WeAct Windsor Microgrid Report

By Terry Taylor, John Stayton and Rick Massell
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1. Summary

Extreme weather, fire threats, rotating outages and PSPS events have made the fact that we are in a climate emergency all too real. In 2019, the Windsor Town Council unanimously approved a Climate Emergency Resolution intended to address local actions to reduce the carbon footprint of Windsor. A group of local citizens working on climate change solutions was invited to work with the Town on developing and implementing these actions. This group, WeAct, has been working on numerous local projects, among them the exploration of building and operating "clean microgrids" in Windsor that decentralize renewable energy generation and storage, and provide sources of power during emergencies such as fires, floods, and earthquakes. They can also serve as power producers which generate revenue during non-emergency intervals.

This paper is a result of that exploration and is intended to point out the benefits and opportunities that microgrids can provide the Town. The paper is a relatively brief overview of an important and growing realm of energy generation and distribution. It is not intended to provide great depth, but rather to serve as a tool to stimulate dialogue and further research of microgrids that would work for Windsor's context. One major conclusion of WeAct's efforts is the discovery that microgrids are indeed an effective, clean, and resilient alternative to the aging and dangerous power distribution system that currently exists. Microgrids are scalable, field-proven solutions that can be sized to specific needs and incorporate renewable generation sources, ensure power reliability, react immediately and automatically when there's a loss of power, and offer multiple economic advantages.

- The list of recommendations below reflects options the Town can pursue to live to its commitment to the Climate Emergency Resolution. Each recommendation is discussed in greater detail in this document.

1.1. Identify, select, and construct "Facility Microgrids" for operating essential services.
1.2. Establish "cooling centers" that are facility microgrids as emergency evacuation locations.
1.3. Expand the Town's fleet of electrical vehicles with 2-way grid communication capabilities.
1.4. Plan and prepare for developing "Community Microgrids" which emphasize serving the most vulnerable and underserved citizens in the Town.

2. Justification for a Clean, Resilient Electrification Strategy

This section includes the background of WeAct and the justifications for a clean and resilient electrification strategy based on the Climate Emergency Resolution passed in September, 2019.

2.1. **Urgent threats:** Windsor has been particularly threatened by wildfires, which have approached our community three of the last four years. We have also experienced record heat, record rainfall and record droughts in our recent past. In addition, rotating outages and Public Safety Power Shutoff (PSPS) events have disrupted our lives. It is painfully clear that the impacts of climate change are already upon us, and with enlightened leadership our community can continue to set an example for towns and cities across the nation of aggressive action to address the climate crisis.

2.2. **WeAct:** The Windsor Earth Action Climate Team (WeAct) was created in the fall of 2019 following the unanimous approval of the Climate Emergency Resolution by the Windsor Town Council. WeAct is a group of concerned citizens from Windsor working to address the global climate emergency through local action. Our efforts are two-fold: we invite our friends and neighbors to join us in projects that we believe can make our community a more resilient and sustainable place. And, we work with the Windsor Town Council to keep and expand their climate commitments. The strategy proposed in this whitepaper addresses the latter effort. We would like to support the Town in implementing the goals of the Climate Emergency Resolution, as well as to help the Town to become more resilient in the face of increasing natural disasters. The following excerpts from the Climate Emergency Resolution justify the adoption of a comprehensive, flexible and resilient electrification strategy that can be implemented over the coming years.

2.3. **Climate Emergency Resolution overall goal:** The heading of the Windsor Climate Emergency Resolution states that it is "A RESOLUTION OF THE TOWN COUNCIL OF THE TOWN OF WINDSOR DECLARING A CLIMATE EMERGENCY AND DIRECTING STAFF TO UPDATE AND PRIORITIZE IMPLEMENTATION OF THE TOWN'S 2040 GENERAL PLAN AND GHG EMISSIONS REDUCTION ACTION PLAN TO ATTAIN GREENHOUSE GAS REDUCTIONS TOWARD ACHIEVING ZERO NET CARBON EMISSIONS BY 2030". Windsor has a long way to go to achieve zero net carbon emissions in the next nine years.

2.4. **Key Climate Emergency Resolution justifications:** Three of the "Whereas" statements in the resolution are especially resonant.

2.4.1. WHEREAS, current global warming is already contributing locally to the increased frequency and intensity of wildfires, floods, droughts, heat waves, and other extreme weather, including the Northern California wildfires in 2017 and 2018 that destroyed at least 38,333 structures, killed 118, displaced

thousands, and caused serious reductions in air quality; *(Please note that this resolution was adopted about seven weeks before the Kincade fire threatened Windsor.)*

2.4.2. WHEREAS, restoring a safe and stable climate requires an emergency mobilization to reach zero greenhouse gas emissions across all sectors, to rapidly and safely draw down or remove excess carbon from the atmosphere, and to implement measures to protect people and species from the consequences of current facts and projections of additional, abrupt climate change;

2.4.3. WHEREAS, marginalized communities worldwide-including people of color, immigrants, indigenous communities, low-income people, those with disabilities, and the unhoused-are already disproportionately affected by climate change and must benefit first from a just transition to a sustainable and equitable economy;

2.5. Key Climate Emergency Resolution clauses: We have focused on four of the resolutions included in the Climate Emergency Resolution and believe they are addressed by this report:

2.5.1. NOW, THEREFORE BE IT RESOLVED that the Town Council of the Town of Windsor, declares that a climate emergency threatens our town, region, state, nation, civilization, humanity and the natural world;

2.5.2. BE IT FURTHER RESOLVED, that, notwithstanding previously adopted targets, the scientific evidence indicates that an urgent global climate mobilization effort to reverse global warming is needed as quickly as possible towards zero net emissions by 2030, and no later than 2045, and that the Town of Windsor should actively participate in an effort to safely draw down carbon from the atmosphere, and accelerate adaptation and resilience strategies in preparation for intensifying climate impacts;

2.5.3. BE IT FURTHER RESOLVED, that the Town of Windsor joins a nationwide call for a regional just transition away from fossil fuels and urgent climate mobilization through a collaborative effort focused on transforming our region, enacting policies that dramatically reduce GHG emissions, and rapidly catalyzing a mobilization at all levels of government to restore a safe climate;

2.5.4. BE IT FURTHER RESOLVED, the Town Council of the Town of Windsor recognizes that in order to meet these goals, the Town must rapidly formulate and implement subsequent phases of mitigation and resiliency plans as soon as practicable, with priority programs and projects implemented locally and with regional partners to secure a sustainable environment, infrastructure, commerce and living conditions for all residents, including the unhoused….

Because of these justifications and resolution clauses, WeAct encourages Windsor to adopt a reasonable and well-constructed plan to develop a clean and resilient distributed grid that is in the control of Town leaders in the event of emergencies.

3. WeAct Clean and Resilient Electrification Strategy Overview

This section comprises the scope of this report, the goals of the report, and an introduction to the strategies described in greater detail in subsequent sections.

3.1. Scope of this report:

3.1.1. *Stimulating further discussion and action by stakeholders* - The main purpose of this report is to stimulate further discussion and action by stakeholders, including the town officials, school district officials, energy consultants, environmental groups and Windsor citizens.

3.1.2. *Not a detailed plan, but a framework for planning by the Town and other community stakeholders* - The scope of this whitepaper reveals a framework for planning by the Town and other community stakeholders.

3.2. Overall goals

3.2.1. *Achievement of net zero emissions by 2030 while minimizing global environmental and social impacts*

3.2.2. *Achievement of resilience in the face of ongoing threats and emergencies*

3.2.3. *Clean, resilient, self-reliant power grid.*

3.3. Strategies for achieving goals

3.3.1. *Facility microgrids* - The first strategy, some of which is already being implemented, includes establishing clean microgrids for cooling centers, emergency essential services, and critical infrastructure.

3.3.2. *Clean backup power and safe transmission grid* – the second strategy is to advocate for 1) PG&E to sunset the diesel substation backup within three years, replacing it with a multi-component solar and natural gas backup system; and 2) PG&E to improve the transmission grid so that backup is used less frequently.

3.3.3. *Clean fleet of Town vehicles* – the third strategy is to increase the number of electric vehicles that can also serve as battery backup for microgrids, if necessary, since that technology is starting to be offered.

3.3.4. *Community microgrids* - In the near future, we expect that the legislature will change laws and the CPUC will change regulations currently preventing connections of microgrids from one location to another, either contiguously or non-contiguously. We will briefly discuss a strategy for preparing for that eventuality.

4. Facility Microgrids

The development of numerous facility microgrids is the backbone of the strategic approach described in this paper.

4.1. Microgrid overview: A facility microgrid consists of energy generation and energy storage that can function as its own "island" in the event of a disaster and power a building, campus, or community when disconnected from the overarching, centrally-controlled electric grid. A facility microgrid includes one or more buildings that can be connected behind a meter that interfaces with the macrogrid. Other types of microgrids include community microgrids, which are not yet legally permitted, and campus microgrids, which are essentially large facility microgrids for applications like college or hospital campuses, with numerous buildings that can be connected behind a utility meter. A facility or campus microgrid requires an interconnection agreement with PG&E.

4.2. Microgrid elements: There are two primary components of a facility microgrid: energy generation and energy storage.

4.2.1. *Energy Generation* - Energy generation for a facility microgrid usually comes from onsite sources, but could come from offsite sources with direct distribution lines to the facility. Energy could be generated by dirty sources, like diesel or natural gas generators, or from clean sources, like solar, wind, or geothermal energy. Because of state mandates and the Town's Climate Emergency Resolution, energy generation should come from clean energy sources. Given the Town's climate and geography, solar energy makes the most sense. The per-watt cost of photovoltaic (PV) solar has dropped dramatically in the last 15 years, and there are still federal, state and local incentives available for installing PV solar arrays. Some Windsor schools have already developed solar arrays, and we urge the Town to investigate other options for increasing solar power. generation such as requiring solar for all new construction where viable.

4.2.2. *Energy Storage* - Typically, facilities use lithium-ion battery energy storage systems. Batteries can be tapped during peak use times by energy distributors or operators to handle the spike in demand, which reduces the pressure on and stabilizes the overall system. This is known as "peak shaving" and can monetize a battery storage system. With a PG&E-approved interconnect, and sufficient energy generation and storage, the system can be "islanded" from the grid in the event of a power outage to provide power for essential services. The State of California offers incentives for onsite storage through the CPUC's Self-

Generation Incentive Program (SGIP). An interesting emerging solution for energy storage is the use of electric vehicles as facility batteries. This will be discussed in the next section.

4.3. **Microgrids for essential services:** WeAct recommends that the Town of Windsor adopt a strategy to develop several public facility microgrids, which allow essential services to continue in the event of a macrogrid power outage (e.g. a rolling power outage during a heat wave). There are multiple ways to fund the development of public facility microgrids, including SGIP or other grant programs, negotiations with third parties (e.g. Sonoma Clean Power or a private investor group) to fund project development in exchange for the right to sell excess energy generated when connected to the grid, and more conventional public funding mechanisms. As policy and technology allows, these facility microgrids could eventually become connected into a flexible and resilient community microgrid. Community microgrids will be discussed later in this report.

4.4. **Microgrids for cooling centers:** Cooling centers are air-conditioned facilities organized by local authorities to provide a cool space, water, restrooms, and often medical and other social services. They were originally designed to mitigate the adverse health impacts of heat waves. An important public service that is required in emergencies and PSPS events is the provision of one or more cooling centers by the Town. In some parts of California, cooling centers are also used during PSPS events and fire or flood evacuations and in these cases it is critical that cooling centers also be microgrids. WeAct supports designating cooling centers that can also be developed as microgrids, such as at Windsor High School as it is already equipped with solar and battery storage will be installed.

4.5. **Case study - Santa Barbara Unified School District:** In January, 2020, Santa Barbara Unified School District announced their plan to develop microgrids at every school in the district, along with installing EV chargers at every school. To illustrate the importance of this, San Marcos High School is currently the only designated emergency evacuation center in the district; it has had its power shut off for every PSPS event. Santa Barbara's new plan would allow any of the schools in the district to be designated as cooling centers, giving Santa Barbara more flexibility in the event of an emergency and any of the schools will be able to operate independently of the grid during a PSPS event. The district's plan is for work to be completed in 2022, will be financed through a power purchasing agreement (PPA), which means that the district will only pay for energy consumed, and will have no upfront costs for microgrid installations.

The development of microgrids at Santa Barbara's schools is a major step in a larger plan created by Clean Coalition to place the entire community into a system that can operate independently from the macrogrid transmission lines, and maximize the

number of people who can maintain power during grid outages. The strategy, called the Goleta Load Pocket Community Microgrid, plans for networked microgrids along 70 miles of coastline in the Santa Barbara region. This is exemplary of the overarching strategy that WeAct recommends for Windsor.

5. Clean Backup Power and Safe Transmission Grid

5.1. **Clean backup power:** As of the writing of this paper, PG&E has installed diesel generation backup for the Windsor substation, but has not sufficiently tested it to put it to use. It is likely that the backup will be used more than initially anticipated due to rotation outages and PSPS events. When the grid is stressed by demand, as during a heat wave, it is likely that diesel generation will be employed so that the scope of rotating outages is reduced. It is possible that dirty diesel generation producing carbon dioxide and other toxins could be employed for a month or more during the year.

The Town of Windsor can advocate to the CPUC and other state agencies to enforce a three-year maximum duration of diesel backup, pressuring PG&E to employ a multi-component solar (with battery storage), and natural gas backup system. The solar/battery infrastructure could increase over the years to reduce the need for natural gas backup that produces methane, a relatively short-lived gas that is much more potent than carbon dioxide. It is also conceivable that Windsor's residential rooftop solar systems could be aggregated as backup to the substation. This is currently being considered by San Jose.

Advocacy to the State (e.g. CPUC) and PG&E should include local elected officials and emergency services representatives, in particular from the Sonoma County Fire District, the Windsor Police, and the Sonoma County Department of Emergency Management. Since Healdsburg is also impacted by the substation, their elected officials and emergency services representatives can also be included in advocacy efforts.

5.2. **Safe transmission grid**: The 2019 Kincade Fire was caused by a PG&E transmission line that went down during a wind event. PG&E has promised action to improve the transmission grid, but as of the writing of this paper have not reported any progress on this front. Windsor needs to advocate to PG&E and the State for aggressive action to improve the transmission grid so that power can be safely delivered, even during high wind events. But if the safety of transmission lines is in question, backup generation, which at this point means diesel generation, will need to be employed with greater frequency. Safe and clean backup generation needs to go hand-in-hand with a more

secure transmission grid.

6. Integration of EV Fleet with Microgrid

The Town of Windsor has already begun its transition to using electric vehicles. In the future, the Town might want to select vehicles that can also discharge into the grid. This is also the case for WUSD, since the batteries of electric school buses are even more powerful.

6.1. **Overview of vehicles as charging systems:** A promising emerging storage option is the use of EVs as mobile energy storage batteries that can serve the same functions as a permanently-mounted battery. Electric vehicles can affect the power grid when they charge, of course, increasing power demand. But they can also serve as batteries on wheels, discharging into the grid as needed. Through “vehicle-grid integration” or VGI, parked cars can become a major part of the power system. The numbers illustrate the potential: current EVs on the market have an average battery capacity of 57 kWh (compare this with the 13.5 kWh of a Tesla Powerwall battery). Assuming that continues to rise over time to 75 kWh, five million electric cars in the US will have an energy capacity of 375,000 megawatt-hours, equal to half of the average daily power consumption in California.

6.2. **Advantages of vehicles as battery storage:** As the CPUC has pointed out, “electric vehicles have three main characteristics that make them an attractive grid resource.” First, a plugged-in vehicle can react quickly to commands to charge or discharge the battery, increasing operational flexibility for grid operators. Second, EVs often have on-board timers and monitors that can be accessed and controlled via the internet, such as with Smartphone apps. So they are ready to communicate. And lastly, most vehicles are not actually used much. CPUC cites travel data showing that a typical car is parked for 96 percent of its life. While it may spend 10 percent of that time charging, the rest is available for other uses. It is important to note that EVs used as battery storage must be able to not only receive power from a power source such as the grid or a microgrid, but must also be able to discharge power to it. "EVs will become a significant driver of the microgrid industry two to four years out, and they will need a place to charge," said Vipul Gore, president and CEO of Gridscape.

In many ways, it is convenient that microgrids and EVs are gaining momentum at a time when there is an urgent need for new investment in the U.S. power grid. There is a unique opportunity to introduce cleaner generation, while adding capacity and decentralizing the grid. In the face of the more extreme weather brought on by climate change, decentralizing the grid is increasingly seen as vital for resiliency. "Battery

prices and EV prices are both going down. It will be important for automakers and fleet owners to leverage EVs as a source of power during an emergency," said Gore. The ability to discharge energy, as well as charge, enables EV fleet owners to use — and in some instances monetize — their power.

6.3. **Windsor's EV fleet:** The Town of Windsor has been steadily building a fleet of electric vehicles as part of a strong commitment to reducing its GHG footprint. Currently, it owns and operates 5 EVs and has every expectation of increasing that number. Even at this current level, the fleet has the capacity of over 20 Tesla Powerwall storage batteries. This fleet could be used as battery back-up for emergency services, particularly if the Town has microgrids that can provide easy access to recharging batteries that continue to operate in emergencies. The microgrid owner can tap into that stored energy when necessary, and, if desired and feasible, provide energy to the grid which can produce revenue. At a minimum, this capacity could allow the Town to operate stop lights and street lights, administrative computers, medical equipment, refrigeration for medicines, and power for command-and-control centers during power outages.

WeAct is enthusiastic about the use of EVs as battery storage systems, but we caution that it is an emerging technology, and some experts predict that it will be 2-4 years before it reaches critical mass as a solution. Nonetheless, we strongly believe that it deserves investigation now as an option for Windsor, as vehicle to grid integration (VGI) systems are being introduced while this paper is being written and we urge that the Town procure EVs that are capable of 2-way communication with the grid.

6.4. **School buses for energy storage:** This would also be a great time for Windsor Unified School District (WUSD) to transition to electric school buses that are VGI-ready, as this would represent a significant lessening of GHG emissions, a robust battery storage resource for emergencies and peak shaving, and create a potential source of revenue for the school district. Even without the use of school buses as storage batteries, WeAct would advocate for the purchasing of electric municipal buses as a contribution to clean air and reduction of GHG.

California has become a leading proponent of electric school buses, recently launching the Hybrid & Zero-Emission Truck & Bus Voucher Incentive Project (HVIP). HVIP is a statewide program that provides vouchers to help offset the cost of eligible hybrids, low NOx engines, hydrogen fuel cells or battery electric trucks and buses. For school bus purchases, fleets can request a voucher for up to $220,000 per bus, plus an

additional $15,000 per bus if operated in a disadvantaged community. The HVIP makes the cost of a new school bus about the same as a conventional school bus. Up to $30,000 per battery electric bus or truck is also available towards the purchase of charging equipment. Please check this website for program and funding status: https://ww2.arb.ca.gov/our-work/programs/school-buses/funding-clean-school-buses

6.5. **Case Study - City of Alameda:** Windsor can potentially profit by investing in electric fleet capabilities for both municipal and school needs. There are systems for intelligent optimization of EV charging rates and schedules, simple EV owner engagement, and control algorithms to create a flexible, modular, and scalable solution for smart charging of existing and future fleet and public EVs that are now in use. The City of Alameda has been doing exactly this, with a fleet of 50 EVs. Listed below are the outcomes from their efforts:

- Monthly cost of controlled fleet charging sessions reduced by 15% - 30%
- Average cost saving per fleet charging session: $2.40 per session ($3.20 per session in summer, $1.40 per session in winter
- Linking fleet vehicle trip management with smart charging control would improve performance and further lower fleet EV charging costs
- Monthly cost of public charging was reduced by 2% to 16%
- Project demonstrated that communicating with customers can be done with fairly simple and inexpensive text messaging
- Demonstrated feasibility of remote optimization and control of public charging sessions with no stranded drivers
- Monthly cost of DC fast charging sessions reduced by 10% to 14%
- Approach to reduce demand of level 2 fleet charging sessions during DCFC sessions is very inexpensive, especially compared to stationary battery storage

7. Community Microgrids

7.1. **Community microgrid overview:** "A community microgrid is a new approach for designing and operating the electric grid, based on local renewables and other distributed energy resources like energy storage and demand response. Although linked to the main electric grid, during a power outage a community microgrid can isolate from the broader grid and provide indefinite renewable-driven backup power to critical facilities. This scalable and replicable approach saves money, provides local economic stimulation, and provisions secure and stable clean local energy, even during disasters of any duration. Community microgrids deliver a trifecta of economic, environmental and resilience benefits across communities."

https://safeenergyproject.org/montecito-community-microgrid-initiative-established/

A clean, expanding community microgrid, starting with Windsor's essential services, will provide greater resilience and flexibility than substation backup in responding to emergencies and power outages, with lower greenhouse gas emissions.

7.2. **Regulatory obstacles:** Community microgrids, as a relative newcomer to the energy industry, face some obstacles before they can be widely implemented. For example, transmission of power between facilities across streets and fences is currently prohibited by law, which renders community microgrids illegal at this point. Another example is a 3¢ per kWh charge by PG&E for transmission even when the microgrid does not utilize any grid transmission lines. These obstacles are apparently temporary in California, however, as the State Legislature is introducing bills to clear the way for microgrids. For example, The CPUC is currently implementing a response to S.B. 1339 that proposes five changes to rules limiting microgrids to help open them for commercialization. It also proposes a pilot community microgrid program that would offer funding of up to $15M for each pilot microgrid. Another example is S.B. 1215, recently introduced by Sen. Henry Stern. The bill would create the Local Government Deenergization Event Resiliency Program administered by the Office of Emergency Services in the governor's office. The program would support state and local government efforts to set up microgrids to keep the power running in facilities that are needed for public safety and to protect vulnerable populations, such as people who have health issues requiring electrical equipment. All microgrids developed through the fund would be powered by renewable distributed energy resources such as microgrids.

7.3. **Selecting microgrid locations:** WeAct anticipates that regulatory barriers will be eliminated in the near future, and pilot community microgrids are already being established. Thus, identifying the potential location of facility microgrids in the Town of Windsor that could later be easily transformed into community microgrids should begin now. There are some schools that are already developing solar arrays and battery energy storage system (BESS) installations such as Windsor High School. Some of these schools could be designated by the Town Council as cooling centers. Buildings adjacent to or near these schools might, in some cases, have critical needs for power during emergencies. Solar and storage installations and adjacent areas which need power, particularly for essential services, can be systematically identified and prioritized by the town so that community microgrids can be formed when they inevitably become part of the energy generation infrastructure in California .

7.4. **Economic and social justice goals:** Another benefit of community microgrids is to serve vulnerable populations during emergencies. For example, transporting seniors to cooling centers during emergencies places a physical burden upon them and may disrupt their lives unnecessarily (especially if there are multiple serial emergencies). This would be particularly true for those seniors with compromised health conditions. It also places a burden upon the cooling center to provide specialized services which may draw down their capacity to serve other community needs. If seniors could shelter in place in such situations with power provided by community microgrids, that would prove much less disruptive and dangerous. There are other populations in Windsor that have a greater need for power both for health and for economic reasons. In the latter category, as an example, are those who may not have the financial resources to move to air-conditioned residences during a heat wave or PSPS event. A map could be developed that overlays the factors of solar, storage and community needs in order to build community microgrids as the technology and legislation make them more available. The momentum for this type of microgrid is growing at a rapid-fire rate. Blue Lake Rancheria in northern California has installed a prototype community microgrid and was able to sustain 100% of their community's power during the 2018 Carr wildfire.

7.5. **Case studies:** 1. Borrego Springs, CA, has developed a community microgrid with San Diego Gas & Electric that relies on diesel generators as well as solar energy to keep the town electrified during power shutoffs. On August 3, 2020, they received a grant for $4.5 million from the U.S. Energy Department to transition to 100% renewable power. 2. A Huffington Post article, "When A Devastating Cyclone Plunged Towns Into Darkness, One Community Kept The Lights On", describes a region in India and also the Blue Lake Rancheria in northern California as places that maintain their power under emergency conditions, using sustainable resources and battery storage.

7.6. **Strategy for expansion:** The Town of Windsor has the opportunity to design a strategy for building facility microgrids and developing new energy/storage facilities that will be able to link in to community microgrids. Once potential sources of solar power, battery backup and community needs have been identified, and as regulatory barriers fall, the town can prioritize how and when community microgrids can be built out. For example, facility microgrids could be developed around the Town Green, including the public works facilities, the fire station, WHS, and the police station / civic buildings. As regulations allow, Bell Village (including Oliver's Market), the Town Green development and neighboring affordable housing developments could all be added into a community microgrids that covered the entire Town Green neighborhood. Community microgrids provide a creative opportunity to serve non-essential (but still important) community services, as well as residents with medical needs, and perhaps even neighborhoods.

WeAct sees these as future possibilities for Windsor, but we believe that investigating now could position Windsor to optimize short-term decisions and actions for long-term strategic and financial benefits.

8. Conclusions and Limitations

We hope this paper can stimulate ideas and strategies for Windsor's long-term sustainability and resilience goals. There are some limitations to point out and conclusions to draw.

8.1. Limitations

8.1.1. Battery storage, electric vehicles and clean energy are all areas or rapid technology development, so this report is based on existing technologies or technologies that are in development and close to being released. We cannot anticipate longer term technology changes that could impact the conclusions of this report.

8.1.2. This is an area of regulatory change, and although we can anticipate regulatory changes, for example to allow community microgrids, we do not know the timeline or guarantee that they will happen. Incentive programs that exist this year may disappear next year, especially given current economic challenges. On the other hand, positive regulatory change and new economic incentives could also have an impact.

8.2. Conclusions

WeAct concludes that Windsor needs cleaner substation backup than the diesel generators currently being employed, since it is likely to be used frequently and for longer periods. We recommend a multi-component (solar and natural gas) backup system). WeAct further concludes that facility and, eventually, community microgrids are squarely in Windsor's best interests for now and for the future. Local microgrids will allow local control of energy and mitigate the risks of events such as PSPS and emergency power outages. They provide a significantly heightened level of safety, particularly for vulnerable residents who would likely suffer in such events, they allow power for command and control for emergency services, and they can contribute significantly to the Town's commitment to lessen its carbon footprint as well as offer a potential revenue stream. Now is the time to act, as State money has recently become available for Facility Microgrids. Electric vehicles will be an increasingly valuable asset as batteries are rapidly improving and VGI is coming online. We encourage the Town to pursue partnerships with our school district, Sonoma Clean Power, PG&E, and companies such as Terra Verde and Barkovich & Yap. We have the expertise, now let's harness the power!

Sources

Conversations with stakeholders and experts

- 5/13/2020: Geof Syphers, CEO, Sonoma Clean Power
- 5/29/2020: Rick Brown, Board Chair, Terra Verde Energy
- 6/4/2020: Barbara Barkovich, Principal, Barkovich & Yap; John Redding, CEO, Unigen Resources; Ted Williams, Mendocino County Supervisor; David Wylie, Grid Technician (retired), PG&E
- 6/24/2020: Debora Fudge, Windsor Town Councilmember; Rick Brown, Board Chair, Terra Verde Energy; Kevin Ross, VP Business Development, Terra Verde Energy; Ken McNab, Town Manager, Town of Windsor; John Jaeger, Acting Public Works Director, Town of Windsor; Michael Cave, Deputy Director of Operations, Town of Windsor; Sandi Potter, Deputy Director of Water & Environmental Management, Town of Windsor; Garrett Broughton, Associate Civil Engineer, Town of Windsor;
- 7/8/2020: John Sarter, CEO, Off the Grid Design
- 9/11/2020: Geof Syphers, CEO, Sonoma Clean Power

Online resources

- https://gridintegration.lbl.gov/microgrids-vehicle-grid-integration
- https://www.independent.com/2020/01/03/s-b-school-district-to-go-off-the-grid/
- https://microgridnews.com/santa-barbara-schools-look-to-microgrids-for-community-resilience-and-ev-charging/
- https://ww2.arb.ca.gov/our-work/programs/school-buses/funding-clean-school-buses
- https://microgridknowledge.com/microgrids-wildfires-mitigation/
- https://www.huffpost.com/entry/cyclone-amphan-electricity-microgrids-solar_n_5ef2fa8dc5b6aa825ac903f9?guccounter=1
- https://www.energy.gov/articles/how-microgrids-work
- https://energycenter.org/thought-leadership/blog/ca-regulations-are-hindering-microgrid-development
- https://microgridknowledge.com/critical-microgrids-california-bill/
- https://microgridknowledge.com/california-puc-microgrid-development/

Seminars/Workshops

- Community Energy Resilience Policy Summit Wednesday, August 5, 2020
- SEEC Virtual Forum - Webinar 4: Community & Climate Engagement Tuesday, June 30, 2020
- Microgrids: Backup Power for BusinessWednesday, June 24, 2020
- Public Workshop: R.19.09.009 Resiliency and Microgrids: CPUC Actions for Microgrid Deployment – Track II Proposals August 5, 2020