020). Index | Electricity | 2020 | ATB | NREL ("2020 ATB spreadsheet"): https://atb-archive.nrel.gov/electricity/2020/data.php.

"Advanced" = Highest annual energy production and lowest capital cost among "Advanced" "Moderate" "Conservative" options in the 2020 NREL ATB spreadsheet.

Year	Utility-scale solar, California desert (Daggett), "Advanced" ($/MWh)	Commercial rooftop solar, coastal SoCal (LA), "Advanced" ($/MWh)
2018	29	70
2022	21	48
2035	10	21
2050	8	15

RDF ignores role of customer-owned NEM solar in decarbonizing County – Part 1

source: 1) California Distributed Generation Statistics ("SDG&E"): https://www.californiadgstats.ca.gov/charts/; U.S. Energy Information Administration, utility-scale solar and wind power plants, 2021 Form EIA-860 Data - Schedule 3, 'Solar Technology Data', 2021 Form EIA-860 Data - Schedule 3, 'Wind Technology Data'.

- Customer-owned rooftop solar is a dramatic decarbonization success story in San Diego County. The County has the highest concentration of rooftop solar of any county in the state, more than 1,800 MW.
- In contrast, there is less than 300 MW of remote utility-scale solar and wind operating in the County.
- All commercial rooftop solar projects required to pay prevailing (union) wages starting January 2024.

RDF ignores role of customer-owned NEM solar in decarbonizing County – Part 2

source: California Distributed Generation Statistics ("SDG&E"): https://www.californiadgstats.ca.gov/charts/

- Customer-owned rooftop solar is now being added in the County at a continuous rate of about 200 MW to 250 MW per year. It supports thousands of workers. In contrast, remote utility-scale solar and wind projects often encounter opposition that slow or stop projects.
- On the ground, rooftop solar is the dominant clean energy resource in San Diego County. In the RDF, it exists only as something that is qualitatively desirable going forward, but not quantified.

Parking lot solar is ignored in the RDF clean energy strategy. Photo: San Diego County Office of Education parking lot solar

source: Google Earth, B. Powers overlays.

Parking lot solar is large resource in County

source: Clean Coalition, San Diego Solar Siting Survey, Task 2.2, Final Summary Report: Solar Photovoltaic (PV) Commercial-Scale Sites for 1,000 kWac and Larger, September 2019, p. 10. (". . . parking lots and parking structures represent approximately 75% of the potential found in this survey . . .")

- The 2019 Clean Coalition *San Diego Solar Siting Survey*, a reference cited in the RDF, states that 75 percent of the solar capacity identified by Clean Coalition for large (1 MW) sites is parking area capacity.
- Clean Coalition advocates in the *Solar Siting Survey* for large-scale development of solar on ground-level parking areas, yet San Diego County parking area solar potential is not considered in the RDF.

RDF does not address high potential for land use conflict by prioritizing remote solar and wind

sources: 1) RDF, Table 7.1, p. 267; and 2) LA Times, Doom isn't inevitable: My top 10 climate lessons from 2022, January 1, 2023: https://www.latimes.com/environment/newsletter/2022-12-29/doom-isnt-inevitable-my-top-10-climate-lessons-from-2022-boiling-point.

RDF, Electricity Generation, Areas of Uncertainty:

- Ability to upgrade the capacity of the transmission system to meet demands.
- Social acceptability of large utility-scale projects.

LA Times, Sammy Roth, January 1, 2023:

- I'm convinced it (renewable energy land use conflicts) will be one of the defining climate stories of the coming decades.

Hazards of ignoring land use impacts of remote utility-scale solar and wind: Valley Center jury verdict

source: SDUT, *Jury awards $6.55 million to Valley Center landowners impacted by solar panel project*, November 17, 2022: https://www.sandiegouniontribune.com/news/courts/story/2022-11-17/solar-panel-verdict-baywa-valley-center.

- Jury awarded $6.55 million in Nov 2022 to adjacent Valley Center landowners (basis: profits since startup) for flooding caused by a rural utility-scale solar farm.
- Project developer not insulated from legal action by County land use permit.
- Intense backcountry large-scale solar and wind development potentially sets stage for perpetual conflict with existing land uses/users.

ATTACHMENT – Calculating cost adder of new transmission, SDG&E Sunrise Powerlink case study

SDG&E 500 kV Sunrise Powerlink, $0.09/kWh cost adder for remote solar and wind delivery

source: California Public Utilities Commission Rulemaking R.20-08-020 (net-metering tariffs*), Rebuttal Testimony of Bill Powers, P.E.*, July 16, 2021, pp. 36-37, and Attachment 37 (SDG&E Sunrise Powerlink case study data inputs).

- Final capital cost: $1.883 billion
- Final annualized cost: $254 million/yr (over 40 years)
- Approved December 2008, voluntary SDG&E commitment to add 1,000 MW of solar
- Current interconnected renewables : 999 MW solar, CF = 0.27
  265 MW wind, CF = 0.22
- Total renewables annual production: 2,873,543 MWh/yr
- Cost premium of SPL transmission line: $0.09/kWh

CF = capacity factor, wind CF = Ocotillo Express wind farm