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COMMENTS OF LOCAL GOVERNMENT SUSTAINABLE ENERGY COALITION ON CAL ADVOCATES' DISTRIBUTION GRID ELECTRIFICATION MODEL STUDY AND REPORT

STEVEN MOSS
/s/ Steven Moss
Partner, M.Cubed
296 Liberty Street
San Francisco, California 94114
415.643.9578; steven@moss.net

Regulatory Consultant for LOCAL GOVERNMENT SUSTAINABLE ENERGY COALTION

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INTRODUCTION

Pursuant to the October 17, 2023, ruling granting the motion of the Public Advocates Office at the California Public Utilities Commission (Cal Advocates) to admit its Distribution Grid Electrification Model (DGEM) Study and Report (DGEM Study and Report) into the Rulemaking 21-06-017 record; and requests by Pacific Gas and Electric Company (PG&E) and Southern California Edison Company (SCE) to allow parties to comment on the Report, the Local Government Sustainable Energy Coalition (LGSEC) offers the following observations and proposals on how to further hone analytical approaches in ways that identify the best pathways to achieve cost-effective, affordable, transportation and building electrification.

The purpose of Cal Advocates' work is to advance discussions of and possible productive avenues towards effectively preparing the grid for increased transportation and building electrification in the service of reducing carbon emissions, including by providing an opportunity for parties to identify analytical omissions that merit additional attention. LGSEC appreciates the effort. Particularly noteworthy is Cal Advocates' clever use of Department of Motor Vehicle registration data to try to tease out potential location-specific implications of electric vehicle (EV) adoption patterns.

Along with the previously published Electrification Impacts Study Part 1 (EIS), authored by Kevala, the DGEM Study and Report helps illuminate the state of knowledge related to potential grid implications from electrification, how to avoid or minimize adverse ones, while highlighting, intentionally or not, what is presently largely missing from extant analyses and regulatory discussions.

Electrification Will be Expensive

Cal Advocate's mid-range estimate indicates that "electrification will cost $26 billion in required upgrades to the utilities' distribution grids through 2035." This is a large number. It would be akin to diverting every single American's annual Valentine Day's purchases – clever cards, chocolate hearts, flowers, jewelry and other items – to just three investor-owned utilities (IOU) in a single, albeit large, state.[1] As Cal Advocates acknowledges this number has "significant uncertainty,"[2] with a high estimation range that exceeds Kevala calculation that "…up to $50 billion in traditional electricity distribution grid infrastructure investments by 2035" will be needed to accommodate California's decarbonization plans.[3,4]

According to the U.S. Energy Information Agency, California retail electricity sales in 2021 were $48 billion, roughly equal to the upward bound forecasted investment stated in the Kevala Study, though less than Cal Advocates' high estimate. Based on Cal Advocate's mid-

[1] https://www.cnbc.com/2023/01/29/americans-plan-to-spend-nearly-26-billion-this-valentines-day.html
[2] ES-4.
[3] Electrification Impacts Study Part 1: Bottom-Up Load Forecasting and System-Level Electrification Impacts Cost Estimates, Kevala, May 9, 2023, page 17.
[4] Overall spending on the utility sector could be much higher. To meet California's climate goals, "…Southern California Edison would need to invest heavily in wind and solar energy while erecting transmission lines and towers four times as fast it does now and building smaller distribution lines 10 times as fast. And it would need to keep the pace going for 20 years – at a cost more than $370 billion." "California's Governor is Rushing to Export His Bold Climate Goals," *The New York Times*, October 24, 2023. These data are largely from SCE's *Pathway 2045*.

range calculation, the expected grid investment required is equal to half the size of the state's entire agricultural sector,[5] which consists of more than 77,000 farms.[6] The timing and level of investment and dependency on less than a handful of for-profit businesses, one of which has been subject to repeated criminal charges associated with the deaths of multiple Californians, another of which charges amongst the highest prices in the nation for its services, would be unprecedented.[7]

LGSEC's bottom line response to this information is: let's not. Whether the number is $26 billion or $50 billion, unnecessary investments, as well as further concentration of monopoly power in pursuit of the greater good of electrification, should be avoided to the greatest extent possible. At least one way to do this, such as encouraging off-peak energy uses, is emphasized in Cal Advocates' report. Many others are missing from the analysis and should be included in future modeling and discussions to determine how they may shape a better future.

Electrification May, or May Not, Contribute to Higher Rates

According to Cal Advocates,

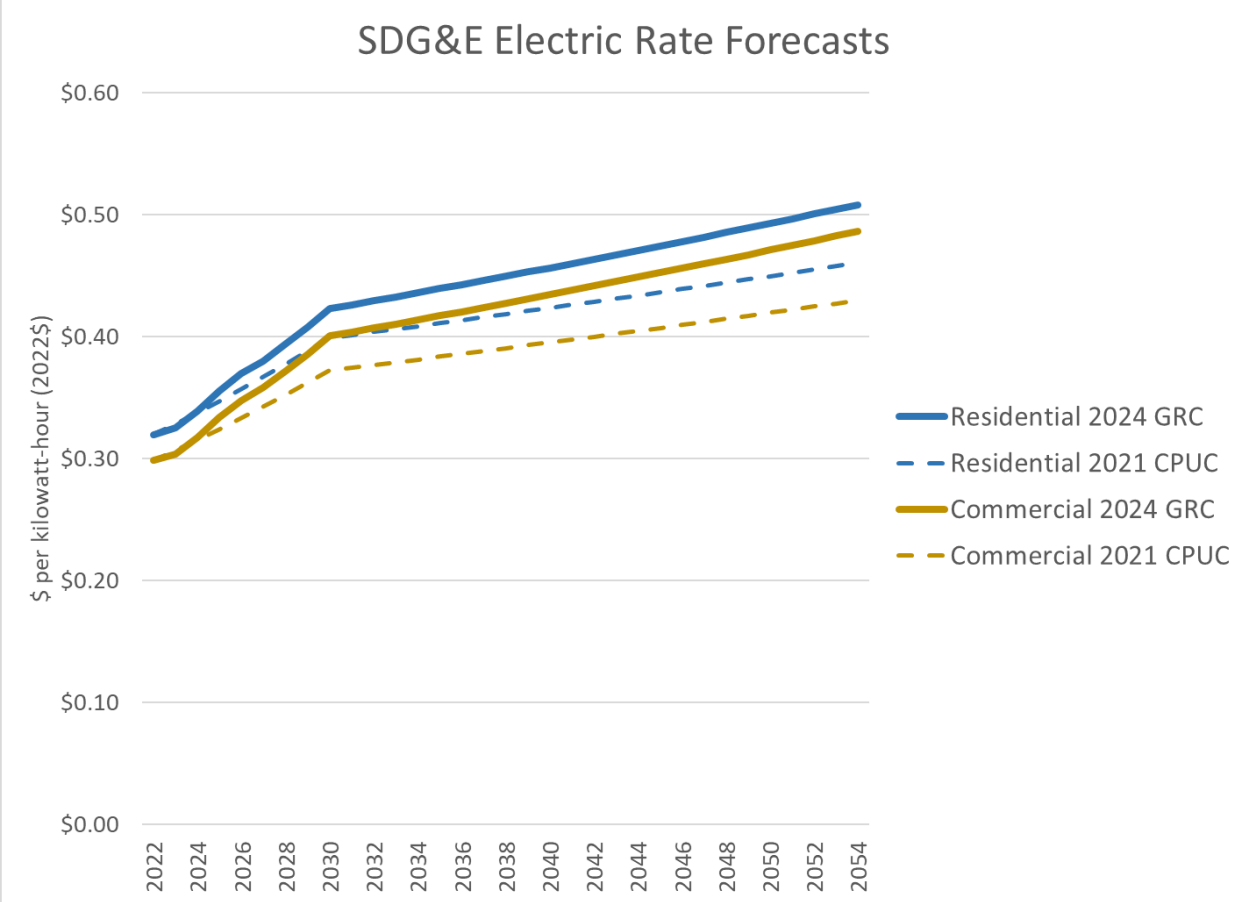
> …electrification could put downward pressure on electric rates by increasing electricity sales… However, this scenario is contingent upon myriad factors, including planning and forecasting to avoid overbuilding grid infrastructure and whether ratepayers pay for costs beyond their traditional responsibilities.[8]

This preliminary, uncertain, finding is good news in that it suggests that grid investment associated with electrification may not be akin to a dog eating its tail in terms of escalating rates.

[5] https://www.cdfa.ca.gov/Statistics/
[6] https://calexpostatefair.com/wp-content/uploads/2021/01/CA-Farms-Ranches.pdf
[7] Bot Cal Advocates and Kevala's estimates are only as good as the underlying data upon which they rely. However, for planning purposes they need not be perfect to provide the Commission and parties a glimpse into the magnitude of investment needed to accommodate electrification, and chart preferred pathways. See for example, INTERSTATE RENEWABLE ENERGY COUNCIL, INC.'S RESPONSE TO ADMINISTRATIVE LAW JUDGE'S RULING DIRECTING RESPONSES TO QUESTIONS ON TRACK 1 PHASE 1, May 22, 2023.
[8] ES-1.

However, potential "downward" price pressures are calculated to be a couple of cents at best for PG&E and SCE, with up to a seven cents savings for San Diego Gas and Electric Company (SDG&E).

In contrast, depending on the outcome of its General Rate Case (GRC) and Energy Resource Recovery Account (ERRA) proceedings, PG&E's rates could increase by as much as almost one-third between 2022 and 2026.[9] Meanwhile, SDG&E, which already imposes the highest rates in the state, as well as amongst the highest in the nation, could see its average price rise above 40 cents per kilowatt-hour before the end of the decade.



[9] Based on the Administrative Law Judge's Proposed Decision in GRC along with the 2023 ERRA.

This context suggests important insights. First, PG&E's rates are on an increasingly unaffordable trajectory, which, under Cal Advocates mid-range scenario, will not be much disrupted by electrification. Higher rates will work against EV adoption and building electrification, diminishing sales from those sources, with associated risks of distribution system over building. A caution ahead sign is brightly blinking. If the Commission cannot get a handle on rate inflation it will deeply undermine electrification, as well as impose hardship on those who cannot afford ever rising utility bills.

Second, it would be significant if SDG&E can achieve upwards of a seven cents rate reduction through proper distribution investment and associated increases in electricity demand from EVs and buildings. Given the IOU's past proclivities, LGSEC is not optimistic that this is a realistic scenario. However, it merits further careful scrutiny, in concert with San Diego's Climate Action Plan (CAP) and other relevant LG actions, to determine if, and how, it can be achieved.

Likewise, grid demand will be significantly determined by how adopters choose to energize structures and vehicles – through sole-, partial-, or no-reliance on the network – which will in turn be strongly swayed by their expectations about grid affordability and reliability. This looped phenomenon may merit contingent valuation-type surveys to further probe, as well as a deeper understanding of the dynamic nature of investment risks.

Analyses of Additional Tactics Needed to Ensure Affordability

Local Governments Must be a Part of Planning and Forecasting Processes

Cal Advocates notes that "Good forecasting and planning are key parts of achieving this downward pressure on rates. Utility forecasts must be accurate and not lead to overbuilding of infrastructure."[10] Similarly, it points out that,

> If planners do not properly forecast where and when load growth, especially from EVs, will appear on the grid, electric investor-owned utilities (IOUs) could build billions of dollars of under-utilized assets, or be unable to satisfy increasing energy demand.**36** Studies using the most up-to-date methods and data are integral to effectively planning for load growth and informing future grid investments.[11]

LGSEC agrees. However, it could find nary a word in the DGEM Study and Report about the need to sync local government climate and land use planning, ordinances, and investments with IOU forecasts.

As indicated in the DGEM Study and Report, transportation, and to a lesser extent, building electrification will undoubtably drive increases in electricity demand over the next two decades. However, while state, and increasingly local, policies demand that these sectors electrify, the speed at which they do so will be substantially influenced by local government ordinances, such as reach codes, and the market as influenced by local land use policies (e.g., construction activity; electric vehicle sales).

Local governments have a unique role in determining the speed in which distributed energy resources (DER), transportation electrification (TE), and building decarbonization will be adopted, frequently serving as the "tip of spear" in advocating for, planning, legislating, permitting and implementing actions that directly or indirectly lead to greater DER and TE deployment, including through adoption of CAPs. This is particularly the case because of LGs' lead role in ensuring community resiliency and managing land use.

[10] ES-5.
[11] Page 5.

For example, local governments are critical players in fielding EV charging facilities, and frequently adopt largescale photovoltaic arrays – and increasingly, storage and microgrids – as part of municipal projects. While Cal Advocates notes that all state and local government vehicle fleet purchases must be zero-emission by 2027,[12] is does not go the next step to investigate the level to which this requirement will trigger LGs and the state to invest in alternative electricity supply strategies, which they are already doing.

Also missing is the rising tide of state and federal funding available for a host of household, business, and public sector climate-related investments, and its potential grid implications**.** Investment of a substantial portion of these monies will be significantly influenced by LG actions. At the federal level, the Inflation Reduction Act (IRA) of 2022 will direct between $390 billion and $1 trillion to clean energy assets primarily through tax credits and grants. The IRA's tax credit provisions, and most grant funding, will expire or start to phase out in 2033, neatly syncing with California's climate goals, and grid impact studies' time horizon. Billions of additional dollars are available through the Infrastructure Investment and Jobs Act (IIJA), commonly referred to as the Bipartisan Infrastructure Law (BIL) of 2021. And the Fiscal Year 2022-2023 State of California Budget allocated $39 billion over five years toward climate resilience and integrated climate, equity, and economic opportunities.[13]

A scenario that models electrification adoption patterns based on local or regional government policies, in which TE and building electrification occurs first, for example, in places where local governments or air quality management districts have adopted ordinances or regulations to require it, is merited. This analysis would provide the ancillary benefit of

[12] Page 4.

[13] However, the FY 2023-24 budget scaled back state spending by $2.9 billion. (See "2023–24 California State Budget Finalized—At Least for Now," *JD Supra*, https://www.jdsupra.com/legalnews/2023-24-california-state-budget-1576852/, July 5, 2023.)

identifying the time and place where natural gas resources might be stranded, or become uneconomic, enabling policymakers to plan how to economically withdraw from that system.[14] A similar approach could be taken based on reliability challenges in hard-pressed communities, as signaled by wildfire investments or interest in microgrids.

It is also plausible that in the face of escalating investments and electricity rates policy makers, including local governments, will reconsider the viability of an assumed high energy intensity future, pivoting to encouraging electric pathways that are low weight, nimble and appropriate to urban communities, such as electric bicycles, two- to four-seater electric motorcycles, and safer transportation circulation. Cal Advocates' EV analysis in San Francisco, discussed later, implies that just such a strategy could be the preferred route for that jurisdiction.

DERs Could Relieve Costly Distribution Demand

Cal Advocates notes in passing that "deployment of customer-sited solar photovoltaics (PV) will also impact load,"[15] and further states that,

> The number of upgrades and associated costs identified in the DGEM do not include non-wires mitigations. Non-wires mitigations include programmatic mitigations, such as changes to current time-of-use (TOU) rates that might obviate the need for upgrades entirely, and infrastructure such as DERs that may be able to provide mitigations at a lower cost than wires solutions. The inclusion of these types of mitigations may substantially reduce the cost of grid upgrades compared to what our model predicts.[16]

[14] The potential for rapid emergence of stranded gas infrastructure is an additional risk to the grid, in that the resulting costs could be incorporated into gas rates, encouraging energy users to completely severe themselves from the utility system.
[15] Page 3.
[16] Page 18. See also page 16, "We did not assess non-wires mitigations, which include changes to TOU rates that might obviate the need for upgrades, infrastructure such as DERs that may provide mitigations at a lower cost, and load transfers between feeders or substations."

This omission should be addressed in future modeling and analyses. The energy sector is undergoing an unprecedented transition, principally driven by policies directed to reducing carbon emissions and an associated movement to "electrify everything." Centralized fossil-based power systems are being retired, customer and community adoption of DERs is increasing, and variable renewable energy deployments have blurred the line between traditional 'supply' and 'demand' side planning. That is, power is being generated on what has historically been considered the demand side, a flexible flow that is not adequately acknowledged in the DGEM mode; customer DERs and Cal Advocates' DER definition are excluded from the analysis and findings.

Customer resources beyond peak pricing can put downward pressure on distribution capital investment needed. For example, absent from Cal Advocates' narrative are virtual power plants[17], the pairing of solar and storage, and grid-forming invertors. Similarly orphaned is the movement towards low energy buildings and passive house strategies that significantly improve energy affordability, thermal comfort, survivability in extreme events, and the habitability of occupied structures.[18] Electrification modeling should reflect pragmatic and off the shelf strategies to curb increased load by leveraging the multitude of ratepayer, state, and federal incentives for low energy, electrified, and integrated demand-side management-enabled buildings, many of which are embodied in municipally adopted CAPs.

LGSEC recommends Cal Advocates re-run the model with these elements included, as well as scenarios for a modernized grid that holistically integrates BTM-DERs. The preferred grid architecture of the future should accommodate a highly flexible power system that leverages

[17] https://www.brattle.com/insights-events/publications/real-reliability-the-value-of-virtual-power/

[18] An example of success in this respect is how California implemented Assembly Bill 1881, expeditiously reducing water consumption, in the face of the state's water crisis.

customer and authorized capital investment, allows local and bulk resources to be dispatched, and will effectively decarbonize California's robust economy.

Build it When and Where it is Needed Most

A demand approach that models electrification adoption patterns in places where they can be accommodated with the least grid impact should be considered. In this scenario, building and transportation electrification would be represented as occurring in locations that require the smallest amount of additional investment, cascading to higher distribution impact geographies in phases.

Consider BUGs

Energy users with means have exhibited a significant willingness to make expenditures to ensure that they have reliable power in the face of real or perceived risks associated with grid reliance, as well as part of household electrification efforts. In the commercial sector, in response to reliability concerns, a "shadow grid" of backup generators (BUGs) has emerged in the state. In 2022 the Bay Area (BAAQMD), South Coast (SCAQMD) air quality management districts, as well as the San Diego County Air Pollution Control District, were collectively home to 29,217 back-up generators, with a generating capacity of more than 14.2 gigawatts (GW), which emitted an estimated 174,000+ metric tons of carbon dioxide (MTCO2) annually. Almost 90 percent of the generators are diesel fueled.

The BUG population jumped 26 percent in BAAQMD and SCAQMD from 2020 to 2021, with a nine percent increase between 2021 and 2022. In 2021, the two districts were home to

23,507 BUGs, which had a generating capacity of 12.2 gigawatts. In 2020 there were 18,600 BUGs with 6.5 GW of capacity.[19]

These numbers exclude the tens of thousands of smaller gasoline, propane, and diesel-powered generators located in backyards and garages. Colloquial and sales data suggest significant expansion of this population as well.

The existing BUG fleet, if translated into clean resources – at least as green as the grid – could accommodate much of the early-year demand growth predicted by Cal Advocates and Kevala. That is, setting aside the fuel source, *conceptually* the state presently has sufficient power capacity to adjust to the preferred pace of electrification over the medium-term. It is only a matter of time, and encouraging public policies, before energy entrepreneurs act upon this multi-billion-dollar opportunity to create true grid alternatives.

BUGs' existence and growth provides both a cautionary tale – energy users can and will act outside policymakers' climate aspirations in ways that undermine goals – and insights into a potential divergence between electrification and grid demand. With the fast emergence of new DERs, including batteries contained in cars and trucks, and experience financing and deploying third-party energy assets, it is more than plausible that the footprint represented by the BUG fleet will be replicated and more, reflecting widespread detachment from the grid associated with electrification. Said differently, the only thing stopping BUG owners from relying on an asset that they have largely already paid for instead of the grid is the equipment's fossil fuel footprint. Once this issue is solved, with economical options to replace or retrofit diesel engines with low- or no-emission power, non-wire alternatives will explode.

[19] *Back-up Generator Populations in Bay Area, South Coast Continue to Grow; San Diego Home to a Significant Number of Generators, Mostly Diesel-Power*, M.Cubed, December 2022.

Medium- and Heavy-Duty Vehicles Should be Examined Carefully

As Cal Advocates indicates, medium- (MD) and heavy-duty vehicles have "…virtually no trends from which to extrapolate.[20] However, indications are that this sector may be resistant to electrification, and in any case require special regulatory attention.[21] Shippers and carriers could respond to California's mandates by shifting operations to border states that do not have the same requirements. They could also lean into the transition, by investing in largescale solar plus storage facilities or microgrids, with associated consequences to the grid.

Given the importance of this sector – to carbon and polluting air emissions, environmental equity, and energy and land use – its potential grid implications merits close and separate analysis. This should be done in concert with LGs, which have a keen interest in the land use and equity consequences of fueling facilities.

Barriers Need to be Realistically Reflected

Cal Advocates' EV analysis of the City and County of San Francisco provides an exemplar of the usefulness of modeling to identify a problem, as well as the essential need to engage with the relevant LG to further understand and ultimately solve it.

According to Cal Advocates,

> In urban areas like San Francisco, our propensity regression model for personal vehicles predicts a high concentration of EVs in 2035…Across the county (which has the same border as the city), 80-100 percent of vehicles are expected to be electric by 2035.[22]

[20] Page 13.

[21] *Barriers, Perceptions and Potential Solutions to Shipper Adoption of Zero-Emission Transportation,* Prepared by M.Cubed and Supply Chain Ecology for the Environmental Defense Fund, July 2022

[22] Page 21.

San Francisco is leading the TE way, with one-third of all vehicles in the City and County (CCSF) electric.[23] However, reaching the next third, let alone two-thirds, in a dozen years is likely to be quite challenging. First, early adopters probably have direct access to charging facilities, mostly those living in single-family homes or with dedicated parking garages. Seventy percent of residential buildings in CCSF consist of two units or more, many of which have no or limited garage space. The City and County has just begun to address the need for the widespread electric charging required by vehicles that do not have access to dedicated plugs.

Second, more than half of the county's residents are low, 18 percent, or very low income, 36 percent.[24] Many of these inhabitants do not own vehicles – on average, 65 percent of households have access to an automobile[25] – but those who do are unlikely to be quick EV adopters, relying on older vehicles for extended time periods. Third, the *average* age of a vehicle is 12 years.[26] While vehicle turnover rates appear to have accelerated in San Francisco, perhaps due to higher climate consciousness, a concentration of wealth, or state and federal subsidies, replacing the city's entire fleet within that period seems fantastical. It would also release large numbers of non-EVs to be purchased elsewhere.

Cal Advocates points out that San Francisco is amongst the most expensive jurisdictions to increase grid capacity to accommodate TE. Combined with the barriers outlined above, this costly investment may be better avoided by favoring a lower energy intensity future, encouraging electric pathways that are low weight and nimble, such as electric bicycles, two- to four-seater

[23] https://www.spglobal.com/mobility/en/research-analysis/firstever-major-us-metro-area-hits-50-electrified-vehicle-regi.html#:~:text=Note%20that%20%22electrified%22%20includes%20battery,15.8%25%20was%20more%20than%206

[24] https://bayareaequityatlas.org/distribution-of-incomes#:~:text=Compared%20to%20the%20other%20Bay,low%20income%20(36%20percent).

[25] https://www.sfmta.com/sites/default/files/reports-and-documents/2021/02/survey_findings_demographics.pdf

[26] https://www.caranddriver.com/news/a33457915/average-age-vehicles-on-road-12-years/

electric motorcycles, and safer transportation circulation. This type of policy response, in turn, would influence future electricity demand, a circular feedback loop driven by policy and economics that will occur everywhere, creating the need for more dynamic and flexible analytical and regulatory engagement.

Cal Advocates' San Francisco analysis serves to underline one of the primary purposes of these types of modeling exercises: to identify potential rough edges that will make it particularly expensive or challenging to solely rely on the grid to electrify transportation or buildings at a specific time or place. The solution should not be to simply note that it will be expensive but could pay for itself through increased sales.

Isolated on its own, the investment level need for San Francisco to fully electrify its present vehicle fleet through a principally grid approach almost certainly would not meet benefit-cost thresholds. If solely visited on San Francisco ratepayers it would likely further exacerbate affordability issues, made worse by increasing weather extremes in a historically mild climate city in which households are increasingly installing air conditioning. Instead, this initial finding should be used to examine alternative pathways, including associated with BTM, DERs, and a lower-energy transportation future. Conducting such essential studies requires close collaboration with the associated LG.

Conclusion

LGSEC appreciates Cal Advocates' contribution to the growing body of information related to the potential cost-consequences of building and transportation electrification. We recommend that the Commission seize on these advancements to further explore critical issues uncovered by Cal Advocates' analysis, through further modeling and examination, the resulting

insights from which should be reflected in polices associated with distribution investments and DER deployment. Topics that merit additional work include,

- Examination of a high DER future in which DER deployment is directed in ways that reduce the need for grid investments.
- Incorporation of local government climate and land use planning, ordinances, and investments with electrification analyses and IOU forecasts, as well as potential flows of state and federal climate-related funding.
- A modeling scenario that reflects electrification adoption patterns based on local or regional government policies, in which TE and building electrification occurs first, for example, in places where local governments or air quality management districts have adopted ordinances or regulations to require it.
- Inclusion of how affordability and rates might dynamically impact electrification's timing and location, including possible implications to DERs, in future modeling and forecasting analyses.
- An analysis of how clean BUGs could be deployed in ways that reduce grid investment.
- An examination of potential affordability consequences of electrification in SDG&E's service territory, including consideration of San Diego's CAP and other relevant LG actions; as well as alternative pathways in the City and County of San Francisco that could lower the need for grid investments.
- An in-depth study of potential medium- and heavy-duty vehicle electrification pathways, linked to land use and equity considerations.

Respectfully submitted,

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STEVEN MOSS
/s/ Steven Moss
Partner, M.Cubed
296 Liberty Street
San Francisco, California 94114
415.643.9578; steven@moss.net

Regulatory Consultant for LOCAL GOVERNMENT
SUSTAINABLE ENERGY COALITION