COMMUNITY ENERGY ACTION NETWORK

RESPONSE TO CITY OF SAN DIEGO REQUEST FOR INFORMATION

RFI No. 10079755-17-A

"Solutions to Support the City of San Diego's Goal of 100% Renewable Energy"

D. RESPONSES TO RFI QUESTIONS

D.1. Detailed description of the concept.

It is proposed that the City of San Diego implement an aggressive deployment of community-based micro grids comprised of roof-top solar installations combined with energy storage including but not necessarily limited to battery storage and provision for electric vehicle charging and discharging in conjunction with necessary upgrades to ensure stable and reliable integration with local distribution and sub-station facilities and operated through demand response protocols and priorities established by the City and other regulatory agencies.

The community microgrids would be operated in cooperation with the entity franchised to use City right of way for electrical transmission or a municipal public utility or such other organization such as a Community Choice Aggregation (CAA) authorized and adopted by the City of San Diego to purchase and/or distribute electrical energy to its constituents.

The concept and definition of a community micro grid is described by the CLEAN COALITION Community Microgrid Initiative as follows:

"A Community Microgrid is a coordinated local grid area served by one or more parts of an electric utility substations and supported by high penetrations (25-50% of energy consumed) of local renewables and other distributed energy resources (DER), including energy storage, electric vehicles, and other solutions. Since these components work together intelligently, the whole system can best serve the community in which it is built. Unlike a traditional microgrid, which usually covers a single utility customer or a small number of adjacent locations, our Community Microgrids benefit thousands of residents in the greater community where they are sited and globally though GHG emission reductions. "

The Clean Coalition further describes a current project in the town of East Hampton, Long Island, New York:

"… (the project) will be designed around the distribution network under a single substation, serving several thousand customers…. a substation…is a building block to remaking the electric grid from the ground up. Specific solar, storage, and demand response technologies, a well as onsite generators, will be used to provide almost 'indefinite' backup to critical facilities such as a water filtration plant and a firehouse."

Such a community microgrid could be integrated into City-owned or controlled municipal facilities or other public or institutional facilities serving as core elements or nodes for what is characterized as a progressively interconnected honeycomb.

The community microgrid systems approach has the advantage of being implemented incrementally and thus able to accommodate improvements and changes in technologies as it is built.

Features as described by Clean Coalition include the following:

- Scale: Spans an entire substation grid area, securing benefits for thousands of customers.

- Cost: Offers a more cost-effective solution by first, achieving much broader scale Distributed Energy Resources (DER) deployment and secondly, by utilizing a systems approach that identifies optimal locations for DER in context of existing local distribution grid assets and loads.

- Grid resilience and security: Provides backup power to prioritized loads that are critical to the entire community, such as police and fire stations, water treatment centers, emergency shelters.

- Scalability: Enables easy replications and scaling across any distribution grid area.

D. 2. Meeting CAP Goals and City objectives referenced in section I.C. (*strategies desired as listed in the RFI Section I.C. are indicated in italics in the order they are set forth in that section).*

Which goals will be achieved and how they will be achieved:

(C.1.1) *Contributing to City's 100% renewable electricity goal by 2035.*
Roof top solar and parking lot installed solar potential capacity has been conservatively estimated at 4,000 MWs and 3,000 MWs respectively within the SDGE service territory.

Assuming that approximately half of that combined potential (3,500 MWs) is located within the City of San Diego and given that the current peak load within the SDGE service territory is 4,300 MWs and average load is approximately one-half of the annual peak load, approximately half of the SDG&E demand is located within the City of San Diego (approx. 2,200 MW peak and 1,100 MW average), and a flat electricity demand growth rate consistent with the last ten years of actual demand, a full deployment of the proposed community micro grid system to include the City's estimated 3,500 MWs potential solar capacity, in conjunction with appropriate storage facilities, would eventually meet about two-thirds of the City's annual electricity demand – assuming 2016 conditions—and allow the City to export solar power during summer peak periods when City solar output approaching 3,500 MWs would far exceed City peak demand of about 2,200 MWs. Ever more rigorous appliance standards, LED bulbs, and other energy saving practices should drive electricity demand down going forward (despite modestly increasing population rate), allowing local solar to potentially meet the entire annual demand. In this case, the renewable already produced by SDG&E from remote sites for City residents can be exported to other locations.

(C.1.2) *Lower carbon content than currently provided and required by the State.* The carbon content of San Diego's electric energy grid would be significantly reduced due to displacement of any fossil fueled electric generation and displacement of fossil fueled transportation mechanisms.

(C.1.3) *New and diverse sources of renewable energy.* The proposal identifies a means to efficiently capture incident solar energy at the main load centers in the City of San Diego. It diversifies the sources of renewable energy by integrating roof top solar generation, storage and electric vehicles operated through a demand management and response system that optimizes reliability and resiliency of each constituent community microgrid and support for the overall City electrical system. It could augment solar panels and storage with fuel cell generation where applicable or desirable.

It has potential to incentivize diversification of technologies employed on different sectors of the economy to include expansion in residential, multifamily, commercial, industrial, institutional and visitor serving facilities

(C.1.4) *Reliability and sustainability.* As described in C.1.3 the community microgrid systems are operated through properly controlled demand management and response systems with priority protocols for energy dispatch that would enhance *reliability*, responsiveness to changing needs and circumstances (such as emergencies) and would provide optimally resilient and *sustainable energy services* indefinitely. Clean Coalition is designing their community micro grid systems to have an expected service life of 30 years or longer.

(C.1.5) *Spur new renewable energy development.* The investments in a community microgrid electrical system for the City could *spur new renewable energy* installations in

all sectors of San Diego including residential, multifamily, institutional, commercial, industrial and visitor serving sectors.

A strategic business plan that designs renewable energy and storage improvements for City-owned or operated or other public entity or institutional facilities to serve as a neighborhood or core location for a community microgrid would make further investments in renewable electric generation and storage attractive to other entities located within that microgrid area. The system has advantage of being built incrementally in what is characterized as a honeycomb inter-related and integrated system.

Where necessary and appropriate and cost-effective imported renewable energy modes such as remotely sited wind, solar, geothermal and hydro generation and storage could be used where they are available through existing transmission and substation facilities and considered compatible and complementary to achieve 100% renewables generation at all times and as an operating bridge to transition through a phased implementation program to achieve the optimum operating capacity of a City-wide community microgrid system.

(C.1.6) *The State of California loading order* would be observed through the employment of roof-top solar generation, storage and demand management technologies. The implementation of community microgrids could also include incentivizing investments in building efficiency as prerequisites to eligibility to participate in the operating, reliability benefits of a community microgrid.

(C.1.7) *Social equity* would be addressed by prioritizing initial investments in identified communities of concern including those communities formerly included in designated redevelopment districts within the City. See response in Section D.5 for discussion of a pilot project in the community of City Heights and the example described in the Clean Coalition Hunters Point, San Francisco neighborhood in Section D.9.

(C.1.8) *Resources dedicated to local investment and economic development* would be *increased* through a strategic business implementation plan that builds upon investments in City and other publicly owned and controlled facilities to create lower operating costs that provide additional incentive funding for microgrid expansions. A capitalization fund could be created and operated as a revolving loan fund using portions of shared savings realized from net operating revenues paid back into the revolving fund.

(C.1.9) *Green jobs would be created* (far) *above levels currently* (being) *achieved* or contemplated. Instead of exporting jobs and dollars to site renewable energy facilities in remote locations outside the City of San Diego, investments in roof top and parking lot sited solar panels combined with neighborhood and community scaled storage facilities that are compatible and contribute to substation renovation and upgrading would create many small business opportunities that would expand demand for green jobs. Local education facilities would create green jobs in instruction necessary to provide the workforce for this aggressive expansion of rooftop solar and storage installation.

The Clean Coalition estimates " of every dollar invested in the proposed Hunters Point Community Microgrid, 50% will remain local, largely in the form of local wages and jobs."

This Proposal advances the following desired ideas:

(C.2.1) *Cost effectiveness.* Cost effectiveness analysis need to take into account what are not always easily quantifiable factors such as improved health, protection of environmental resources and stimulation of jobs and small businesses. In addition, when comparing a community microgrid as described herein to energy generated remotely, and adverse impact on undeveloped land or loss of open space, the real costs of the transmission facilities and loss in power over the transmission lines needs to be factored into any analysis.

A community microgrid systems approach will be *cost effective for City, communities, businesses and residents* because, if modeled and administered properly, it will engage them in the design implementation and the economic benefits both directly and indirectly. Both as consumers and owners. renters and landlords can share in the operating cost savings that roof top and parking lot solar can provide when it is deployed through a community microgrid model.

(C.2.2) *The effects on the City's and its communities, businesses and residents.* Impacts and benefits are discussed in several other sections. Clean Coalition notes that each of the community microgrid projects they have modeled "will directly benefit the members of the community it serves by providing affordable clean local energy, avoiding transmission infrastructure expansion, delivering local economic benefits, and vastly increasing community resilience."

In addition they have demonstrated in their models that "Community Microgrids can provide indefinite renewables-driven backup power to critical facilities like fire stations, hospitals, and water facilities. All of the systems constructed as a part of a CMI project are expected to have a service life of 30 years or longer."

(C.2.3) *Innovative concepts and/or technologies:* A community microgrid system is an innovative concept that will require the application of known technologies and will spur the development of advanced demand response programs that integrate locally generated renewable energy, storage and electric vehicles with other sources available to the local distribution grid.

(C.2.4) *Greenhouse gas reduction.* A community microgrid systems approach will *ensure long-term greenhouse gas reductions* by incrementally displacing any need for fossil fueled power plants and –through the inclusion of electric vehicle charging/discharging connections--greatly reducing the need for fossil fueled transportation.

(C.2.5) *Minimize use of RECs.* A community microgrid systems approach will *minimize the use of renewable energy certificates (RECs)* by incrementally reducing reliance on any imported energy whatsoever. The capacity of a full build out community microgrid system will obviate the need for any RECs to achieve state mandated GHG reductions.

D. RESPONSES TO RFI QUESTIONS (continued)

D. 3. ***Support of City Renewable Energy Goals****:* The Community Microgrid System Approach supports the City's renewable energy goals by incrementally and steadily increasing the amount of locally generated renewable energy used by all sectors in the City of San Diego and reducing the amount of fossil fuel generated and the importation of remote sources of energy howsoever they are generated, thereby increasing reliability, responsiveness and resilience of the local electric system and stimulating the local economy for new businesses and sustainable green industry career jobs.

D. 4. a) ***Specific technologies****:* Technologies employed initially would be existing and imminently developing roof top solar systems and storage systems including batteries integrated with community and neighborhood electric distribution and substation facilities. Public facilities and large to medium scale institutions and facilities in the private and/or non profit sector would serve as core to a honeycomb-type system of interconnected microgrids.

Additional technologies would be developed through an incremental implementation program to interconnect community microgrids with demand management and response programs that ensure maximum availability for power for priority uses identified by the City in partnership with community planning groups and other stakeholders.

Incremental implementation allows for flexibility and learning and modifications in an economic environment that is continually and rapidly evolving in efficiencies, responsiveness and availability of product choices.

D. 4 ***b) Estimated costs and appropriate funding mechanisms and parties that may incur costs****:* Costs of roof top solar systems and projections of future costs with and without tax credit subsidies are well documented. Battery storage technologies and hybrids of systems that employ battery storage with solar and/or a range of other smaller to medium sized electric generators and fuel cell installations are already proven at different scales and their costs for capacity and dispatch are well documented. It is recognized that with additional commitment to expanding numbers of installations, the costs of systems will continue to be significantly reduced.

An array of funding mechanisms will be appropriate for different generators and users. "Clean Coalition" studies evaluating the proposed community micro grid operated by PSEG utility in Long Island, New York propose that "all 15 MWs of the local solar will be procured through a feed-in tariff. Property owners and third parties renting roofs will be directly reimbursed for their power production." They estimate that "of every

dollar invested (there) and at (the proposed) Hunters Point (San Francisco) Community Microgrid, 50% will remain local, largely in the form of local wages and jobs."

Depending on the mechanism that is chosen by the City of San Diego to administer the generation and transmission of electricity the actual capitalization of costs will be borne by varying combinations of third party investors, the City, other public institutions, property owners, residents, businesses and rate payers. What programs are developed and available to participating generators will help determine how costs will be distributed and benefits shared.

Funding mechanisms such as PACE program can be augmented by funds that identify a nexus between the source of funds and costs imposed by those users. As an example, funds could be made available for retrofits and equipping of visitor serving facilities using the City's Transient Occupancy Tax (TOT) mechanism.

Other funding opportunities could include:

- Formation of cooperations/cooperatives where property owners and homeowner or neighborhood associations could be incentivized to participate in mini-neighborhood grids with low interest and/or qualified potentially forgivable loans **;**

- City adoption of a community microgrid approach in its Municipal Energy Strategy**.** By incorporating applicable upgrades to surrounding distribution facilities, municipal facilities could serve a core nodes for community micro grids. This could make expansion of the micro grid in to surrounding areas more economically viable.

- City establishes a CCA with commitment and business plan to provide funding for community micro grid implementation.

D.5. ***Estimated timeframe for implementation***. The implementation time frame will depend on the adoption of a strong commitment to local clean energy generation. The time frame depends on decisions by the City and the City's ability to control decisions on electricity generation and distribution. The City has the ability through State law to create a Community Choice Aggregation (CCA) energy program. The City has the ability through the City Charter to create a municipal electric utility And with the impending expiration of the current franchise agreement, the City has the opportunity to determine who and how its public right of way will be used for electrical distribution purposes.

If the City choses to include a community microgrid component or option as a pilot project for response in its proposed RFP for municipal facilities the program could begin within the 2018-2019 time frame. If the City also choses to create a CCA or a municipal utility or municipal community microgrids, the implementation to achieve optimum levels of potential penetration could be accelerated.

The community microgrid proposals by Clean Coalition intended for creation around substations located in Long Island and Hunters Point in San Francisco are projected to move distributed solar to 25-50% of those local area's annual energy consumption. With higher solar energy incidence in San Diego, those estimates could be increased commensurately.

Assuming that the current renewable mix projection by SDGE to be between 35% and 50% in the next 15 years and the City choses to incorporate those resources into meeting its 2035 100% goal, an implementation plan could be set forth that would achieve the necessary 50 – 65% of the remainder of the City's 100% renewables goal by 2035 through a community microgrids program.

Once microgrid areas are delineated and surveyed for key energy node opportunities, the actual interconnections and integration facilities and systems could be designed and carried forth in 2-3 year increments depending on the sizing of the districts and the improvements that would be needed to the local distribution and substation facilities.

In order to address the social equity goals of the CAP the City could designate a currently underserved, "community of concern" that was included in a formerly designated redevelopment area as an "Opportunity Community" for Climate Action priority. This would provide potential access to other federal, state and charitable, foundation funding.

City Heights Pilot Project. As an example, the community of City Heights within the Mid City Communities Plan was formerly designated as a redevelopment district due to significant infrastructure deficiencies and other qualifying factors. It has been designated as one of several "Wellness Communities" by The California Endowment foundation.

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The San Diego Unified School District is building a new K-8 School and considering use of properties for a new administrative headquarters adjacent to the SR-15 freeway and new CenterLine Rapid Transit stations in City Heights. Two area electric substations are located within or directly adjacent to City Heights.

The City, agencies such as Civic San Diego, community-based development organizations, utility and other stakeholders could cooperate in such a pilot program to implement a community microgrid concept.

D. 6. ***Potential participants in implementation and operation***. As outlined in Section D5 and other sections of this response, depending on the City adopted governance structure and budget for a CCA, municipal utility or another program the goal would be to engage both public and private entities in the implementation.

The operation and maintenance would be through cooperative agreements with the participating residents, associations, businesses, property owners, institutions or their designated representatives. It may be determined in initial stages to operate the

community microgrids and their interface with the existing distribution infrastructure through SDGE or such mechanisms authorized by the State and CAISO to operate such systems.

Key partners in implementation of a community microgrid approach could include the following to function as core nodes:

- Municipal facilities owned and operated by the City of San Diego and facilities such as parking lots franchised by the City and current and contemplated Pure Water treatment and distribution facilities and waste reduction and recycling facilities

- SDGE substations

- Federal and state and County facilities located within the City (eg, courthouses, jails)

- Business Improvement Districts and Assessment Districts within the City

- Institutions and facilities of scale with large buildings, parking lots or structures such as hospitals, universities, colleges, Metropolitan Transit System facilities, sports complexes, High school, Middle school and Elementary school campuses, shopping centers, condominium and apartment complexes, hotels and motels and other visitor serving and tourist and entertainment facilities.

D. 7. ***Integration with existing or future projects or programs.*** As outlined in the preceding section and other sections one of the key steps that the City can take to facilitate establishment of community microgrids is to incorporate the potential of municipal facilities and other buildings or facilities authorized by the City to serve as the core or key nodes in a community microgrid.

The design of each constituent community microgrid within certain substation region-based areas will depend on a survey of opportunities and constraints in the surrounding communities and neighborhoods. It will be important to integrate and implement in accord with land uses set forth in the City General Plan and community plan updates and the City Capital Improvement Plans need to focus on the potential for community-based microgrid improvements. Existing investments in microgrids such as the UC San Diego microgrid can be evaluated for their potential role and connection to a City-wide community microgrip system.

D. 8. ***Potential obstacles to implementation***. One of the key obstacles is to not clearly set forth the policy path to achieve renewables. Significant investments will have to be made in either systems to enhance remote generation and transmission of renewable resources or systems to generate and use the energy available at the load centers.

If the advantages of local electric generation are not recognized by the City Council and the policy direction to pursue the 100% Renewables Goal through a priority investment in those facilities, community microgrids will not be a feasible alternative.

If the City recognizes the economic as well as environmental benefits of local generation at the load source through a combination of roof top and parking lot solar combined with storage and advanced demand response and the designated distributor of the energy generated cooperates in advancing a commitment to achieving the renewables goal through an accelerated installation of local clean energy generators, the community microgrid approach should be able to overcome any compliance requirements, regulatory barriers or technical and financing challenges.

D.9. *Estimated results.* As delineated in other sections, the results of a commitment to generating renewable energy from within the City of San Diego through a Community Micro grip approach are manifold. Major portions of the GHG reductions attributed to 100% renewables will be achieved while the economic multipliers in this approach reach residents and businesses in the areas of new businesses created and far more jobs created locally than through investment in remote generation and transmission.

In depth studies completed for two current proposals by Clean Coalition as part of their Community Microgrid Initiative include the following:

- Eliminating nearly 1 billion pounds of toxic greenhouse gas emissions by utilizing 30 megawatts (MW) of solar on the utility substation that serves the Bayview Hunters Point neighborhood of San Francisco (which used to be the site of a coal-fired power plant) while bringing in tens of millions in regional economic activity, including hundreds of local jobs over 20 years.
- Providing nearly 50% of annual local electricity and indefinite solar-driven power backup for multiple critical facilities, including a fire station and the water pumping and filtration stations that provision fresh water to more than 40,000 residents on the East End of Long Island.

In the study completed by Clean Coalition for the Hunters Point neighborhood of San Francisco, the local grid was modeled and ..(it was) demonstrated how it could withstand high penetrations of local solar without compromising the power system[2].

D. 10. ***Other comments***. A Community Microgrid approach to achieve the 100% renewable energy goal as outlined herein will achieve maximum benefit to San Diego. They can best be implemented in a manner and through institutional infrastructure that demonstrates transparency, accountability and responsiveness to the different recognized and designated communities and constituencies while they provide financial and operational sustainability for the City of San Diego.

Given the gravity of the challenges that climate change represent and the opportunities presented in the City Climate Action Plan we need to radically change the economic development strategy if we are going to achieve what is needed and prescribed. We are asking the wrong questions if we make the energy imperative to switch rapidly to renewables subject to conventional economic “cost effectiveness” analysis.

The proposal for a community micro grid system is the most environmentally and economically effect way to achieve our 100% renewables goal. All other modes are less efficient and represent less or no local economic value capture for the residents and businesses in San Diego.

Incorporated into this proposal by reference and links provided here and previously incorporated as background to this RFI by City staff are the recommendations by the City of San Diego Sustainable Energy Advisory Board (SEAB) regarding Priority Guiding Principles for the CCA Feasibility Study underway and SEAB adopted comments on the Climate Action Plan Program EIR and Implementation.

In addition information from Clean Coalition that has been presented as background for the presentations and discussion of Renewable Energy Integration at the August 2016 SEAB meeting and the following links provided by Clean Coalition regarding their Community Microgrid Initiative (CMI) to City Staff are incorporated as supporting information to this RFI response:

- Industrial Economics, Inc. 2016. *Long Island Community Microgrid Project Feasibility Study, Independent Third-Party Benefit-Cost Analysis, (Appendix A)*
https://www.nyserda.ny.gov/-/media/NYPrize/files/studies/8-Town-of-East-Hampton.pdf
Independent confirmation of the value of the Clean Coalition's Long Island Community Microgrid Project.
- EPRI. 2014. *The Integrated Grid: Realizing The Full Value Of Central And Distributed Energy Resources.*
http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000003002002733
Grid modernization is critical for integration of solar, wind, electric vehicles and other clean local energy resources.

- California Public Utilities Commission. 2016. *Distribution Resources Plan.*
http://www.cpuc.ca.gov/General.aspx?id=5071
As the result of Clean Coalition led regulatory efforts, each California IOU was required to evaluate and plan for the inclusion of distributed energy resources.
- San Diego Gas and Electric. 2014. *Borrego Springs Microgrid Demonstration Project.*
http://www.energy.ca.gov/2014publications/CEC-500-2014-067/CEC-500-2014-067.pdf
Leading demonstration project highlighting microgrid resilience capabilities and foundation for a Community Microgrid expansion.

- Southern California Edison. 2016. *The Emerging Clean Energy Economy.*
https://www.edison.com/content/dam/eix/documents/our-perspective/der-dso-white-paper-final-201609.pdf
Utility planning showing the need for grid coordination for large deployments of distributed energy resources.

- Rocky Mountain Institute. 2014. *Bridges to New Solar Business Models.* http://www.rmi.org/rmi_sunshot_doe_bridge_solar_business_models
Value of distributed solar resources.
- U.S Department of Energy. 2014. *The Advanced Microgrid: Integration and Interoperability.* http://energy.gov/oe/downloads/advanced-microgrid-integration-and-interoperability-march-2014
Highlights advanced microgrid functionality when both interconnected with the grid and in outages.
- NYSERDA. 2010. *Microgrids: An Assessment of the Value, Opportunities and Barriers to Deployment in the New York State.* https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Electic-Power-Delivery/microgrids-value-opportunities-barriers.pdf
Benefits and barriers of traditional microgrids.

REFERENCES

1. Grimley, Matt & Farrell, John. (2016). *Mighty Microgrids.* Washington, DC: Institute for Local Self-Reliance. https://ilsr.org/wp-content/uploads/downloads/2016/03/Report-Mighty-Microgrids-PDF-3_3_16.pdf
2. Clean Coalition. (2016). *Hunters Point Community Microgrid Project Power Flow Analysis Methodology*. Menlo Park, CA. http://www.clean-coalition.org/site/wp-content/uploads/2015/08/HPCMP-Grid-Modeling-Methodology-report-41_jv-30-Aug-2016.pdf
3. Clean Coalition. (2016). *Feasibility assessment for the Long Island Community Microgrid Project.* Albany, NY: New York State Energy Research and Development Authority. http://www.clean-coalition.org/site/wp-content/uploads/2016/03/FINAL-LICMP-Feasibility-Report-for-CC-website-22_kc-30-Aug-2016.pdf