City *of* Tigard

Tigard Business Meeting –Agenda

TIGARD CITY COUNCIL

MEETING DATE AND TIME:	JUNE 4, 2024 - 5:00 p.m. Executive Session & 6:30 p.m. Business Meeting
MEETING LOCATION:	Hybrid - City of Tigard - Town Hall - 13125 SW Hall Blvd., Tigard, OR 97223 - See PUBLIC NOTICE below

PUBLIC NOTICE: In accordance with Oregon House Bill 2560, this will be a hybrid meeting where some Council, staff or public will participate in person and some will participate remotely.

How to comment:

- Written public comment may be submitted electronically at www.tigard-or.gov/Comments by noon the day before the meeting date.
- If attending the meeting in person, please fill out the public comment sign-in sheet at the front of the room and come to the microphone when your name is called.
- If you prefer to call in, please call 503-966-4101 when instructed to be placed in the queue. We ask that you plan on limiting your testimony to two minutes.
- You may comment by video through the Teams app. Go to this link to learn how to participate by video: June 4, 2024 Council Meeting (https://www.tigard-or.gov/Home/Components/Calendar/Event/6324/372).

Upon request, the City will endeavor to arrange for the following services:

- Qualified sign language interpreters for persons with speech or hearing impairments; and
- Qualified bilingual interpreters.

Since these services must be scheduled with outside service providers, it is important to allow as much lead time as possible. Please notify the City of your need by 5:00 p.m. on the Thursday preceding the meeting by calling: 503-718-2419 (voice) or 503-684-2772 (TDD - Telecommunications Devices for the Deaf).

SEE ATTACHED AGENDA

VIEW LIVESTREAM ONLINE: https://www.tigard-or.gov/boxcast

CABLE VIEWERS: The City Council meeting will be shown live on Channel 21 (1st Tuesdays) and Channel 28 (2nd & 4th Tuesdays) at 6:30 p.m. The meeting will be rebroadcast at the following times on Channel 28:

Thursday 6:00 p.m. Friday 10:00 p.m. Saturday 7:30 p.m. Sunday 11:30 a.m. Monday 6:00 a.m.

City *of* Tigard

Tigard Business Meeting –Agenda

TIGARD CITY COUNCIL

MEETING DATE AND TIME: JUNE 4, 2024 - 5:00 p.m. Executive Session and 6:30 p.m. Business Meeting

MEETING LOCATION: Hybrid - City of Tigard - Town Hall - 13125 SW Hall Blvd., Tigard, OR 97223

5:00 PM

1. EXECUTIVE SESSION: The Tigard City Council will go into Executive Session to discuss the performance review of public officers or employees, under ORS 192.660(2) (i). All discussions are confidential and those present may disclose nothing from the Session. Representatives of the news media are allowed to attend Executive Sessions, as provided by ORS 192.660(4), but must not disclose any information discussed. No Executive Session may be held for the purpose of taking any final action or making any final decision. Executive Sessions are closed to the public.

6:30 PM

2. BUSINESS MEETING

   A. Call to Order

   B. Roll Call

   C. Pledge of Allegiance

   D. Call to Council and Staff for Non-Agenda Items

3. PROCLAMATIONS AND RECOGNITION

   A. PRIDE MONTH PROCLAMATION

4. PUBLIC COMMENT

   A. Follow-up to Previous Public Comment

B. Public Comment – Written

C. Public Comment – In Person

D. Public Comment – Phone-In

E. Public Comment – Video

5. CITY MANAGER REPORT

6. CONSIDER AN AMENDED AND RESTATED INTERGOVERNMENTAL AGREEMENT OF THE REGIONAL WATER PROVIDER'S CONSORTIUM **6:45 p.m. estimated time**

7. TIER 2 MICROGRID UPDATE **6:50 p.m. estimated time**

8. NON-AGENDA ITEMS

9. EXECUTIVE SESSION: The Tigard City Council will go into Executive Session to discuss the performance review of public officers or employees, under ORS 192.660(2) (i). All discussions are confidential and those present may disclose nothing from the Session. Representatives of the news media are allowed to attend Executive Sessions, as provided by ORS 192.660(4), but must not disclose any information discussed. No Executive Session may be held for the purpose of taking any final action or making any final decision. **7:25 p.m. estimated time**

10. ADJOURNMENT **8:25 p.m. estimated time**

AIS-5558 **3. A.**

Business Meeting

Meeting Date: 06/04/2024

Length (in minutes): 5 Minutes

Agenda Title: Pride Month Proclamation

Authored By: Rebecca Hathaway

Presented By: Mayor Heidi Lueb

Item Type: Proclamation

Public Hearing Legal Ad Required?: No

Publication Date:

Information

EXPLANATION OF ISSUE

This proclamation recognizes the contributions of LGBTQIA+ individuals in Tigard and beyond. June is nationally recognized as Pride Month in support of the quest for continued recognition of basic human rights for all LGBTQIA+ people. Tigard reaffirms its commitment to fight discrimination against our valued members of the LGBTQIA+ community and celebrates the progress they've made towards equality.

ACTION REQUESTED

The Tigard team asks the Mayor to proclaim the month of June 2024 as Pride Month in Tigard and to read the proclamation in full at City Council.

BACKGROUND INFORMATION

Dates of Previous and Potential Future Considerations

City Council has issued a proclamation in support of June as Pride Month every year since 2019.

Public Involvement

The city has been working with Tigard-Tualatin School District to promote and plan a Pride Parade & Festival on June 29 from 2-5PM at Tigard High School. Tigard Library is giving away a pride-themed book bag filled with an LGBTQIA2+ book and other goodies.

Impacts (Community, Budget, Policies and Plans/Strategic Connection)

This proclamation reinforces the city's strategic vision and community promise to be equitable for all.

ALTERNATIVES & RECOMMENDATION

The Mayor could choose not to issue the proclamation, but city teammates recommend its issuance to reaffirm our support for LGBTQIA+ friends and family members.

ADDITIONAL RESOURCES

https://www.tigard-or.gov/explore-tigard/community-events/pride-festival#ad-image-0

Attachments

Proclamation

City *of* Tigard

PRIDE MONTH
JUNE 2024

WHEREAS, June is celebrated as Pride Month nationwide to commemorate the Stonewall Uprising which is considered the beginning of the LGBTQIA+ civil rights movement; and

WHEREAS, Pride Month in Tigard is meant to raise awareness of the prejudice and discrimination still facing members of the queer community and honor their power and perseverance in fighting discrimination in all its forms; and

WHEREAS, everyone is entitled to equal rights freely granted to all Americans inclusive of gender identity and sexual orientation; and

WHEREAS, the valuable contributions made by Tigard's LGBTQIA+ community promote innovation and positive change with lasting effects within our city; and

WHEREAS, our city will stand up to discriminatory actions and harmful speech; and

WHEREAS, in partnership with Tigard-Tualatin School District, the City of Tigard celebrates Pride with a community festival and parade on June 29. The city acknowledges and affirms queer love with waived Municipal Court fees for all LGBTQIA+ wedding ceremonies performed during the month of June. The city is committed to creating safe spaces for the community with Pride programs at the Tigard Public Library this June;

NOW THEREFORE BE IT RESOLVED, the City of Tigard Mayor does hereby proclaim her support for designating June 2024 as,

PRIDE MONTH

in Tigard and encourages all community members to respect and honor our diverse community.

Dated this ___th day of _____ 2024

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Seal of the City of Tigard to be affixed.

_____
Heidi Lueb, Mayor
City of Tigard

Attest:

_____
Carol A. Krager, City Recorder

AIS-5467 **6.**

Business Meeting

Meeting Date: 06/04/2024

Length (in minutes): 5 Minutes

Agenda Title: Consider an Amended and Restated Intergovernmental Agreement of the Regional Water Provider's Consortium

Authored By: Brian Rager

Presented By: Brian Rager

Item Type: Motion Requested

Public Hearing Legal Ad Required?: No

Publication Date:

Information

EXPLANATION OF ISSUE

The City of Tigard is a member of the Regional Water Provider's Consortium, and the intergovernmental agreement (IGA) between the members has been updated in various sections and all members are asked to execute the amended and restated agreement.

ACTION REQUESTED

It is recommended that the council approve the amended and restated intergovernmental agreement. The agreement would be signed by the Mayor.

BACKGROUND INFORMATION

The City has been a voting member of the Regional Water Provider's Consortium (RWPC) and benefits from that membership in a variety of ways, including networking with other water providers in the region, collaborating about current regulatory requirements, strategizing about future water supply considerations and utilizing educational materials produced by RWPC staff.

The intergovernmental agreement (IGA) for the RWPC was in need of an amendment to update the language in several sections. A summary of changes is below:

- New and updated definitions are added, including types of members: "Associate Member" and "Full Member" and defining "Region".
- Removal of outdated Metro references from when the Consortium was formed
- Update of purposes of Consortium to align with mission statement and Strategic Plan
- Update of Participant language regarding "Associate Members"
- Update of withdrawal language to encourage timely notification
- Update to dues language (primarily for Associate Members)
- Added obligation and Board authority to maintain a Strategic Plan to guide its work and removed the obligation to update the Regional Water Supply Plan
- Added language regarding the roles and responsibilities of the Executive Committee
- Update language to reflect current best practices for agreements

Staff reviewed the proposed amended and restated IGA and believes the updates are warranted and reasonable and recommends approval and execution by the council.

ALTERNATIVES & RECOMMENDATION

Council could choose not to execute the IGA and provide staff with other direction.

ADDITIONAL RESOURCES

Fiscal Impact

Fiscal Information:

Consortium dues for each member are based on a 50/50% split between factors of customer accounts and the current annual average water usage, as reported by each member. That ratio is then applied towards the Consortium budget to determine each member's proportionate share. For FY 24, Tigard's dues were $41,404.

Attachments

RWPC Restated IGA

AMENDED AND RESTATED INTERGOVERNMENTAL AGREEMENT OF REGIONAL WATER PROVIDERS CONSORTIUM (2023)

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REGIONAL WATER PROVIDERS CONSORTIUM

This Amended and Restated Intergovernmental Agreement of the Regional Water Providers Consortium (2023) is entered into by and among the undersigned municipalities and districts, hereinafter called "Participants," to participate in the Regional Water Providers Consortium for the Portland Metropolitan Region ("the Consortium").

RECITALS

WHEREAS, in 1989 water providers of the Portland metropolitan area began meeting in an informal group called the "Regional Providers Advisory Group" to coordinate water supply planning efforts; and

WHEREAS, in 1996 a Regional Water Supply Plan was completed; and

WHEREAS, the Regional Water Supply Plan, which contains specific recommendations for cooperation and coordination between the water providers in this region through the formation of the Regional Water Providers Consortium, was adopted by signatory water providers in their *Inter-Governmental Agreement of Regional Water Providers Consortium*; and

WHEREAS, as the regional land use agency under state law and regional charter, the Metropolitan Service District ("Metro") adopted the Regional Water Supply Plan as part of the Metro Regional Framework Plan; and

WHEREAS, in 1997 the Consortium was formed when 15 Participants entered into an intergovernmental agreement to endorse the Regional Water Supply Plan and coordinate and cooperate in its implementation, and amended that intergovernmental agreement in 2004-05 (*2004-05 IGA*); and

WHEREAS, the Participants desire to amend and restate the 2004-05 IGA to make certain updates to the Participants and their obligations, and to streamline certain procedures, while continuing to endorse the Regional Water Supply Plan; and

WHEREAS, ORS Chapter 190 authorizes units of local government to enter into written agreements with any other unit or units of local government for the performance of any or all functions and activities that any of them has authority to provide; and

WHEREAS, all the Participants of this Agreement are thus authorized to enter into an intergovernmental agreement;

NOW, THEREFORE, the Participants agree as follows:

Section 1. **Definitions**

For purposes of this Agreement, the following terms shall be defined as follows:

"Agreement" – Shall mean this document and any authorized amendments thereto.

"Associate Member" – Shall mean a Participant that does not have an appointed representative to the Board and that pays reduced dues as determined by the Board.

"Board" – Shall mean the Board of Directors established by Section 9 of this Agreement, consisting of one member from the governing body of each Full Member Participant.

"Bylaws" – Shall mean the regulations of the Consortium adopted by the Board pursuant to Section 9.B. of this Agreement.

"Consortium" – Shall collectively mean all Participants to this Agreement acting pursuant to and under the terms of the Agreement.

"Consortium Funds" – Shall mean Consortium funds consisting of all dues, voluntary contributions, grant monies, and funding from any other source provided to the Consortium to conduct the activities and business of the Consortium.

"Executive Committee" – Shall mean the committee established by Section 10 of this Agreement.

"Full Member" – Shall mean a Participant that has an appointed representative to the Board and Technical Committee and that pays full dues as outlined in Section 7.

"Participant" – Shall mean any signatory to the Agreement.

"Plan" – Shall mean the 1996 “Regional Water Supply Plan” for the Portland Metropolitan Area, and all subsequent amendments thereto.

"Region" – Shall mean the area within which Participants provide services to Retail Customer Accounts.

"Retail Customer Accounts" – Shall mean all retail accounts that are billed by a Participant (including residential single family, residential multifamily, commercial, industrial, and wholesale accounts).

"Technical Committee" – Shall mean the committee established by Section 11 of this Agreement.

"Total average daily water use" – Shall mean all billed water usage for Retail Customer Accounts.

Section 2. **Purposes**

The general purposes of the Consortium are as follows:

A. To provide leadership in the planning, management, stewardship, and resiliency of drinking water in the Region;

B. To foster coordination in the Region by sharing knowledge, technical expertise, and resources between Participants;

C. To serve as the central custodian for Consortium documents, data, and studies;

D. To review and recommend revisions to the Plan, as appropriate;

E. To provide a forum for the study and discussion of water supply issues of mutual interest to Participants;

F. To promote fiscal responsibility by pooling resources to achieve economies of scale;

G. To allow for public participation in Consortium activities;

H. To promote stewardship, emergency preparedness, and water conservation in the Region through outreach and education;

I. To strengthen emergency preparedness and resiliency among water providers in the Region;

J. To ensure safe and reliable drinking water is accessible to all.

Section 3. **Strategic Plan**

A. The Consortium will maintain a strategic plan to guide its work, establish priorities, and set goals for the strategic planning timeline.

B. The strategic plan will be updated at an interval set by the Board.

Section 4. **Cooperation and Participants' Retained Powers**

The Participants intend that the Consortium shall act through the processes laid out herein in the spirit of cooperation. Unless specifically provided for herein, by entering into this Agreement, no Participant has assigned or granted to any other or to the Consortium its water rights or the power to plan, construct, and operate its water system or perform any other obligation or duty assigned to it under law.

Section 5. **Consortium Authority**

In accomplishing its purposes, and utilizing the organizational structure and decision-making processes contained herein, the Consortium is authorized to:

A. Adopt or revise Bylaws and other operating procedures consistent with the terms of this Agreement to govern Consortium operation and administration, including such things as meeting arrangements, voting procedures, election of officers of Consortium boards and committees, notice procedures, procedures for execution of binding legal documents, budgeting, and financial operations.

B. Adopt or revise, and implement an annual work plan and budget and issue annual reports and such supplementary reports as the Consortium may determine appropriate;

C. Update and adopt its strategic plan as set forth in Section 3.

D. Collect regular dues from Participants to support the routine business of the Consortium in amounts established as established in Section 7;

E. Accept voluntary contributions from Participants in amounts higher than the regular dues for the purpose of conducting studies or engaging in other activities consistent with Consortium purposes;

F. Apply for and receive grants and accept other funds from any person or entity to carry on Consortium activities;

G. Expend Consortium funds, however obtained, and establish accounts and accounting processes to manage Consortium funds, which may include utilizing the accounts and processes of Participants for such purposes under appropriate agreements;

H. Execute public procurement contracts and enter into arrangements whereby Participants may enter into a public procurement contract on behalf of the Consortium;

I. Execute intergovernmental agreements;

J. Establish procedures or recommendations for the hiring, dismissal, and review of Managing Director, and to delegate such activities to a Participant;

K. Accept assignment of staff from individual Participants to conduct Consortium work and to reimburse the Participants for the salary and other costs associated with the assigned staff;

L. Establish procedures and criteria whereby other governmental entities may become a Participant in this Agreement;

M. Establish a process to coordinate Participant response to water policy issues of mutual interest or concern;

N. Establish procedures to solicit the views of the public on water supply and water resource issues within the purview of the Consortium;

O. Establish a process whereby water policy and water supply disputes or disagreements among Participants may be resolved;

P. Protect Consortium rights and enforce obligations owed to the Consortium by third parties to the extent permitted by law;

Q. Take other action within the powers specifically granted to the Consortium herein by the Participants to exercise the authority granted in this Section 5 and to carry out the purposes stated in Section 2.

Section 6. Participants

A. Participant Memberships: A Participant may join as a Full Members or Associate Member in accordance with the definitions set forth in Section 1 and as further provided in the Bylaws.

B. Any Participant which, having once joined, withdraws or is expelled from the Consortium for non-payment of dues, may only re-join as provided in Section 7.F.

C. Additional Participants: The Board may accept additional governmental entities as Participants into the Consortium under terms and financial arrangements that the Board determines just and appropriate. The Board may establish standards for membership in the Bylaws or may allow Participants to join on a case-by-case basis. Provided, however, that in all cases, no new Participant may join the Consortium without the affirmative vote of a majority of the Board.

D. Withdrawal: Any Participant may withdraw from the Consortium at any time by giving written notice to the Chair of the Consortium Board. Consortium dues already paid shall not be refunded to the withdrawing Participant. Unless otherwise approved by the Board, a withdrawing Participant shall have no ownership or interest in a Consortium asset after the date of withdrawal. Any Participant intending to withdraw from the Consortium shall make its best efforts to advise the Board Chair of that fact prior to February 1 and the approval of the Consortium budget for next fiscal year. Participants acknowledge that failure to notify the Consortium in accordance with these procedures may cause financial harm to the Consortium.

Section 7. **Dues**

A. Each Participant shall pay annual dues no later than September 1 of each year sufficient to fund the approved annual budget of the Consortium, as established by the Board, provided, however, that the Board may establish a different payment amount and/or schedule for a Participant upon request from that Participant or upon the Board's own motion.

B. The dues of each Participant shall be determined annually as follows:

1. Total annual dues for all Participants shall be set to equal the annual budget for the Consortium, not counting budget items to be funded by fewer than all the Participants as provided in Section 8.C.

2. Any grants or non-dues monies obtained by the Consortium may be applied towards the annual budget, thereby reducing the annual dues assessments commensurately.

3. The Board shall establish the dues obligation of Associate Members at the time it approves an entity's membership and which amount is subject to any changes set forth in the Bylaws.

4. The total annual dues of an Associate Member shall be subtracted from the total annual dues-based budget, described in subsection 7.B.1. leaving a budget number to be funded by Full Member dues. Dues shall be set so that the dues of each Full Member reflect its proportional share of that sum based on the following formula:

(a) 50% of the dues shall be allocated proportionally based on the Participant’s proportional share of the total number of all Participants' Retail Customer Accounts for the prior year;

(b) 50% of the dues shall be allocated proportionally based on the Participant’s proportional share of total average daily retail water use (in million gallons per day) in the prior year of all Participants.

C. Minimum dues may be set by the Board to cover costs of adding a new Participant as outlined in the Bylaws.

D. In-kind contributions may be made in lieu of dues if approved by the Board. In-kind contributions must be tracked and quantified.

E. A Participant that fails to pay its assigned dues by September 1, or a time otherwise established by the Board pursuant to Section 7.A., may be removed by the Board as a Participant after two reminders are sent.

F. Upon a majority vote of the Board, a removed Participant (or a Participant that has previously withdrawn from membership) may be reinstated in the Consortium upon its agreement to pay its full dues for the year during which it wishes to rejoin (calculated as if the entity had been a Participant at the time the budget was approved). Upon receipt of such dues by a rejoining Participant, the Board shall add the dues payment to the existing budget for expenditure or carry over to the following year's budget.

G. If a new Participant joins the Consortium during an annual dues cycle, its dues and those of the existing Participants shall be calculated as follows:

1. If a new Participant is a Full Member, its dues requirement will be calculated pursuant to Section 7.B.4.

2. If a new Participant is an Associate Member, its dues will be determined as provided in Section 7.B.3.

3. The initial year dues for a new Participant joining partway through a fiscal year will be pro-rated to reflect partial year membership if more than halfway through the fiscal year.

4. New Participants joining at any time after September 1 shall pay their initial year's dues within 90 days of signing this Agreement.

Section 8. Work Plan and Budgeting

A. Each year, at the first Board meeting of the calendar year, the Board shall adopt an annual work plan of Consortium activities for the upcoming fiscal year beginning on July 1.

B. At the same time, the Board shall adopt a budget sufficient to conduct the Consortium's annual work plan. The budget shall also include a calculation of the dues owed by each Participant to fund the budget as provided in Section 7 and a table apportioning the dues to each Participant.

C. The budget may include special projects that will be funded by fewer than all of the Participants on a voluntary basis as outlined in Section 5.E.

D. The Board may amend the budget and the work plan at any time as it deems appropriate except that dues may only be increased annually as provided for in Section 7. Additional expenditures may be permitted so long as there are identified sources of revenue, other than increased dues, for such expenditures.

E. Participants shall provide to Consortium staff the data necessary to calculate the annual dues for budgeting and planning in a timely manner.

Section 9. **Consortium Board**

A. The Board shall be made up of one member from the governing body of each Full Member. Each Participant shall also name an alternate Board representative from its governing body to serve in case the primary representative cannot. Provided, however, that if the Board Chair does not attend a meeting, the Vice Chair shall assume the Chair's duties rather than the Chair's alternate.

B. Annually, the Board shall elect a Board Chair and a Vice Chair and appoint the Executive Committee members in accordance with the provisions in the Consortium Bylaws.

C. The Board is authorized to: (1) approve the Consortium's annual work plan and budget; (2) approve the Consortium's strategic plan; (3) set Consortium policy; (4) approve new Participants; (5) initiate updates to the Plan as needed; (6) approve minor amendments to the Plan; (7) recommend to Participants' governing bodies major amendments to the Plan; (8) recommend to Participants' governing bodies amendments to this Agreement; (9) adopt and update the Bylaws; (10) exercise any other powers and authority granted to the Consortium by this Agreement necessary to accomplish the Consortium's purposes.

D. The Board shall have the authority to designate which amendments to the Plan are major and which are minor for purposes of determining the process for amendment consideration. Generally, major amendment to the Plan should include revisions to the Plan's policy objectives, resource strategies, or implementation actions which significantly alter Plan direction or would significantly change the implementation strategies. Minor amendments are all other changes to the Plan.

E. The Board may assign such duties or delegate such Board authority as the Board deems advisable to any Participant, Board committee, the Executive Committee, or to the Technical Committee, except that the Board may not delegate the authority (1) to execute intergovernmental agreements, (2) to designate Plan amendments as minor or major, (3) to recommend major Plan Amendments or amendments to this Agreement, (4) to approve the annual work plan and the budget, (5) to approve minor Plan amendments, (6) to approve the admission of Participants to the Consortium, or (7) to dissolve the Consortium.

F. To be effective, Board actions must be approved by a vote of a majority of the Board at a meeting at which a simple majority of the Board is present.

Section 10. **Executive Committee**

A. The Consortium shall have an Executive Committee, which shall be appointed by the Board and consist of seven Board members, one of which shall be the Board Chair. The Board shall endeavor to appoint Executive Committee members in a manner that achieves geographic representation and representation from municipalities, special districts, and other types of entities that form the Consortium.

B. The Board Chair shall be the Chair of the Executive Committee.

C. The Executive Committee shall serve to assist the Board in more timely and meaningful policy action as outlined in the Bylaws.

D. The Executive Committee shall at no time act on behalf of the Board unless specifically authorized by the Board to do so as provided in Section 9.E.

E. Except for the Board Chair, the term for each Executive Committee member shall be two years, and individuals may serve consecutive terms if re-appointed.

F. To be effective, Executive Committee actions must be approved by a vote of a majority of the Executive Committee at a meeting at which a simple majority of the Executive Committee is present.

Section 11. Technical Committee

A. The Consortium shall have a Technical Committee, which shall be made up of one staff representative appointed by each Full Member. Each Full Member shall also appoint an alternate Technical Committee representative to serve when the primary representative cannot. Provided, however, that if the Technical Committee Chair does not attend a meeting, the Vice Chair shall assume the Chair's duties rather than the Chair's alternate.

B. On an annual basis, the Technical Committee shall elect a Chair and Vice Chair.

C. The Technical Committee shall advise and provide assistance to the Board on any matters falling within the Consortium's purview under this Agreement, and may act upon Board delegation of authority as provided in Section 9.E.

D. The Technical Committee under the provisions of any agreement or contract to provide staff shall advise Consortium staff and assume the responsibility to draft proposed work plans, budgets, annual and other reports, plan amendments, and implementation proposals for submission to the Board or Executive Committee as appropriate.

E. To be effective, Technical Committee actions must be approved by a vote of a majority of the Technical Committee at a meeting at which a simple majority of the Technical Committee is present.

Section 12. Dispute Resolution

It is the intention of the Participants to limit the issues available for dispute resolution. The issues raised must be related to interpretation of the express terms of this Agreement. No issues related to water supply development or program development by individual Participants may be raised.

Any such dispute shall, if possible, be resolved through the use of a mandatory, but non-binding dispute resolution mechanism established by the Board through the Bylaws.

Section 13. Duration and Dissolution

This Agreement shall remain in effect, subject to the following: (1) any Participant may withdraw at any time as provided in Section 6.D. of this Agreement; (2) should all but one Participant withdraw, the Agreement shall end and the Consortium shall be dissolved; (3) the Agreement may be ended and the Consortium dissolved by a vote of the Board; (4) remaining funds shall be distributed in accordance with the Bylaws.

Section 14. Legal Liability

Participants agree to share any costs or damages, including reasonable attorney's fees, from third party actions against the Consortium. The obligation shall apply to any entity that was a Participant in the Consortium at the time the liability arose or the cause of action accrued. Payment obligations shall be proportional to the dues of each entity. Participants agree to assist and cooperate in the defense of such an action. Settlement of any action that would impose an obligation to pay upon the Participants under this provision must be approved by a majority of the Board. The obligations of a Participant under this Section 13 shall survive that Participant's withdrawal from the Consortium, termination of this Agreement, or dissolution of the Consortium.

Section 15. Oregon Law and Forum

A. This Agreement shall be construed according to the law of the State of Oregon.

B. Any litigation between the Participants under this Agreement or arising out of work performed under this Agreement shall occur, if in the state courts, in the Multnomah County Court having jurisdiction thereof, and if in the federal courts, in the United States District Court for the District of Oregon.

Section 16. Public Notification

The Board, the Executive Committee, and the Technical Committee shall be deemed public bodies for purposes of Oregon's public meeting laws as provided by ORS Chapter 192. Other committees or sub-committees are subject to ORS Chapter 192 only as applicable.

Section 17. Agreement Amendment

Amendments to this Agreement shall be recommended by the Board and shall be effective when authorized by the governing body of every Participant.

Section 18. **Indemnification**

Subject to the conditions and limitations of the Oregon Constitution, Article XI, Section 7, and Oregon Tort Claims Act, ORS 30.260 through 30.300, each Participant shall indemnify, defend, and hold harmless the Consortium and other Participants from and against all liability, loss, and costs arising out of or resulting from the negligent or intentionally wrongful acts of the indemnifying Participant, their governing bodies, officers, employees, and agents in the performance of this Agreement.

Section 19. **Severability**

If any term or provision of this Agreement is declared by a court of competent jurisdiction to be illegal or in conflict with any law, the validity of the remaining terms and provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Agreement did not contain the particular term or provision held to be invalid.

Section 20. **No Third-party Beneficiaries**

The Participants are the only parties to this Agreement and as such are the only parties entitled to enforce its terms. Nothing contained in this Agreement gives or shall be construed to give or provide any benefit, direct, indirect, or otherwise to third parties unless third persons are expressly described as intended to be beneficiaries of its terms.

Section 21. **Merger Clause**

This Agreement constitutes the entire agreement between the Participants. No waiver, consent, modification or change of terms of this Agreement shall bind a Participant unless in writing and signed by the affected Participants. Such waiver, consent modification or change, if made, shall be effective only in the specific instance and for the specific purpose given. There are no understandings, agreements, or representations, oral or written, not specified herein regarding this Agreement.

Section 22. **Counterparts**

This Agreement may be signed in counterparts, each of which shall be deemed an original, and which, when taken together, shall constitute one and the same Agreement.

The Participants agree that any Participant may execute this Agreement, including any Agreement amendments, by electronic means, including the use of electronic signatures.

AMENDED AND RESTATED REGIONAL WATER PROVIDERS CONSORTIUM INTERGOVERNMENTAL AGREEMENT

IN WITNESS WHEREOF, the signatory hereby causes this agreement to be executed.

(Signatory page can be changed to fit specific adoption process)

SIGNATORY PARTY

CITY OF TIGARD
Jurisdiction or Entity Name

By:_____
Heidi Lueb, Mayor

APPROVED AS TO FORM:

By: _____
Shelby Rihala, City Attorney

Dated:_____

Address:
13125 SW Hall Boulevard
Tigard, OR 97223

Send signed agreement to Patty Burk patty.burk@portlandoregon.gov or mail to:

Portland Water Bureau
Attn: Patty Burk
1120 SW 5th Ave. Suite 405
Portland, OR 97204

AIS-5520 **7.**

Business Meeting

Meeting Date: 06/04/2024

Length (in minutes): 35 Minutes

Agenda Title: Tier 2 Microgrid Update

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Presented By: Gary Pagenstecher, Greg Daniels, Daniels Group; David Heslam, Earth Advantage; Patrick Doherty, InfraCenters

Item Type: Update, Discussion, Direct Staff

Public Hearing Legal Ad Required?: No

Publication Date:

Information

EXPLANATION OF ISSUE

The City of Tigard Resiliency Initiative is a microgrid feasibility study. It was conducted to learn more about pre-disaster energy resilience in Tigard through the installation of microgrids at three scales: 1) at the Tigard library to support resilient operation of the building and the backup emergency operations center (EOC); 2) at the district scale for community solar and publicly accessible resilience services; and 3) at the public scale, for additional resilience and climate benefits, along with economic development.

This Council briefing continues the July 11, 2023 overall introduction and January 16, 2024 Library Tier 1 briefings on the Initiative. This presentation will share the findings and recommendations of the Tigard Tier II: Creating Community Energy Resiliency report (attached), prepared by our consulting engineer PAE, and provide an update on developing implementation efforts.

PAE's study identifies the distributed energy resources (DERs) including photovoltaics (PV) and battery energy storage systems (BESS) for facility and community resiliency through an "island-capable" microgrid control system in the neighborhood of the Fields property. The neighborhood is comprised of the Trailhead development site and adjacent sites, including the Fields Apartments and the Martin property (including the future City of Tigard Public Works and Police Department site). The analysis explored the implementation of a microgrid system for the purpose of peak load shedding and resilience scenarios of varying durations, given the assumptions in play at the time of the study. The key findings of the study included:

- A district scale microgrid design with buy-in from all relevant stakeholders. While solutions exist that could be built within the framework of private enterprise, the best solution would require a public/private/utility partnership.
- Due to the limitations on the amount of PV that can be built on the site, as well as the limitations on the climate region occupied by the city of Tigard, installation of a large battery would be necessary to achieve the full resilience goals explored in this report.
- Either PGE or a third party private investor would be the best means for providing the battery on site.

A Community Development Department invitation to implement a neighborhood-scale microgrid within a resiliency hub framework at the Fields property is of interest to potential project partners: The Daniels

Group, which has site control of the Trailhead development site; InfraCenters, for developing significant on-site battery energy storage systems (BESS); These stakeholders will be present at the Council meeting to share how they would like to partner with the City of Tigard to implement the recommendations of the study and to share perspectives of how and why this opportunity is ripe for addressing the Council's goal of Climate Action.

ACTION REQUESTED

Receive project update.

BACKGROUND INFORMATION

Dates of Previous and Potential Future Considerations

July 11, 2023 - first project briefing. Staff provided background about microgrids, resiliency, sustainability and the rationale for the three-tiered study. Councilors expressed general support for the project and specifically expressed interest in engagement.
January 16, 2024 – Briefing, focusing on Library Tier 1 microgrid design development and adopting a resolution to seek funding for implementation.

Public Involvement

In addition to prior council briefings, resilience has become a feature of ongoing community discussions in the community, most recently at CD's community get-together hosted by the Muslim Educational Trust on April 30th and through the library education program focusing on microgrids on May 23rd. The Climate Action Tigard volunteer group has also talked about resilience as an important community focus in the coming years.

Impacts (Community, Budget, Policies and Plans/Strategic Connection)

The project is responsive to the Council's 2023-25 goal to address climate change by reducing the city's carbon emissions and prioritizing carbon responsibility in City operations. The project meets objective 3.5 in the city's 2020-25 Strategic Plan by addressing climate impacts to the maximum extent practicable, especially for those most vulnerable and by preparing the city's landscapes and public spaces for a changing climate. It also meets multiple Comprehensive Plan goals and policies related to disaster preparedness, emergency response, energy conservation and pursuit of alternative energy sources.

Specifically, the neighborhood microgrid project will begin implementation of the 2019 Climate Action Report's strategy to lower greenhouse gas (GHG) emissions by expanding distributed energy resources in the city to an estimated 50MW by 2030.

If implemented, energy cost savings for the city and for district participants could be realized from the the solar PV system and by use of the battery and controller both demand management and controlling the time-of-day energy is purchased when energy prices are lower. Additionally, a community solar project could be implemented to benefit low-income households in Tigard.

The neighborhood microgrid project would provide energy resilience during grid failure, a key to ensuring the city can provide continuity of emergency response services (EOC at PW/Police Wall Street site).

Implementation of this high-visibility project will improve understanding of the City's climate work and how the organization is supporting it; and build awareness in support of residents' own carbon emissions reduction.

Next steps:

- Community Renewable Energy Program Grant (submitted May/award Aug), 6 month study results

in March 2025, which will provide the basis for fiscal impacts on the city.
- Resiliency Hub charrette with interested parties, June 20th
- Future Council meeting on the results of the charrette and a proposed Earth Advantage Community Change Grant, July (if available)

ALTERNATIVES & RECOMMENDATION

Receive the Tigard Tier 2: Creating Community Energy Resiliency update and meet prospective implementation partners.

ADDITIONAL RESOURCES

Attachments

PowerPoint

PAE Tier II Microgrid Report

CITY OF TIGARD

Respect and Care | Do the Right Thing | Get it Done

Tigard Resiliency Initiative

Pre-disaster Energy Resiliency Through Microgrids:

Tier 2 Microgrid Update

(no Council action required)

City Council | **June 4, 2024**

Trailhead Resiliency District Partners

CITY OF Tigard

PGE

The Daniels Group

CAPSTONE PARTNERS

MACADAM FORBES COMMERCIAL REAL ESTATE SERVICES

INFRACENTERS

Scott Edwards Architecture

PAE

earth advantage.

Tigard Tier II: Creating Community Energy Resiliency

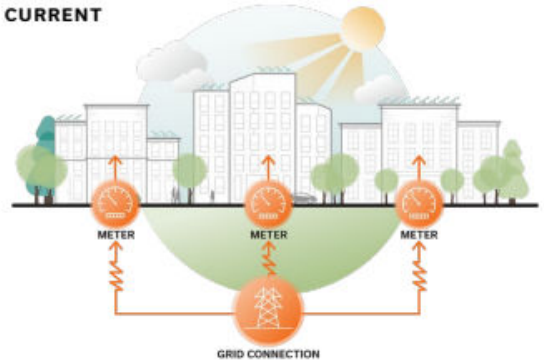
Included in this analysis are 5 apartment buildings, the apartment clubhouse, two future office buildings, and a transportation hub and bridge

Location: 7790 SW Hunziker St, Tigard, OR 97223

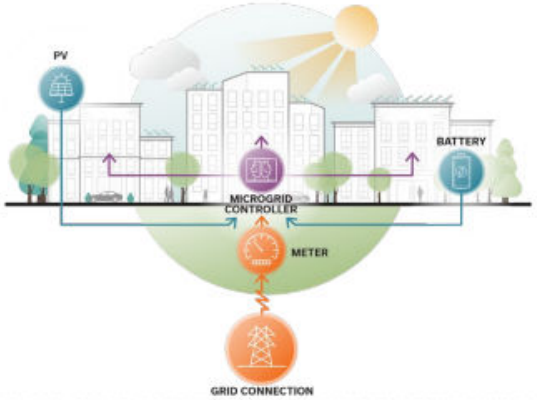
CONTEXT WITHIN PGE SYSTEMS

Medium voltage campus scale microgrid will need to be contained on owner side. PGE will provide utility to boundary point.

CURRENT

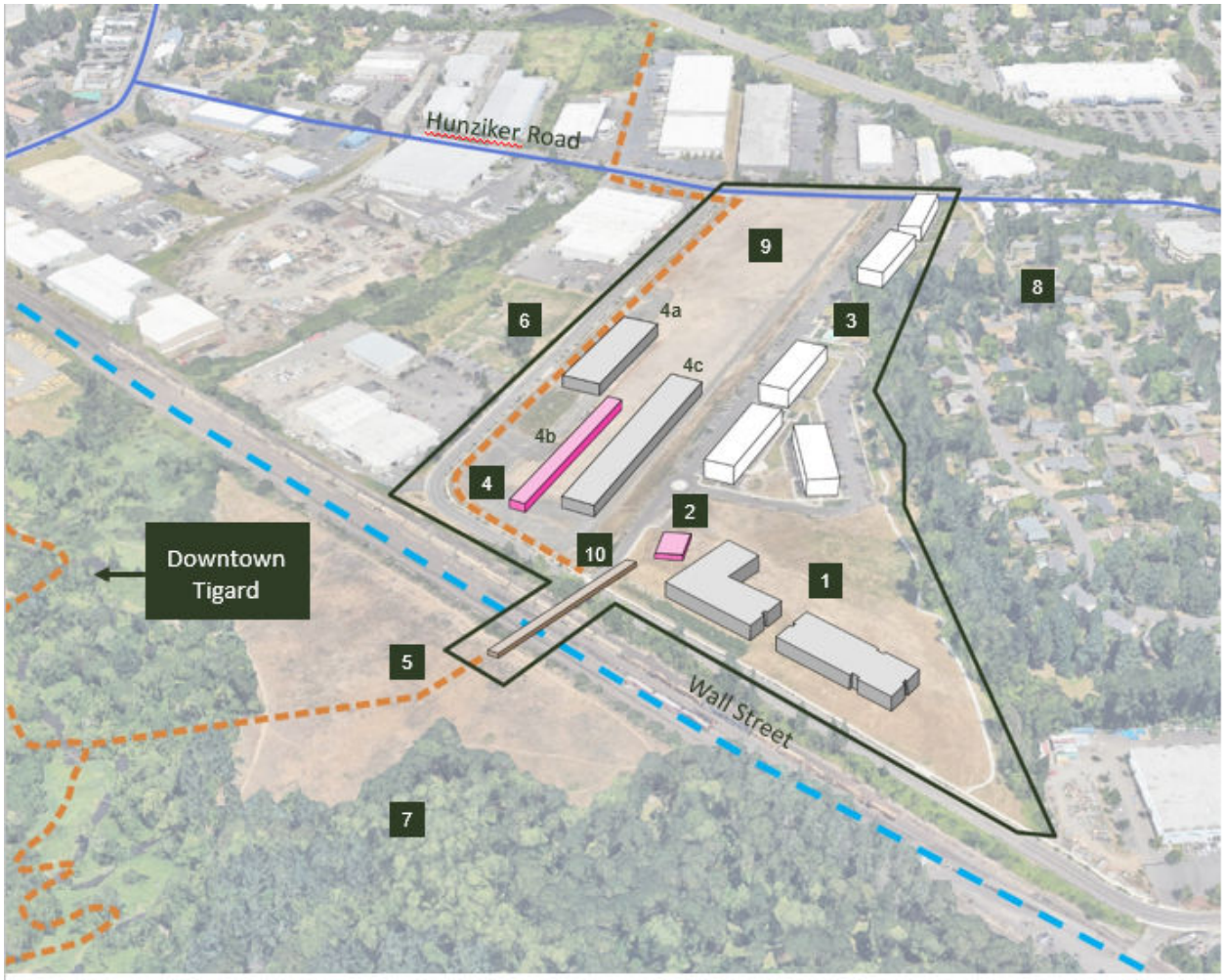


PROPOSED MICROGRID





Trailhead Resiliency District Boundary



- Infrastructure for Microgrid System
- District Boundary
- 1 — Trailhead Site, Private Land, Future Multi-Family Development
- 2 — Resilience Hub
- 3 — Fields Apartments
- 4 — Industrial Land, City of Tigard Future Development
- 4a — Office Building
- 4b — Battery Storage
- 4c — Warehouse
- 5 — Metro Park
- 6 — Potso Dog Park
- 7 — Durham Neighborhood
- 8 — Rolling Hills Neighborhood
- 9 — Future Industrial Development
- 10 — Pedestrian & Bike Bridge, Solar Collector
- WES Rail Line
- TriMet Bus Lines
- Red Rock Creek Trail

Tigard · PGE · The Daniels Group · CAPSTONE · MACADAM FORBES · INFRACENTERS · Scott Edwards Architecture · PAE · earth advantage

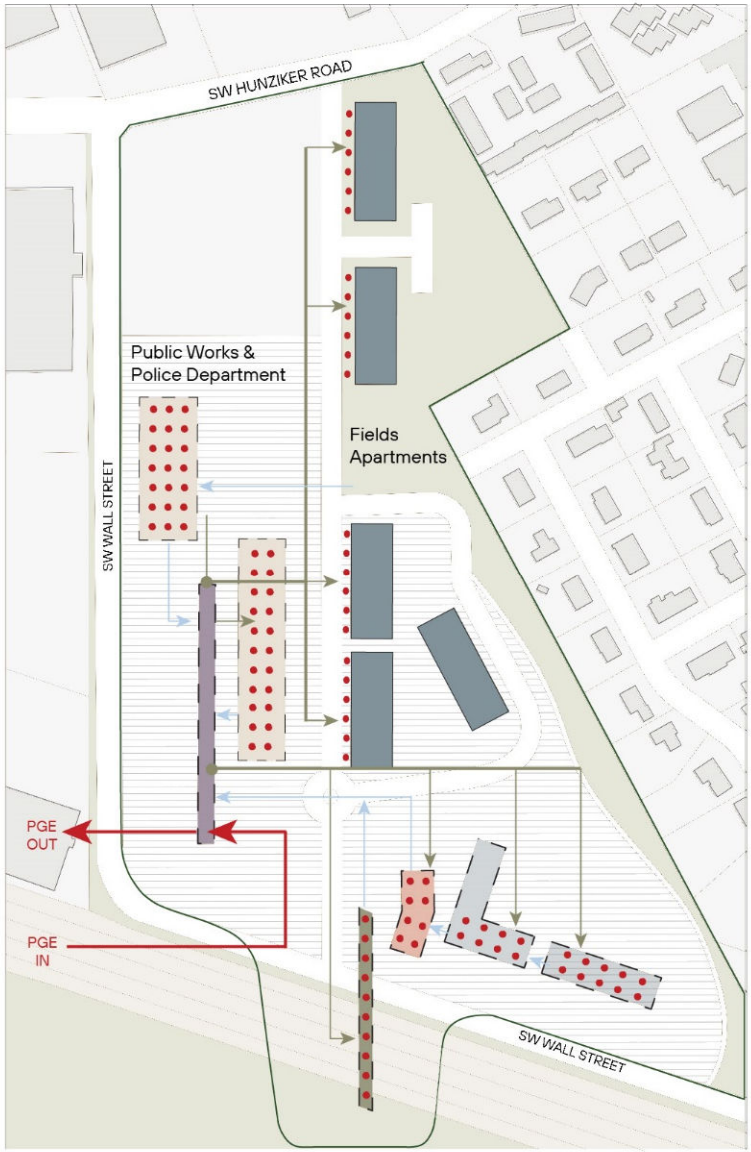
Microgrid Component Distribution

Battery Energy Storage System

Solar/Photovoltaics
- rooftop
- carport canopy
- pedestrian bridge

PGE Feeder connection





CITY OF TIGARD

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Tigard Resiliency Initiative

Tier 2 Microgrid Update

Questions/Discussion/Direction

City Council | **June 4, 2024**



Tigard Tier II:

Creating Community Energy Resiliency

A PRELIMINARY ANALYSIS OF RESILIENCY OPTIONS

OCTOBER 6, 2023

PAE

pae-engineers.com



Notes on How to Read this Report

A quick look at the length of this report might feel overwhelming. But fear not, a comprehensive summary can be found in the opening executive summary section. This initial section provides a summary of the study's key findings and conclusions.

The remainder of the report provides an in-depth look at the modeling results and supporting data.



High Level Summary

Pay special attention to the flow chart in the Executive Summary. This captures most of the scenarios explored in the completion of this report. You can reference the numbers on that flow chart in all of the later data sections to stay oriented as you read through this report.

Defining Terminology

Defining Resiliency lays out terminology used throughout the report as well as how the project approached the analysis of resiliency.

Scenario Details

The Whole Community Scenarios Section follows a consistent pattern.

1. Scenario Overview page
2. Analysis of the relevant loads
3. Analysis of the PV production possible on the site
4. Overlay of the loads and PV combined.
5. The battery sizes explored. Battery sizing pages will also include some additional scenarios explored based on the findings.

A Deeper Dive

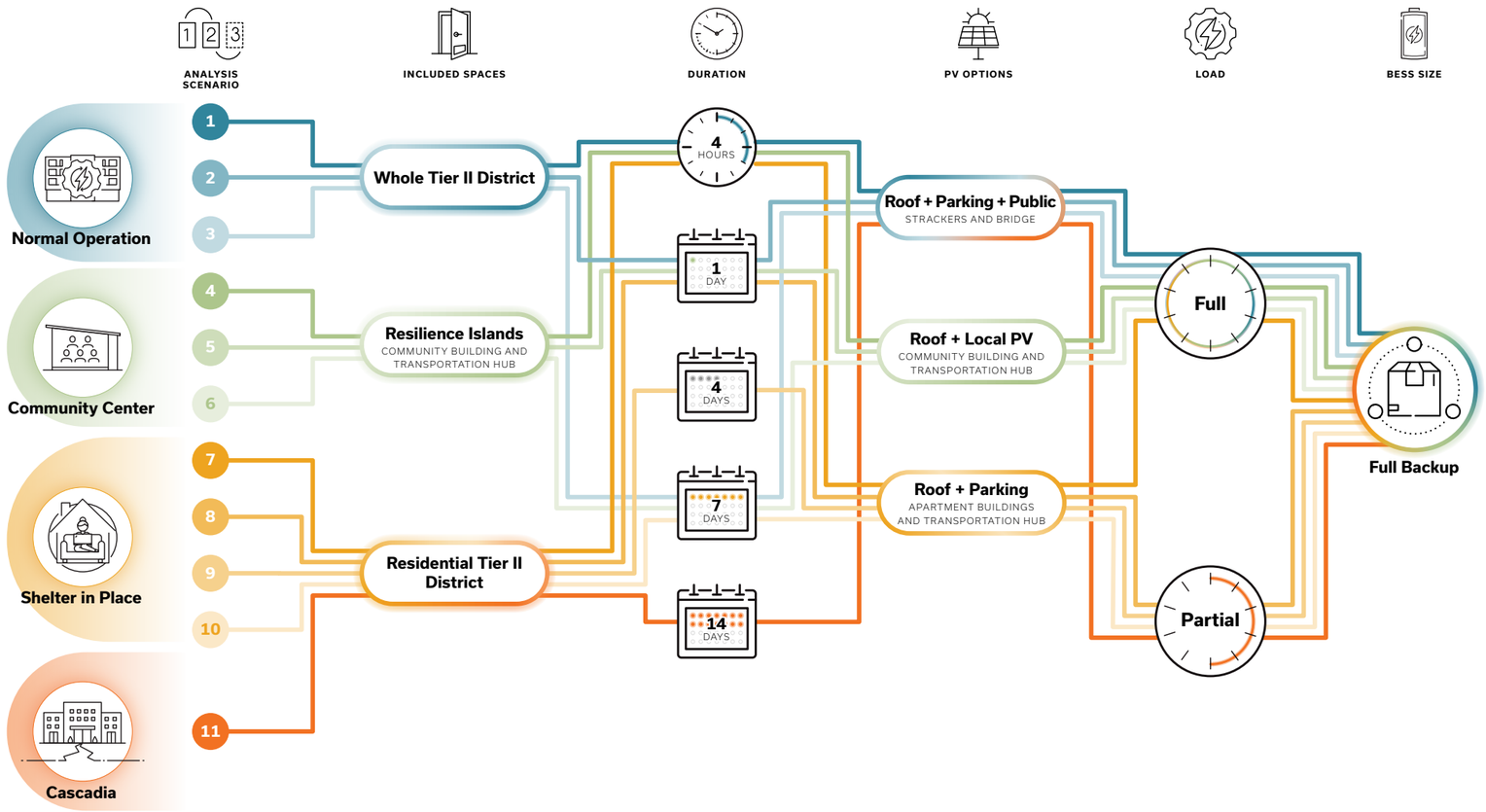
The Resiliency: A Deeper Look section is the most technical and needs a careful reading. In each section this report explores in depth several different methods for either increasing the resiliency of some part of the district or a means of stretching resources as far as possible in the event of a power loss event.

Vision of How

This report concludes with **a vision for HOW this Community Microgrid could begin to become a reality**, including an analysis of how the proposed district Microgrid would connect to the existing PGE power infrastructure, possible sources of funding and the foundation for the further explorations of Tier 3.

Executive Summary

Mapping a Path to Resiliency



Report Contents

3 Executive Summary

7 Defining Resiliency

13 Whole Community Scenarios

31 Resiliency: A Deeper Look

36 The District Microgrid: A Vision for Tomorrow, Today

39 Appendix

Executive Summary CONTINUED

Goals and Intent

The goal of this report is to analyze feasible resilience solutions for a district scale microgrid. This district scale microgrid meets the goals and recommendations set forth in the City of Tigard's Community Action Plan to respond to the needs of climate change.

In it's Executive Summary the City of Tigard "Identifies how the broader community—from utility operators and local businesses to educators, and citizens of all ethnicities, genders, and socio-economic groups—will need to be engaged, take responsibility for, and benefit from Tigard's transition to becoming a net-zero emissions community.

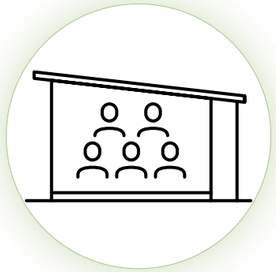
This report is written as part of a solution to meet this goal.

This report analyzes methods for providing local resilience with only site owned resources, as well as the benefit of a larger scale more integrated approach that requires buy-in both from the Tigard community as well as the utility, PGE, and private enterprise. The goal being to create a win-win-win solution that benefits all three stakeholder groups.

The following scenarios and systems are considered in this report



NORMAL OPERATION RESILIENCE



COMMUNITY CENTER RESILIENCY HUB



SHELTER IN PLACE RESILIENCE



CASCADIA EVENT RESILIENCE

How We Achieve Resiliency

THE FOLLOWING TECHNOLOGY SOLUTIONS WERE EXPLORED IN THIS REPORT.



PV Array Size and Location

- Transportation Hub and Bridge
- Community Center Rooftop
- Apartment Building Rooftop
- Office Rooftop
- Strackers



Battery Size

- For Community Resilience Hub
- For Normal Operation Resilience
- Shelter in Place Resilience
- Cascadia Event Resilience



Load Shedding Control Systems

In scenarios where consumption was high, such as the shelter-in place or cascadia scenarios, loads shedding techniques were explored.

LOAD SHEDDING CONTROL SYSTEMS

MANUAL LOAD CONTROL

- Rolling Blackout Scenario
- Microgrid Support for Hallway space conditioning

AUTOMATED LOAD CONTROL

- CTA 2045 standard devices
- Prepaid Metering

KEY FINDINGS

1 A district scale microgrid design will require significant buy in from all relevant stakeholders for this project to succeed. While solutions exist that could be built within the framework of private enterprise, the best solutions require a public/private/utility partnership.

2 Due to the limitations on the amount of PV that can be built on the site, as well as the limitations on the climate region occupied by the city of Tigard, a signifcantly sized battery is necessary to achieve the full resiliency goals explored in this report.

3 It is recommended that either PGE or a third party private investor is the best means for providing the battery needed for this site. A means for compensation and return on investment will require a re-imagining of the public/private/utility partnership.

Overview of Tier II Scope

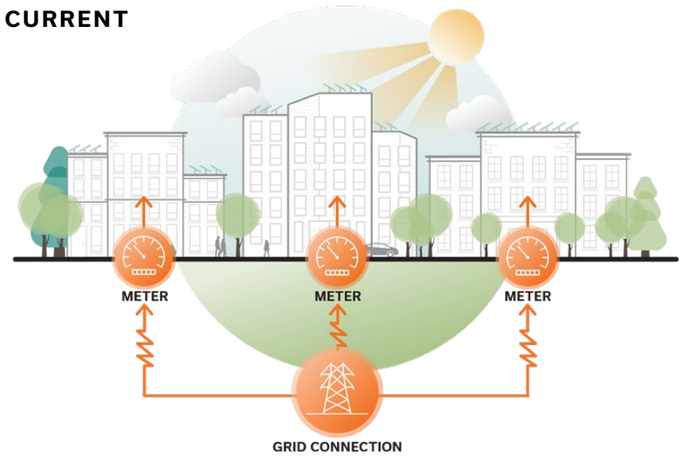
Included in this analysis are 5 apartment buildings, the apartment clubhouse, two future office buildings, and a transportation hub and bridge

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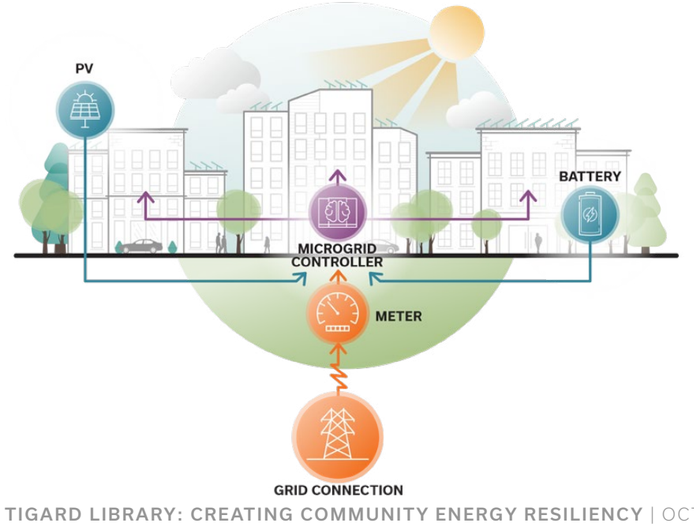
CONTEXT WITHIN PGE SYSTEMS

Medium voltage campus scale microgrid will need to be contained on owner side. PGE will provide utility to boundary point.

CURRENT



PROPOSED MICROGRID



Tigard Resiliency District Tier II

THE FIELDS APARTMENTS
- 5 Buildings
- 4 Stories
- 250,000 SF
- EUI = 45

THE FIELDS APARTMENTS CLUBHOUSE
- 3,500 SF
- EUI = 58

FUTURE TRANSPORTATION HUB
- Covered bike parking and charging

FUTURE OFFICES
- 2 Buildings
- 2 Stories
- 80,000 SF
- EUI = 29

Current TIER II

RESILIENCE HUB

THE FIELDS APARTMENTS

The Fields Apartments are a privately owned existing apartment complex. Ultimately, modifications will be evaluated with consideration of benefits for all parties involved including the owner.

RESILIENCE HUB

Future TIER II

Recommendations

While a recommended battery size is given for each scenario, the microgrid can be used in multiple scenarios. The number of days the microgrid can run has been calculated by battery size for each scenario.

In this case, only one scenario is running at a time. It shows that although a 3500 kWh may be chosen to achieve full resiliency for 4 hours in normal operation, a 3500 kWh battery would achieve 21 days of resiliency when powering the clubhouse and transportation hub (community resilience hub scenario). Similarly, a 3500 kWh battery would achieve 0-21 days of resiliency in the shelter in place scenario.



Normal Operation

GOAL

Provide continued, uninterrupted power so all buildings can continue to operate as normal.

4 Hours

OUTAGE DURATION

3500 kWh

BATTERY SIZE



Community Center Resilience Hub

GOAL

Provide a community space where community can come to access electricity to charge devices, make food, warm up or cool down.

7 Days

OUTAGE DURATION

1250 kWh | 100 kWh

CLUBHOUSE **TRANSPORTATION HUB**

BATTERY SIZE



Shelter in Place

GOAL

Provide power to apartments and common spaces to allow tenants to sustain livable conditions.

1 Day

OUTAGE DURATION

7500 kWh

BATTERY SIZE



Cascadia

GOAL

Provide power to apartments and common spaces to allow tenants to sustain livable conditions.

14 Days

OUTAGE DURATION

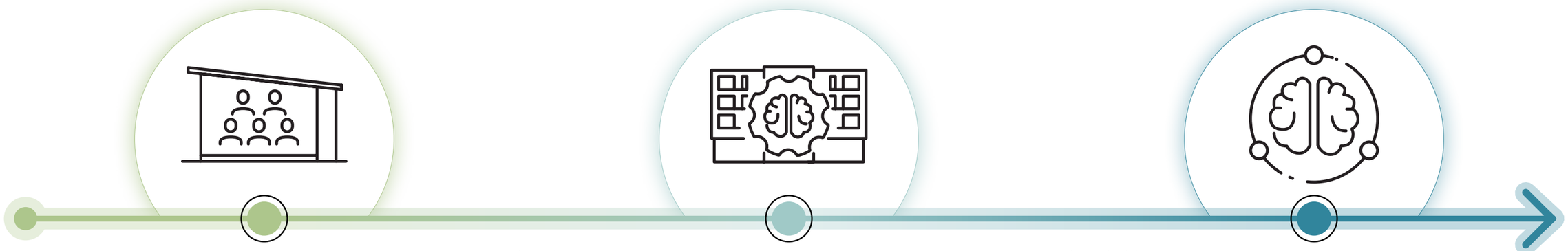
1750 kWh - 179,250 kWh

BATTERY SIZE

DEPENDING ON WHAT WILL BE POWERED. SEE CASCADIA EVENT PAGE FOR RESULTS

A Look Forward

Next Steps for the Field Property



NEAR TERM

Community Center Resilience Hub

CLUBHOUSE MICROGRID

A single building microgrid to serve as a community hub and point of respite can be established today with existing technologies and utility programs. It would only provide a limited amount of resilience during a major event, but is the most straightforward option for implementation today.

Resilient Spaces

APARTMENT BUILDING HOUSE PANELS

Adding small microgrids to the house panels and communal spaces (i.e. corridors) in all the apartment buildings could be implemented with existing technologies and utility programs today.

There are potential design challenges to this approach and further study is required to confirm feasibility and retrofit impacts.

FUTURE OUTLOOK

Resilience District

CAMPUS MICROGRID

The campus-scale microgrid is the most challenging of the options but also the most rewarding. The technology to support this solution is becoming more readily available, although is still relatively new and not without it's challenges. The biggest hurdle is a utility policy that is advantageous enough to be of interest to private party financial partners. If this limitation can be overcome with updated PUC policies and innovative utility programs. this option could become a viable path forward in the not too distant future.

TIER II TIGARD COMMUNITY

Defining Resiliency

What Makes a Community Resilient?

Resilience Districts are community-serving facilities augmented to support residents and coordinate resource distribution and services before, during, or after a natural hazard event. They leverage established, trusted, and community-managed facilities that are used year-round as neighborhood centers for community-building activities.



COMPONENTS OF A RESILIENCE DISTRICT

Building & Landscape
shelter able to support operational goals in all conditions

Energy Systems
uninterrupted power to facility during a hazard

Water Systems
provide access to freshwater

Services & Programming
provide access to food, medical supplies, and charging stations

Operations
ensure personnel and processes are in place to run center in event of a disruption

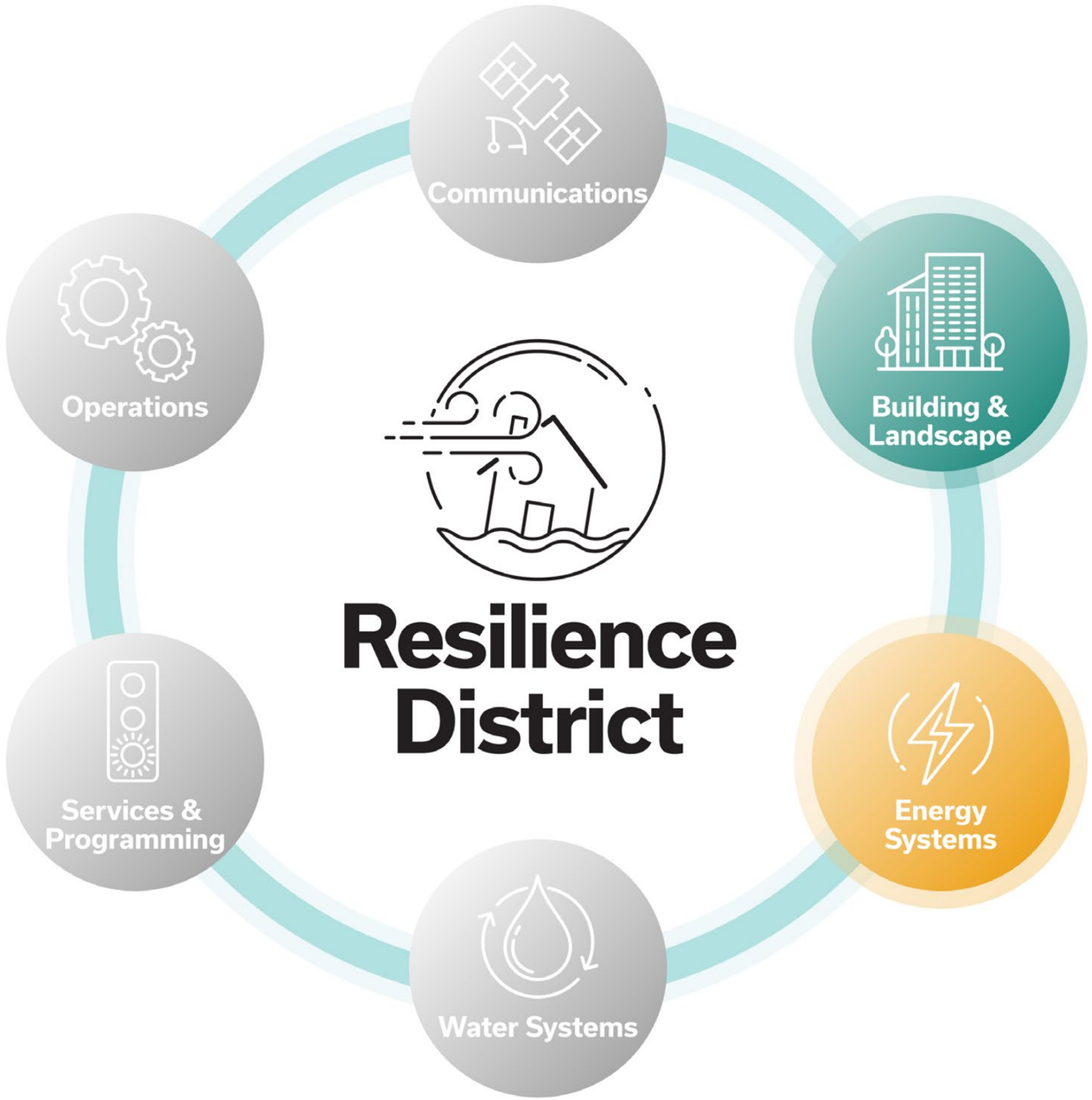
Communications
set up system to communicate within and across community



Steps to create a Resiliency District:

1. What hazards will the district handle?
2. Assess current community resiliency.
3. How will the district improve resiliency?
4. What stakeholders will define the district requirements?
5. What does success look like?
6. Establish resiliency modes for review with stakeholders.
7. Implement resiliency district design.

How does a District Microgrid improve Resiliency for the Tigard Community?



ANALYSIS

For this analysis, two components of a resilience district have been evaluated:

1. Building & Landscape
The mixed use sector the City of Tigard has identified for this project was chosen due to its unique character. It brings together the residential as well as the commercial realm into one unified system working together for the mutual benefit of both.

2. Energy Systems
The sector is also located at a medium voltage through-point that will allow the city to create a power entity that will be one of the first of its kind: A privately controlled medium voltage sub district that is managed for the benefit of its commercial and residential tenants.

How does this project fit into Tigard's Community Goals?

It Identifies how the broader community — from utility operators and local businesses to educators, and citizens of all ethnicities, genders and socio-economic groups — will need to be engaged, take responsibility for, and benefit from Tigard's transition to becoming a zero emissions community.

The Symbiosis of Sustainability and Resiliency

THE FACTS

Based on Tigard's 2019 Climate Action Report, residences, either single home or multifamily, are the second largest carbon emitters in the city.

When combined with commercial buildings, they account for 53% of all carbon emissions in the city of Tigard for 2019.

The largest portion of that energy emissions comes from space conditioning equipment like heat pumps, traditional ACs, and furnaces.

WHAT DOES THIS MEAN FOR THE CITY OF TIGARD?

Any meaningful efforts to reduce carbon emissions will require the community at large to re-evaluate the mechanics of how we use (and produce) energy.

THE SOLUTION?

While there is no silver bullet that will solve the problems presented by climate change, various solutions exist that can make significant contributions to the overall goal of reducing carbon emissions.

Chief among them: the creation of a District Scale Microgrid for the city of Tigard.

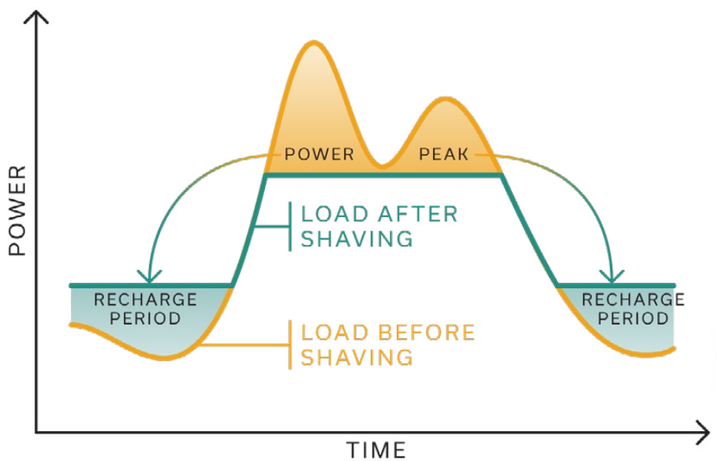
Sustainability

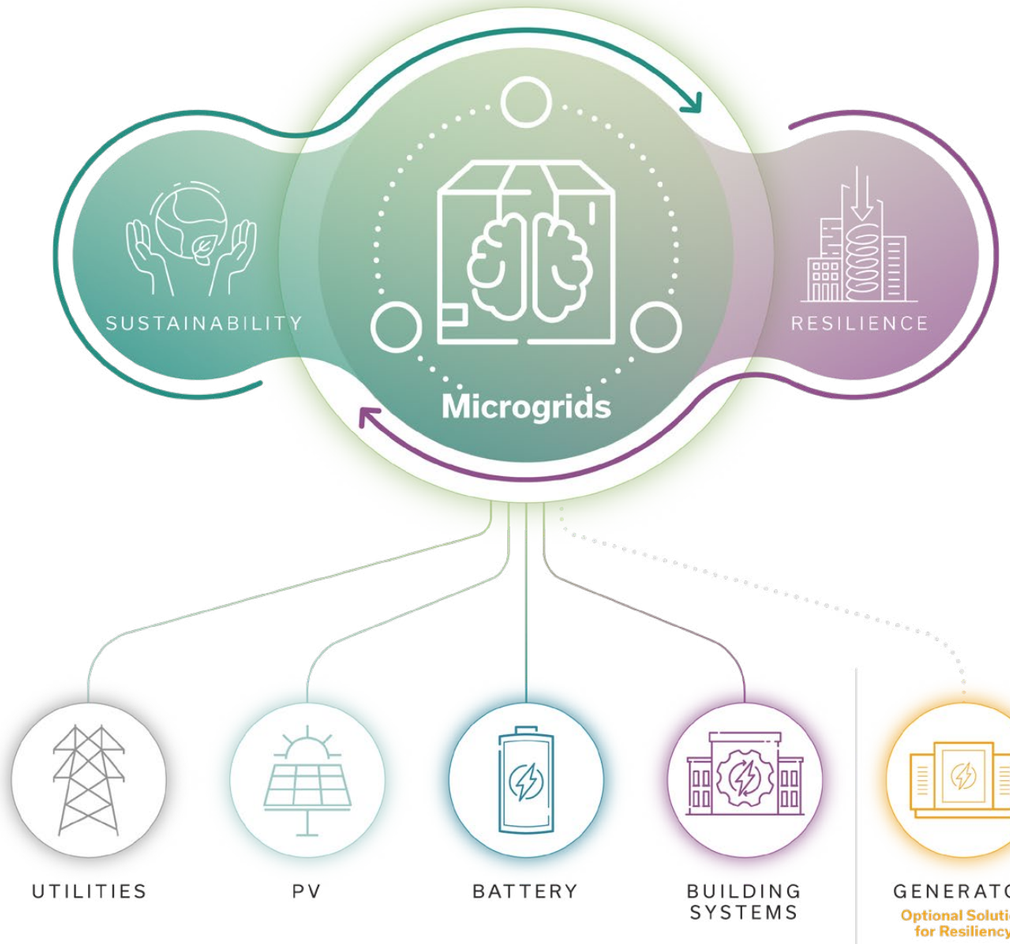
ADD 1.8 MW OF PV

City of Tigard Climate Action Report sets target of adding 50 MW by 2035

USE OF BESS SYSTEM DURING PEAK HOURS

when grid is the dirtiest can reduce carbon emissions and save on peak load charges.





Resiliency

USE OF BESS SYSTEM DURING PEAK HOURS

can reduce strain of utility grid, creating more robust utility for all.

CREATES COMMUNITY SAFE SPACE

to be used as gathering center during outages.

INCREASES VALUE OF BUILDINGS

with tenants willing to pay more for resilient building.

GENERATORS

Generators can be used to bridge the gap between economical battery sizes and full resiliency. As technology develops, generators will be replaced with cleaner technology and more batteries. For this reason, generators were not analyzed in this study.

Summary of Technology Innovation Ideas

Production



Single Tilt (South) Racking

Modules installed at 10° tilt toward south

APPLICATION
Flat roofs

MAINTENANCE

COST
$

DIFFICULTY OF INSTALLATION

PRODUCTION
1190 kWh/kW

SPACING

- Requires largest interrow spacing to reduce shading
- Mounting option with potential for highest production per panel



Dual Tilt (East/West) Racking

Modules installed in alternating rows to face east and west.

APPLICATION
Flat roofs

MAINTENANCE

COST
$-$$

DIFFICULTY OF INSTALLATION

PRODUCTION
1140 kWh/kW

- East and west orientation extends daily production time period as it catches morning and evening daylight

SPACING

- Requires some interrow spacing to reduce shading



Flush-Mount Racking (Carport)

PV modules installed flush with angled carport

APPLICATION
Carports

MAINTENANCE

COST
$$$

DIFFICULTY OF INSTALLATION

PRODUCTION
1105 kWh/kW

SPACING

- Don't require spacing between rows to offset shading allowing more modules in area
- Losses due to temperature from reduce airflow between rows



Dual Tilt Axis (Strackers)

PV modules installed in array the moves with the sun

APPLICATION
Ground

MAINTENANCE

- Mechanized parts will require maintenance

COST
$$$$

DIFFICULTY OF INSTALLATION

PRODUCTION
2000 kWh/kW

SPACING

- Separation required between independent strackers

Image source: strackersolar.com

Summary of Technology Innovation Ideas

BATTERY TECHNOLOGY

Li-ion Battery GENERIC

4MW/16MWH | LITHIUM FERROPHOSPHATE, LIFEPO4



Cost
$600/kWh

Size
- 3,840 square feet (16'x30' Shipping Containers)
- 55,000 lbs per Container

Reliability
- High Reliability
- Integral BMS* and HVAC

Maintenance
- Battery Module Replacement Every 7-10 years
- Charge Cycles: 3,000 to 10,000
- Complete Charge /Discharge Every 6 months

Power Available
within <1 second

Sustainability
- High Efficiency (>85% to 90%)
- End-of-Life Recycling is Emerging Business (currently difficult)

Full Discharge/ Recharge in 4 hours

Fire Protection
- Integral Fire Detection/ Suppression
- Clearance from Buildings, Lot Lines, and Egress Pathways
- Large-scale Fire Risk Exists

** BMS: Battery Management System*

Flow Battery

4MW/16MWH | IRON REDOX FLOW



Cost
$500/kWh at 4 hours
$297/kWh at 8 hours
$237/kWh at 12 hours

Size
- 32,670 square feet (3/4 acre)
- Battery in Prefabricated Structure Electrolyte in Exterior

Reliability
- Integral BMS*
- Wide Operating Temperature Range
- No HVAC Required in Hot Climates
- Large Parasitic Load in Cold Climates

Maintenance
- Electrolyte Replacement
- Charge Cycles: Unlimited (No Degradation)

Power Available
within <1 second

Sustainability
- Medium Efficiency (70% to 75%)
- Non-Toxic Chemistry

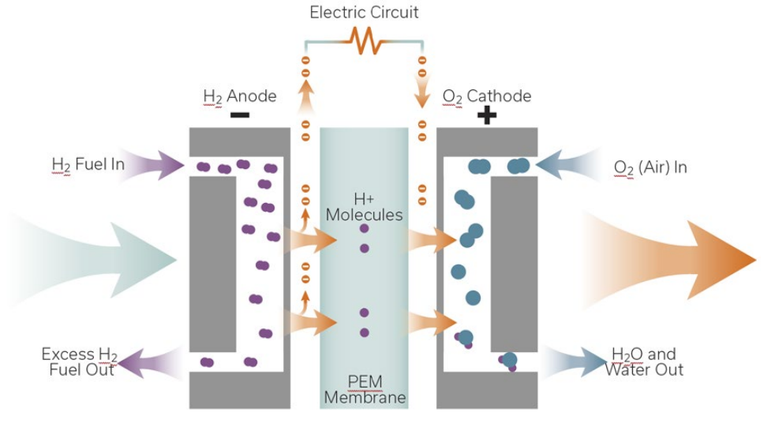
Full Discharge/ Recharge in 4 to 12 hours

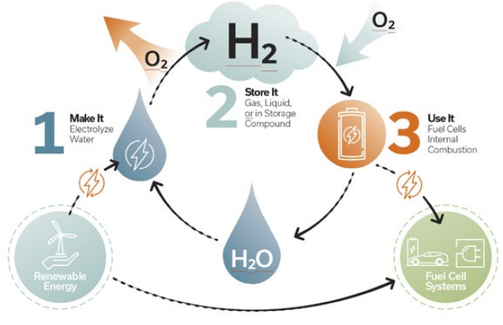
Fire Protection
- Electrolyte is Inherently Safe
- Fire Detection Required for Electronics
- No Large-scale Fire Risk

OTHER TECHNOLOGIES

Hydrogen Fuel Cell

- **Emerging technology** that promises to decarbonize gas systems and supplement battery systems
- **Fuel cells use hydrogen** to create electricity
- Can be used as an **alternative to generators**
  - Carbon free, non-toxic chemistry
  - Fuel (hydrogen) can be easily transported to site and refilled
- Hydrogen fuel cells **work well in heavy duty applications** like transportation
- **Lower Efficiency** (40% to 60%)
- **The emissions impact of hydrogen is very dependent on how it is generated.** Ensuring the source is "green" hydrogen — generated using renewable sources — is key.





HOW HYDROGEN FUEL CELLS CAN HELP

Fuel (hydrogen) can be extracted from water during times of abundant production then stored or transported to where it's needed.

TIER II TIGARD COMMUNITY

Whole Community Scenarios

Resiliency Scenarios

What do we want to be able to do?



Normal Operation

GOAL

Provide continued, uninterrupted power so all buildings can continue to operate as normal.

BUILDINGS

- Clubhouse
- Apartments
- Transportation Hub
- Offices

LOAD



OUTAGE TYPE



Community Center Resilience Hub

GOAL

Provide a community space where community can come to access electricity to charge devices, make food, warm up or cool down.

BUILDINGS

- Clubhouse
- Transportation Hub

LOAD



OUTAGE TYPE



Shelter in Place

GOAL

Provide power to apartments and common spaces to allow tenants to sustain livable conditions.

BUILDINGS

- Clubhouse
- Apartments
- Transportation Hub

LOAD



OUTAGE TYPE



Load Shedding Employed See Pages...

Cascadia

GOAL

Provide power to apartments and common spaces to allow tenants to sustain livable conditions.

BUILDINGS

- Clubhouse
- Apartments
- Transportation Hub

LOAD



OUTAGE TYPE



Load Shedding Employed See Pages...

Key Terms and Definitions

PARTIAL RESILIENCY
A solution that maintains some part but not all of the normal electrical load during an outage

FULL RESILIENCY
A solution that maintains the entirety of the normal electrical load even during an outage.

FULL LOAD
The normal electrical load when the grid is providing power.

PARTIAL LOAD
Anything less than the normal electrical load when the grid is providing power.

TYPICAL OUTAGE
- This study modeled a **4 and 24-hour outage**.

MAJOR OUTAGE
From time to time a major outage occurs from inclimate weather events such as a winter storm, a wind storm or a fire event that leaves significant sections of the grid off-line for an extened period of time. This study modeled a **7 day outage**

CATASTROPHIC OUTAGE
The west coast is long overdue for an earthquake that could cripple basic infrastructure. This study modeled a **2 week outage**.

Normal Operation

Goal

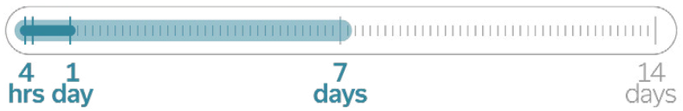
Provide continued, uninterrupted power so all buildings can continue to operate as normal.

LOAD

FULL LOAD
The normal electrical load when the grid is providing power

OUTAGE TYPE

TYPICAL OUTAGE
— Typical or major outage (4 hours - 1 day)



SCENARIOS | WHOLE TIER II DISTRICT

1. 4 Hour Outage | Full Load | Full Backup
   Roof + Parking + Public PV: Strackers and Bridge

2. 1 Day Outage | Full Load | Full Backup
   Roof + Parking + Public PV: Strackers and Bridge

3. 7 Day Outage | Full Load | Full Backup
   Roof + Parking + Public PV: Strackers and Bridge



Loads

NORMAL OPERATIONS

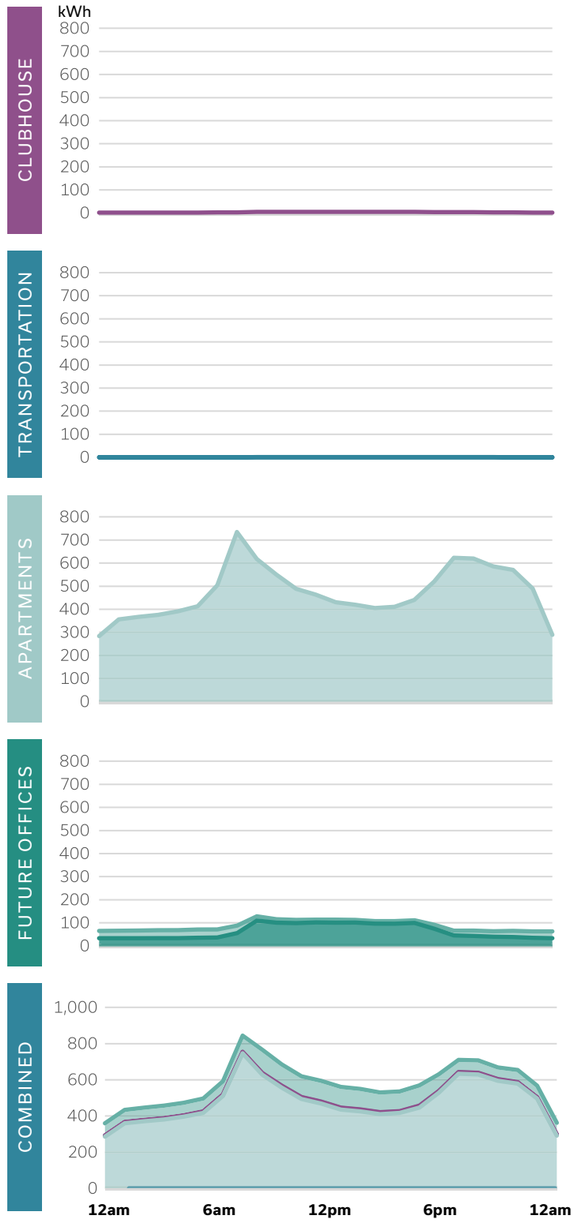
LOAD	OUTAGE TYPE		
Full Load	4 hours	Full Day	7 Days

KEY TAKE AWAYS

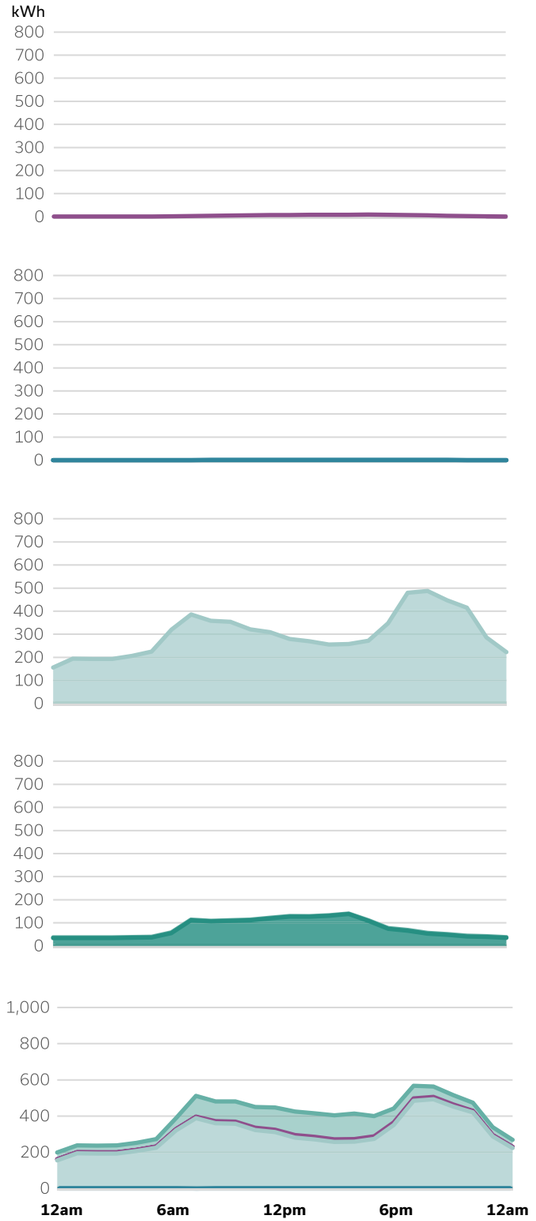
The apartments have a much higher load than any of the other buildings due to their size and frequency of usage. Loads are highest in winter due to space heating. While the apartments lack a central cooling system they are all outfitted with wall baseboard heaters.



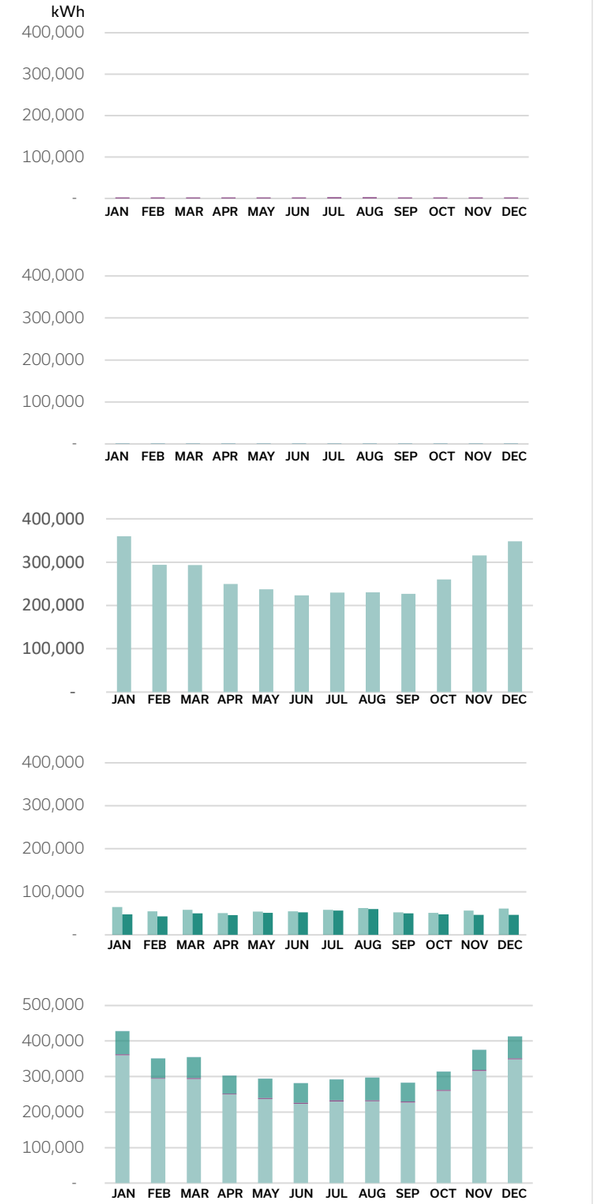
WINTER | JANUARY



SUMMER | JULY



ANNUAL CONSUMPTION



Note: Shown from left to right are the typical daily loads for a typical winter and summer day followed by the annual consumption by month.

PV Production

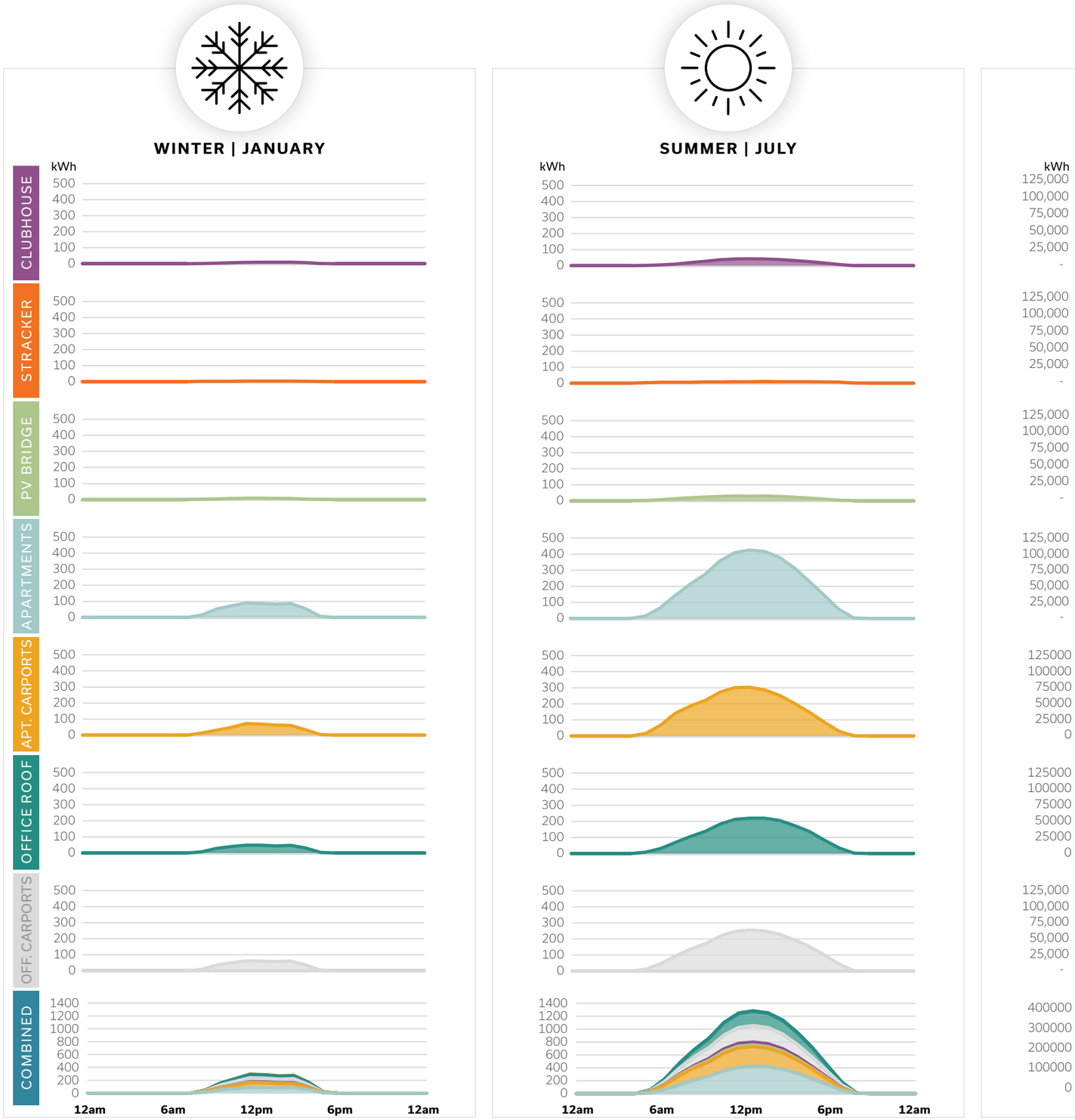
NORMAL OPERATIONS

LOAD	OUTAGE TYPE		
Full Load	4 hours	Full Day	7 Days

KEY TAKE AWAYS

The apartment roofs have the highest PV production capacity with ~560 kW total possible. Each building is able to hold from 87kW-136kW worth of PV depending on the building.





Note: Shown from left to right is the typical daily PV production for a typical winter and summer day followed by the annual production by month.

Loads + PV

NORMAL OPERATIONS

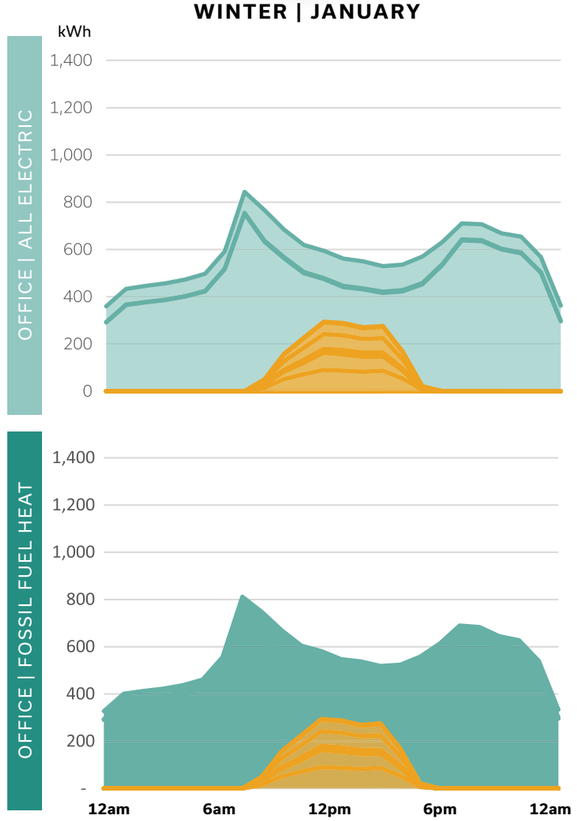
LOAD	OUTAGE TYPE		
Full Load	4 hours	Full Day	7 Days

KEY TAKE AWAYS

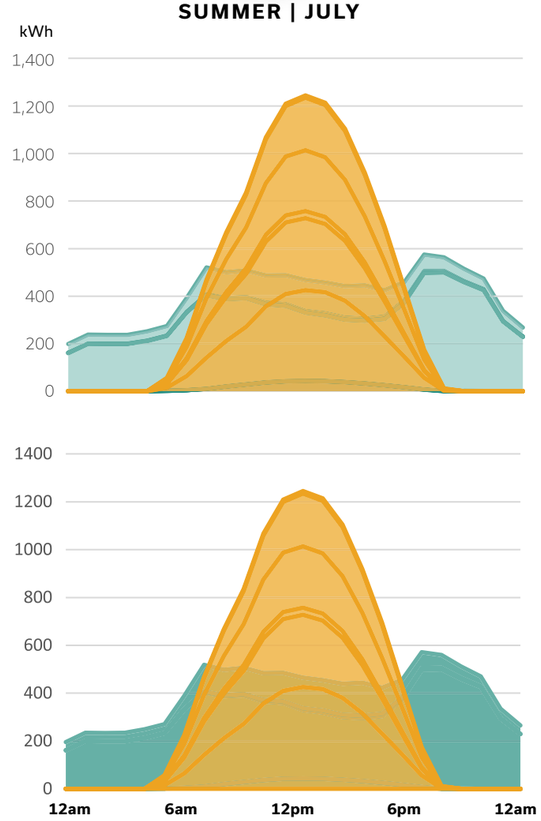
With January having the highest loads and the lowest production, a large battery will be required to provide resiliency in winter months.



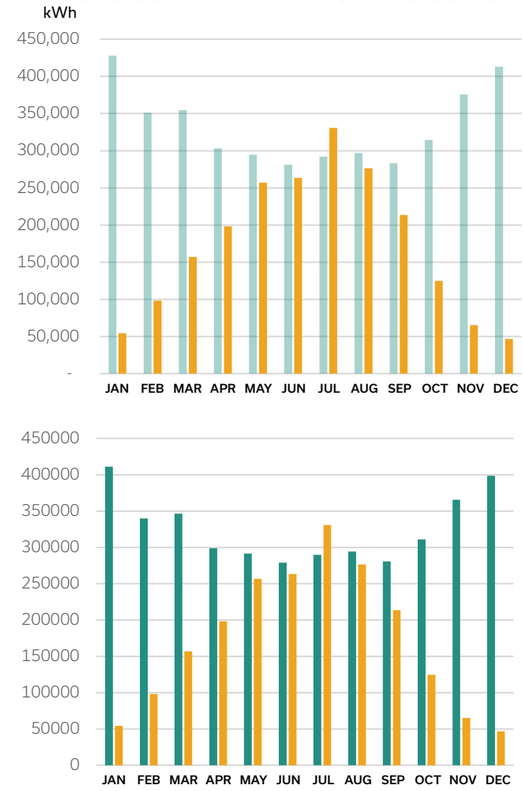
WINTER | JANUARY



SUMMER | JULY



ANNUAL CONSUMPTION VS PRODUCTION



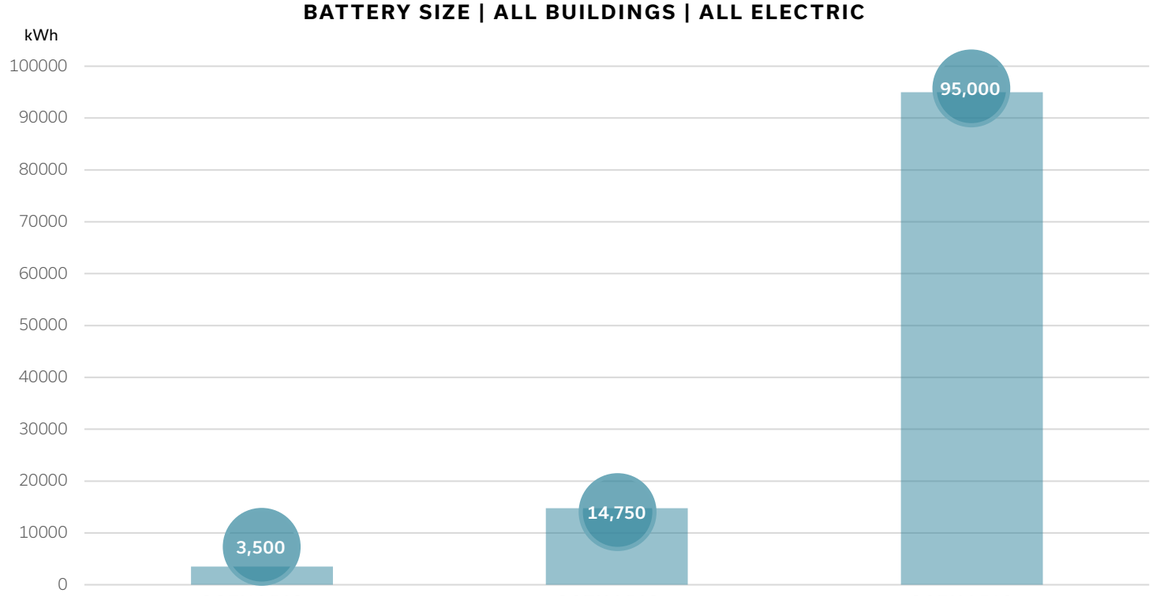
Note: Shown from left to right are the same graphs from the previous two pages overlayed together.

LEGEND Loads PV

Battery Size

NORMAL OPERATIONS

BATTERY SIZE | ALL BUILDINGS | ALL ELECTRIC

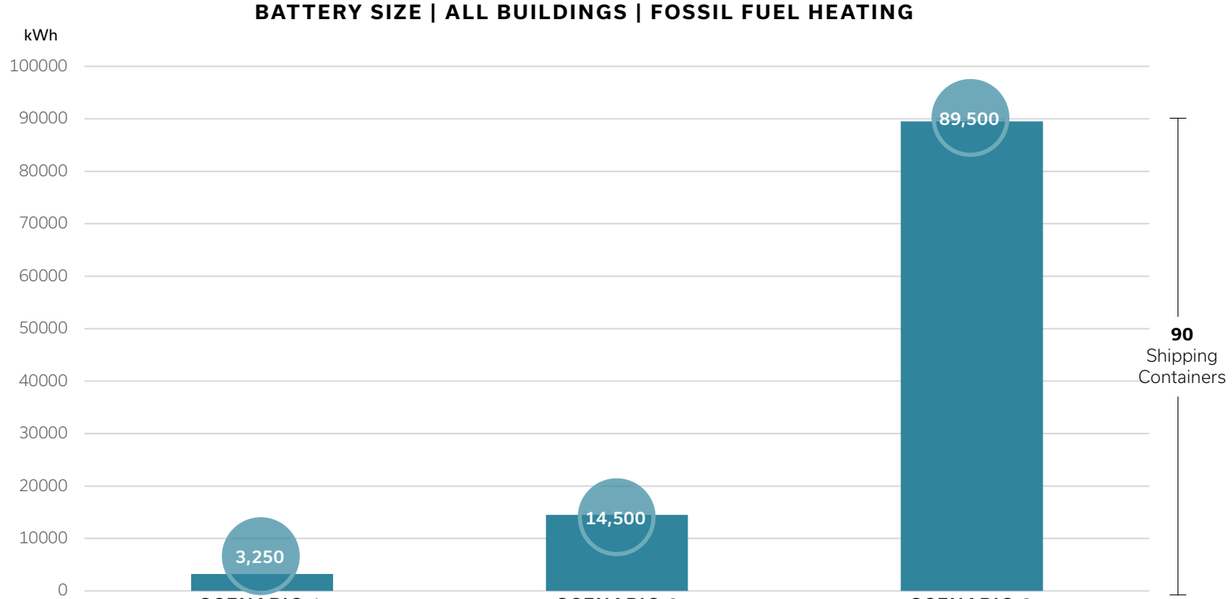


SCENARIO 1
4 hours

SCENARIO 2
1 day

SCENARIO 3
7 days

BATTERY SIZE | ALL BUILDINGS | FOSSIL FUEL HEATING



SCENARIO 1
4 hours

SCENARIO 2
1 day

SCENARIO 3
7 days



Inputs

FULL RESILIENCY
a solution that maintains the eintirety of the normal electrical load even during an outage.

FULL LOAD
the normal electrical load when the grid is providing power.

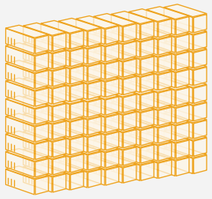
Key Findings

The battery size necessary to support the entire District load is exceptionally large

4 HR-1 DAY OUTAGE

An outage lasting less than a day could be supported with roughly one shipping container worth of battery without needing contribution from the onsite PV. This would support the worst case condition in the winter when loads are high and PV production is low.

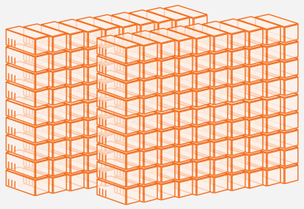
In a summer outage, this same system could potentially support up to three weeks of resilience due to the improved contributions from the PV system.



7-DAY OUTAGE

A 90 MWh battery could support the site for up to 7 days. In an outage beyond this duration could potentially maintain an extremely limited amount of operation, but recharging the battery to full capacity with the onsite PV would be challenging.

During summer months, with an average PV production rate of 5 MWh, it would take nearly 20 day to fully recharge the battery even if all production was used for this purpose. In winter months, recharging with PV only would be nearly impossible and would require a return of the main utility service.



14-DAYS

A 14-day outage would require 180 shipping containers of batteries. The space and cost implications of a system like this make it likely prohibitive. It is recommended than one of the more targeted resilience solutions as outline elsewhere in this report is considered instead.

See the page 31 (Cascadia Event) for more analysis.

Community Center Resilience Hub

Goal

Privide a community space where community can come to access electricity to charge devices, make food, warm up, or cool down.

LOAD

FULL LOAD
The normal electrical load when the grid is providing power

OUTAGE TYPE

TYPICAL OUTAGE

MAJOR OUTAGE

4 hrs | 1 day | 7 days | 14 days

SCENARIOS | RESILIENCE ISLANDS

4 — 4 Hour Outage | Full Load | Full Backup
PV Roof + Local PV: Community Building and Transportation Hub

5 — 1 Day Outage | Full Load | Full Backup
PV Roof + Local PV: Community Building and Transportation Hub

6 — 7 Day Outage | Full Load | Full Backup
PV Roof + Local PV: Community Building and Transportation Hub



Loads

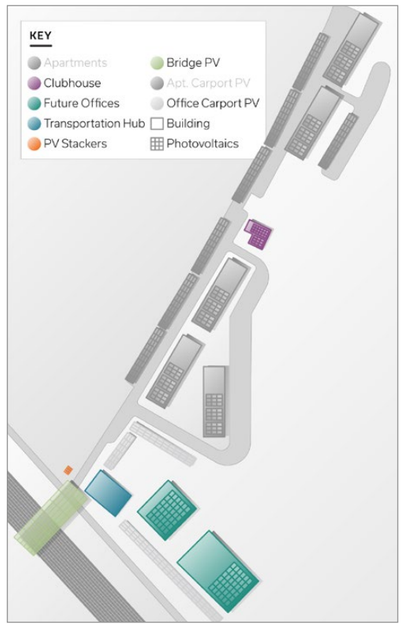
COMMUNITY CENTER RESILIENCE HUB

LOAD	OUTAGE TYPE		
Full Load	4 hours	Full Day	7 Days

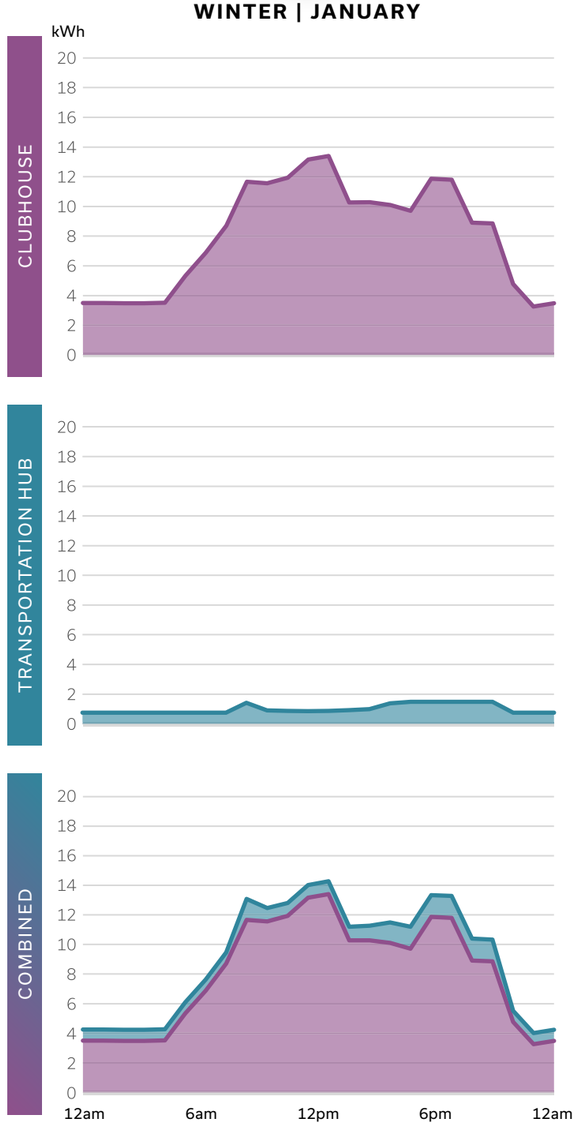
KEY TAKE AWAYS

The Clubhouse has a much higher load than the transportation hub since it includes an enclosed space with heating, cooling, and warm water for showers.

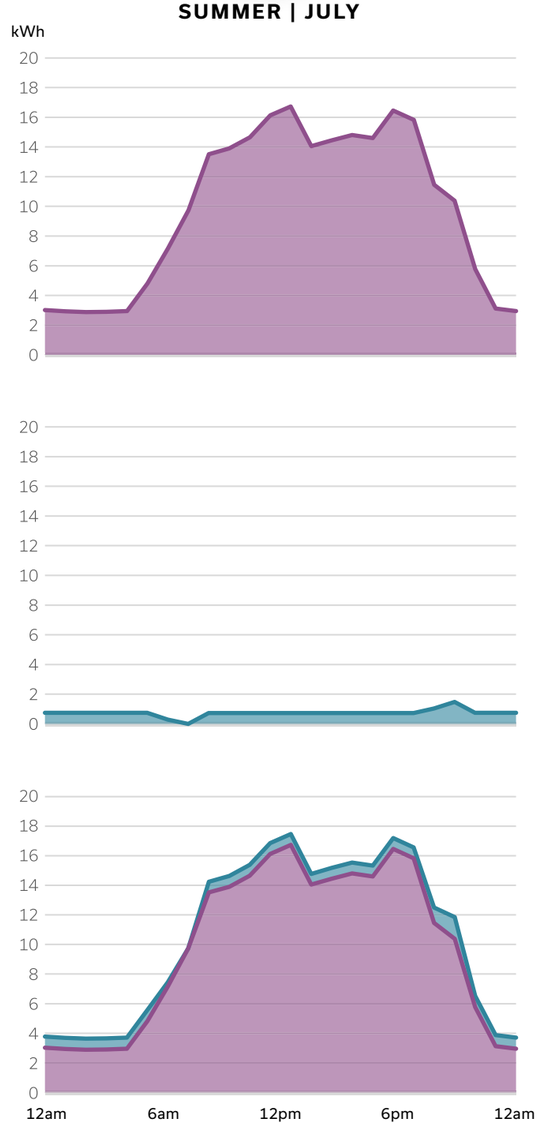
In summer, the air conditioning in the clubhouse can be used to provide cooling for more sensitive groups.



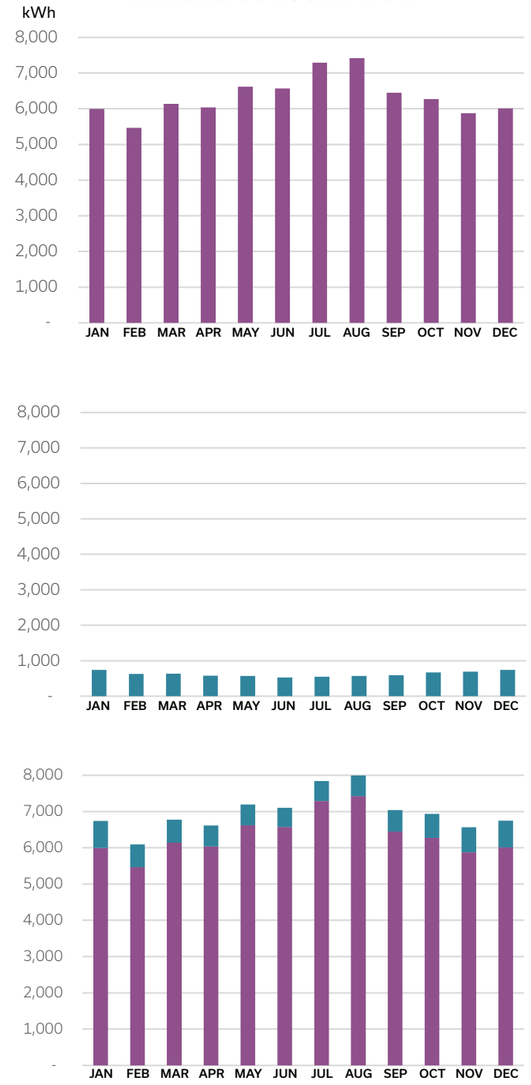
WINTER | JANUARY



SUMMER | JULY



ANNUAL CONSUMPTION



Note: Shown from left to right are the typical daily loads for a typical winter and summer day followed by the annual consumption by month.

PV Production

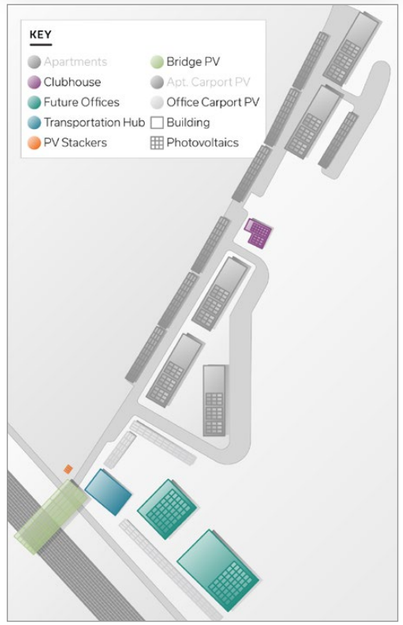
COMMUNITY CENTER RESILIENCE HUB

LOAD	OUTAGE TYPE		
Full Load	4 hours	Full Day	7 Days

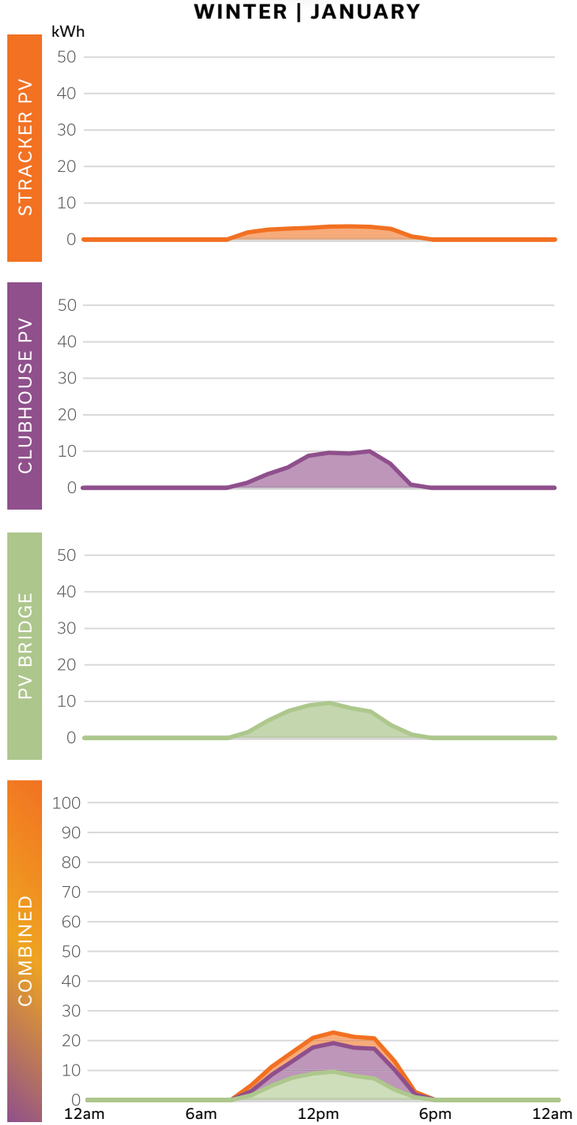
KEY TAKE AWAYS

All three PV sources are subject to seasonal variations and the daily hours of sunlight. The Stracker has a longer daily production because it is able to track the sun.

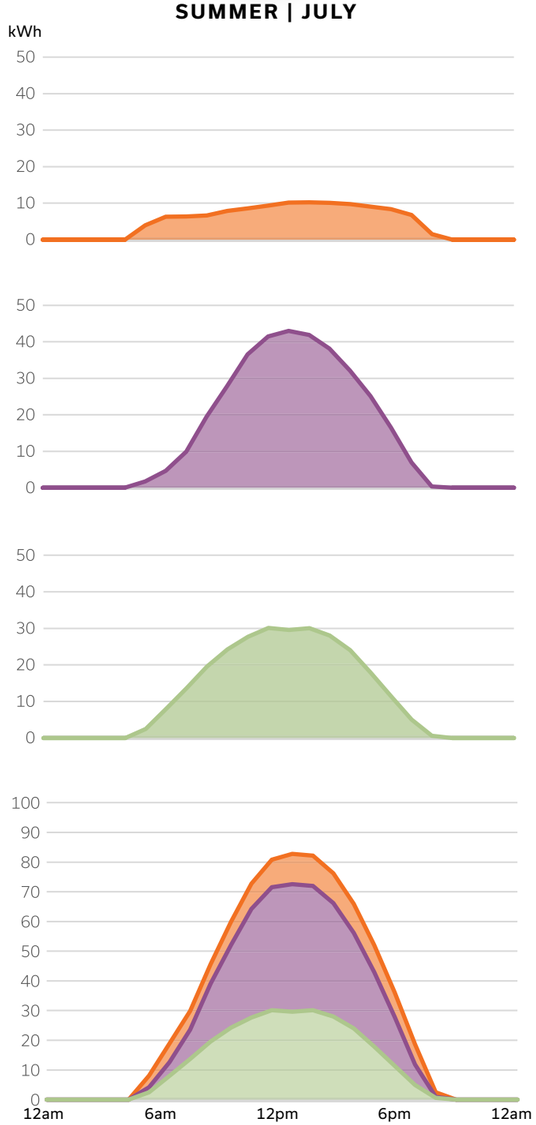
If permitting proves insurmountable for the bridge, three additional strackers could be used to provide equivalent energy production.*



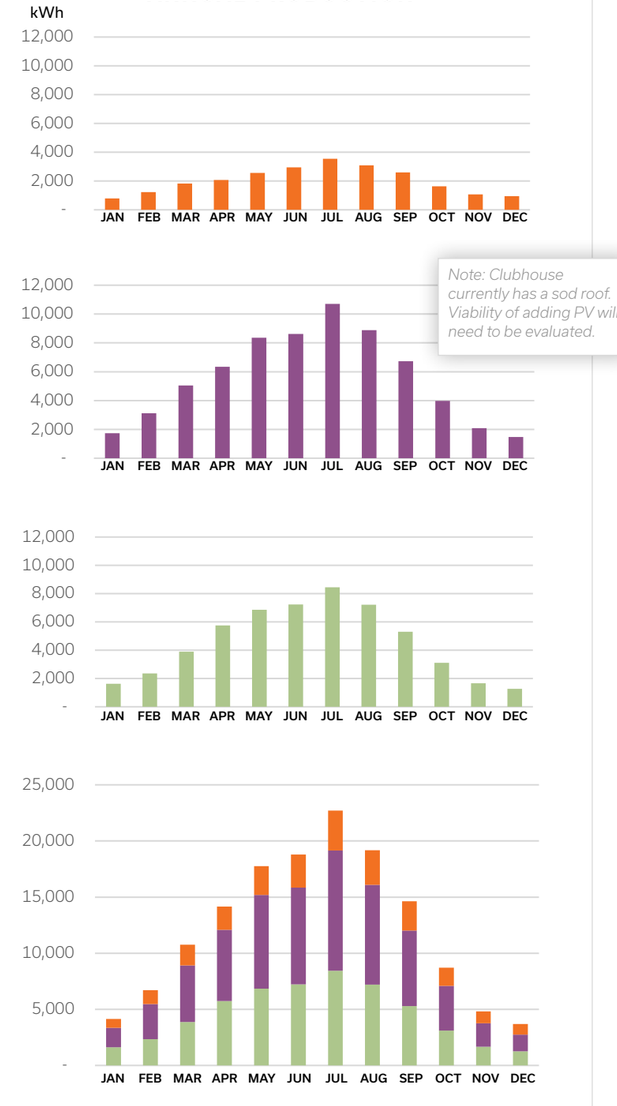
WINTER | JANUARY



SUMMER | JULY



ANNUAL PRODUCTION



Note: Clubhouse currently has a sod roof. Viability of adding PV will need to be evaluated.

Note: Shown from left to right is the typical daily PV production for a typical winter and summer day followed by the annual production by month.

* However, strackers cost twice as much as a traditional PV panel with the same rating.

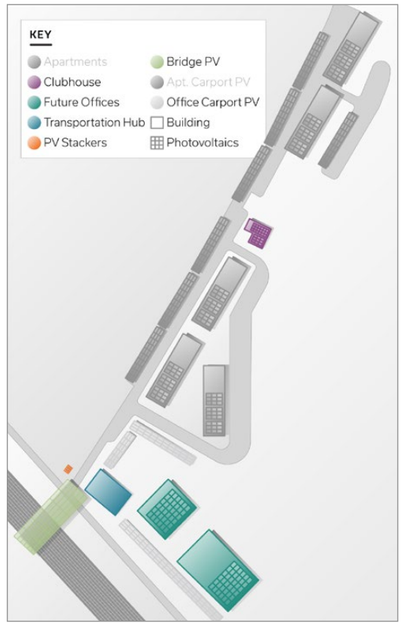
Loads + PV

COMMUNITY CENTER RESILIENCE HUB

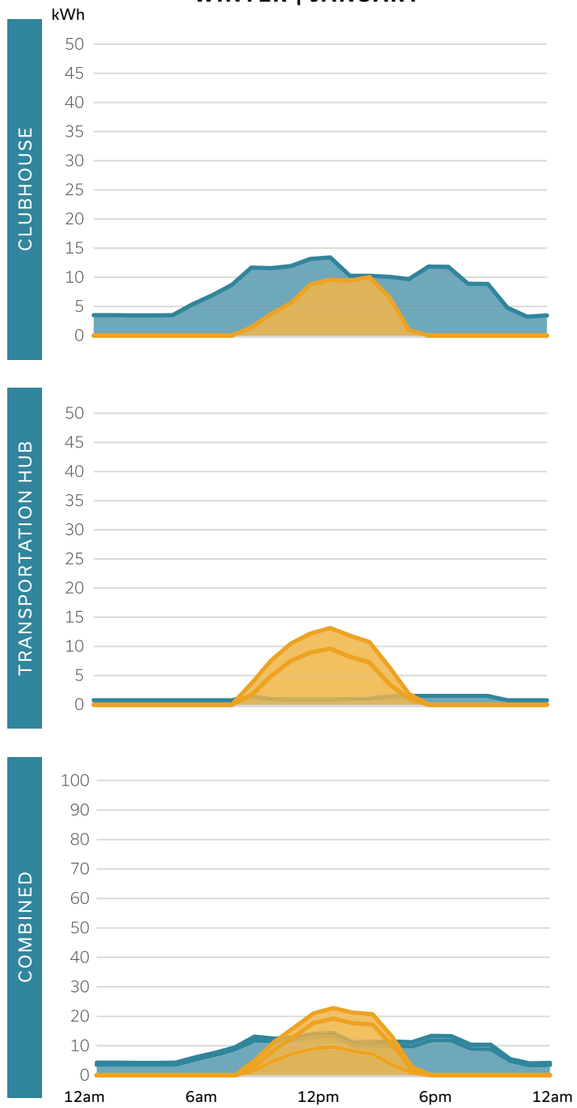
LOAD	OUTAGE TYPE		
Full Load	4 hours	Full Day	7 Days

KEY TAKE AWAYS

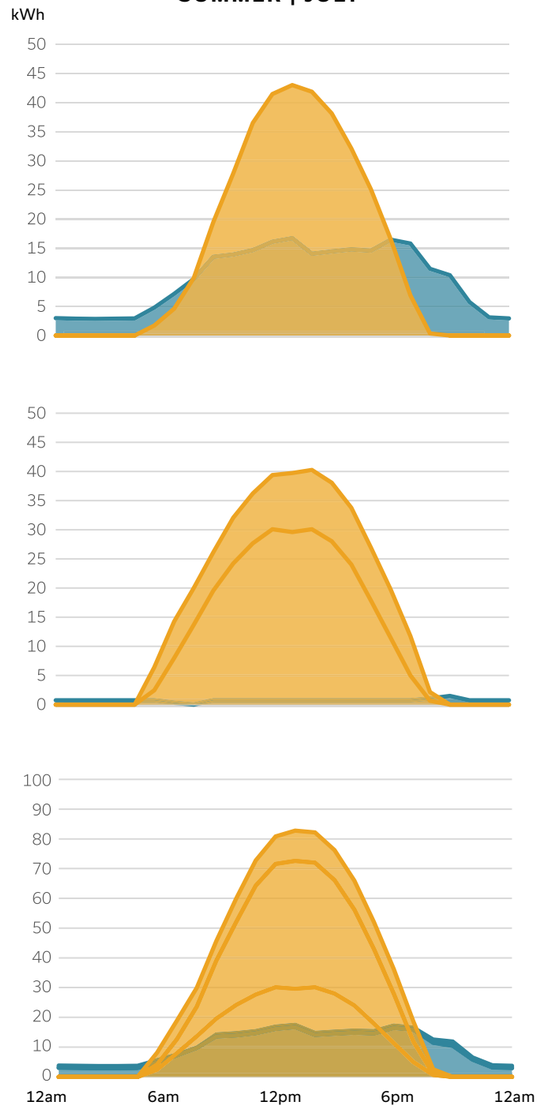
In summer months the PV produces more than is consumed while in winter months the building loads outweigh PV production. The battery will need to be sized based on the needs of the system in winter, when PV support lags.



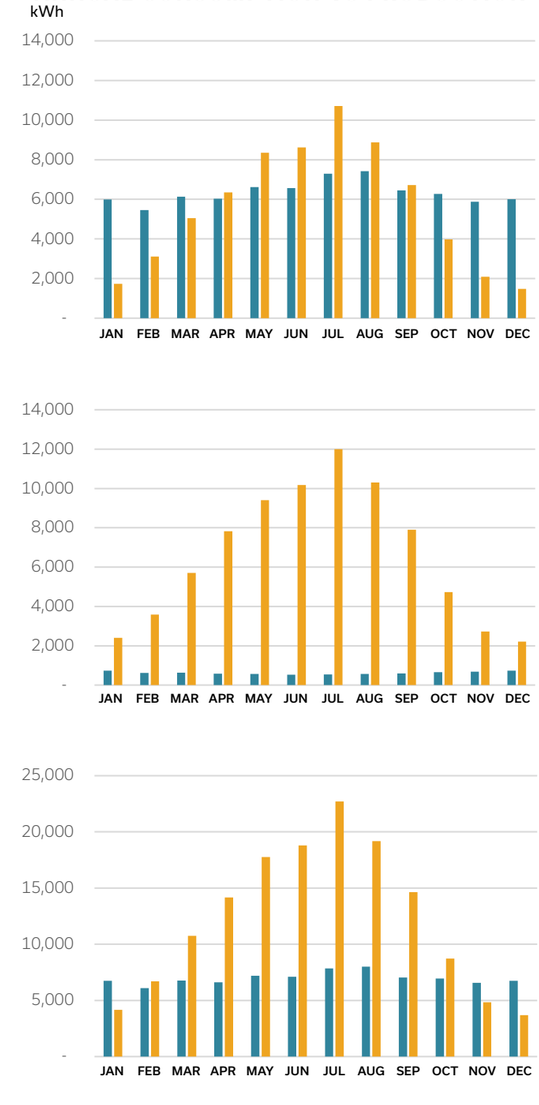
WINTER | JANUARY



SUMMER | JULY



ANNUAL CONSUMPTION VS PRODUCTION



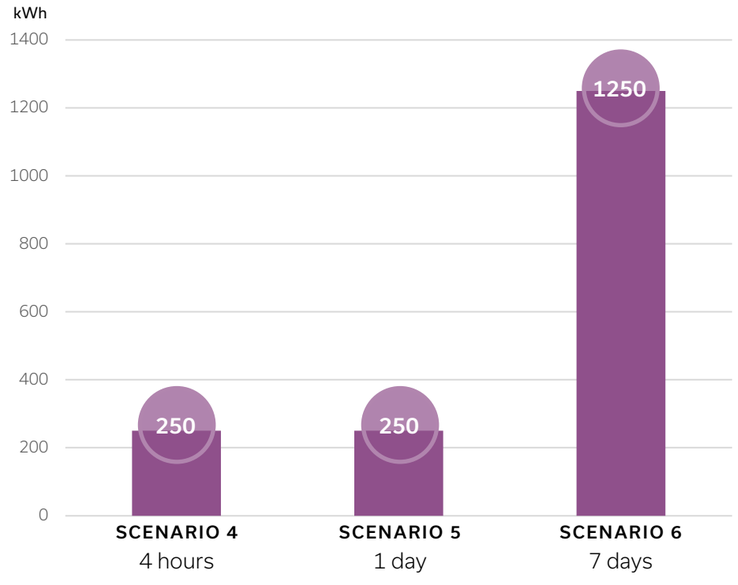
Note: Shown from left to right are the same graphs from the previous two pages overlayed together.

LEGEND Loads PV

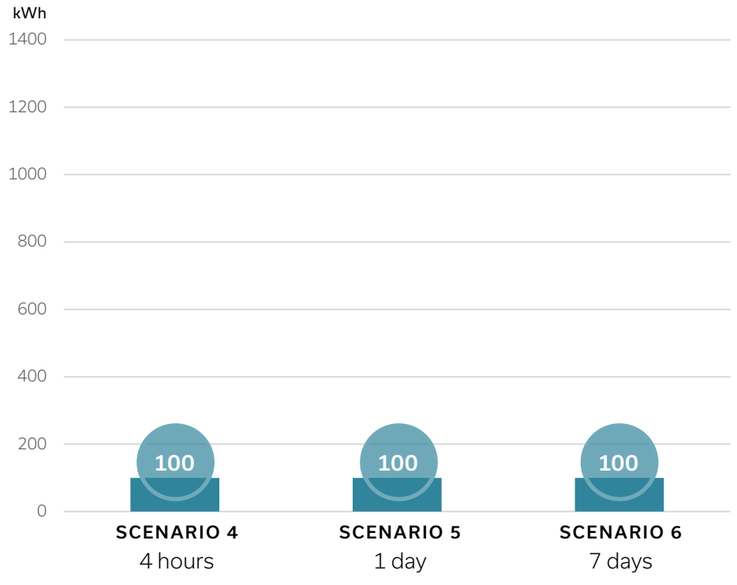
Battery Size

COMMUNITY CENTER RESILIENCE HUB

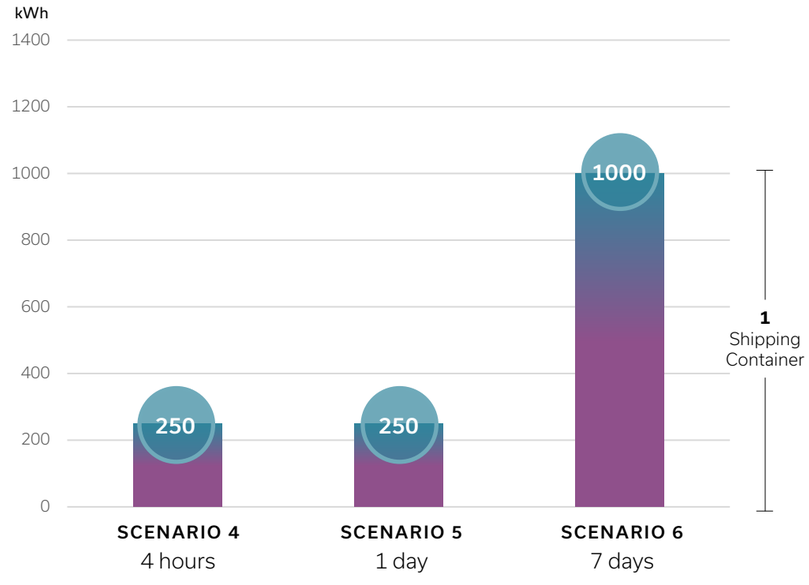
BATTERY SIZE | CLUBHOUSE ONLY

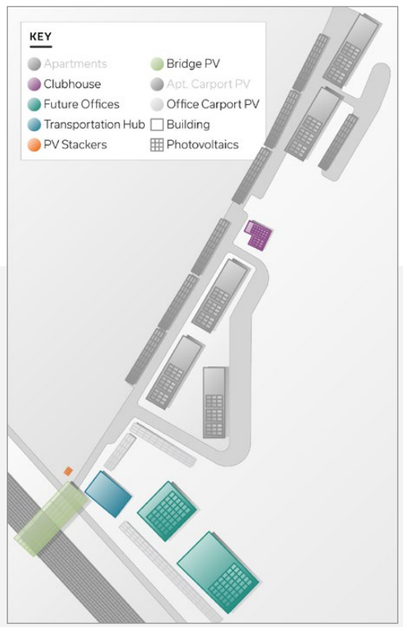


BATTERY SIZE | TRANSPORTATION HUB ONLY



BATTERY SIZE | CLUBHOUSE + TRANSPORTATION HUB ONLY





The proposed PV near the transportation hub would involve placing solar panel arrays in the public realm. This will require coordination and code review with the AHJ. While more difficult to permit and install, it would have two benefits:

- Serve as an educational exhibit or tool of photovoltaic technology to the public at large
- Gives the opportunity for public or city-owned electricity production

Battery size for a microgrid combining both the clubhouse and transportation center is smaller than the summation of the individual batteries due to the large PV system and small load at the transportation hub. By combining both buildings onto the same microgrid, the clubhouse benefits from the added bridge PV. Due to the geographic distance, connecting both of these buildings may prove difficult.

Inputs

FULL RESILIENCY
a solution that maintains the eintirety of the normal electrical load even during an outage.

FULL LOAD
the normal full electrical load without any modifications despite loss of grid power

Key Findings

The clubhouse consumption is low. With the contribution of the PV generation, the battery size would be minimal while still providing continued operations.

One downside of this scenario is no power is restored to any of the apartment buildings so each tenant would experience almost complete loss of any perishable foods on hand at the start of the outage.

There would be no access to hot water outside of the EOC Clubhouse.

Shelter in Place

Goal

Provide power to apartments and common spaces to allow tenants to sustain livable conditions.

LOAD

FULL LOAD
The normal electrical load when the grid is providing power

PARTIAL LOAD
Anything less than the normal electrical load when the grid is providing power.

OUTAGE TYPE

TYPICAL OUTAGE

MAJOR OUTAGE



SCENARIOS | RESIDENTIAL TIER II DISTRICT

7 4 Hour Outage | Full Load | Full Backup
PV Roof + Parking: Apartment Buildings and Transportation Hub

8 1 Day Outage | Full Load | Partial Backup
PV Roof + Parking: Apartment Buildings and Transportation Hub

9 4 Day Outage | Full Load | Partial Backup
PV Roof + Parking: Apartment Buildings and Transportation Hub

10 7 Day Outage | Full Load | Partial Backup
PV Roof + Parking: Apartment Buildings and Transportation Hub



Loads

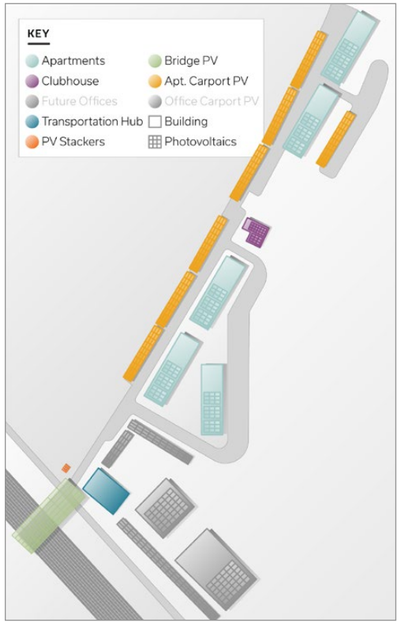
SHELTER IN PLACE

LOAD	OUTAGE TYPE		
	7		
Full Load	4 hours		
Partial Load	Full Day	4 Days	7 Days

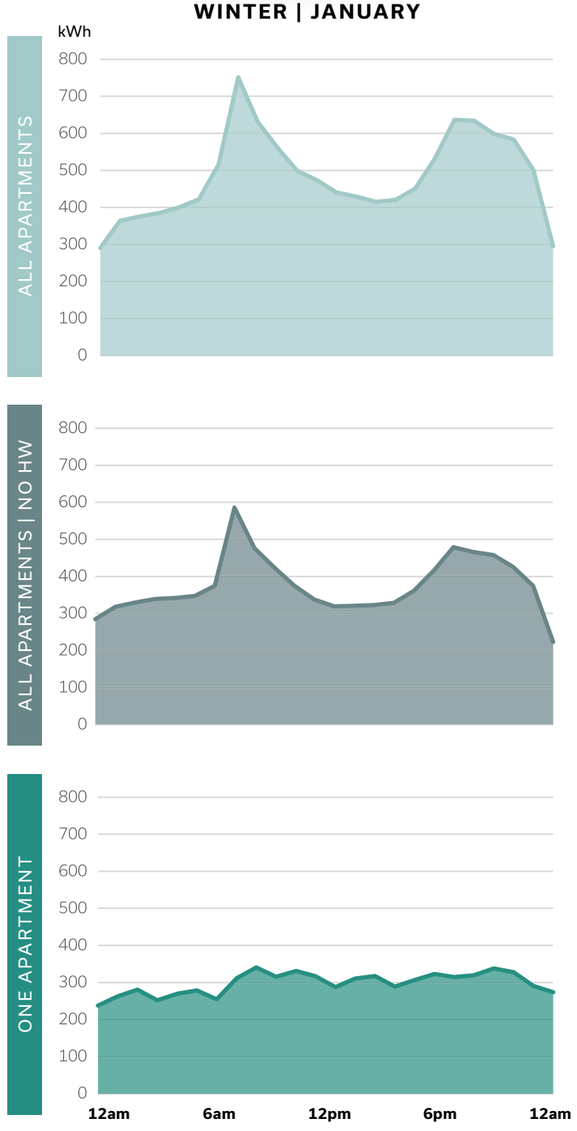
KEY TAKE AWAYS

The Shelter in Place resilience evaluates how load shedding could reduce the overall load. While turning off hot water heaters reduces load,the most impact came from a rolling blackout of the apartments.

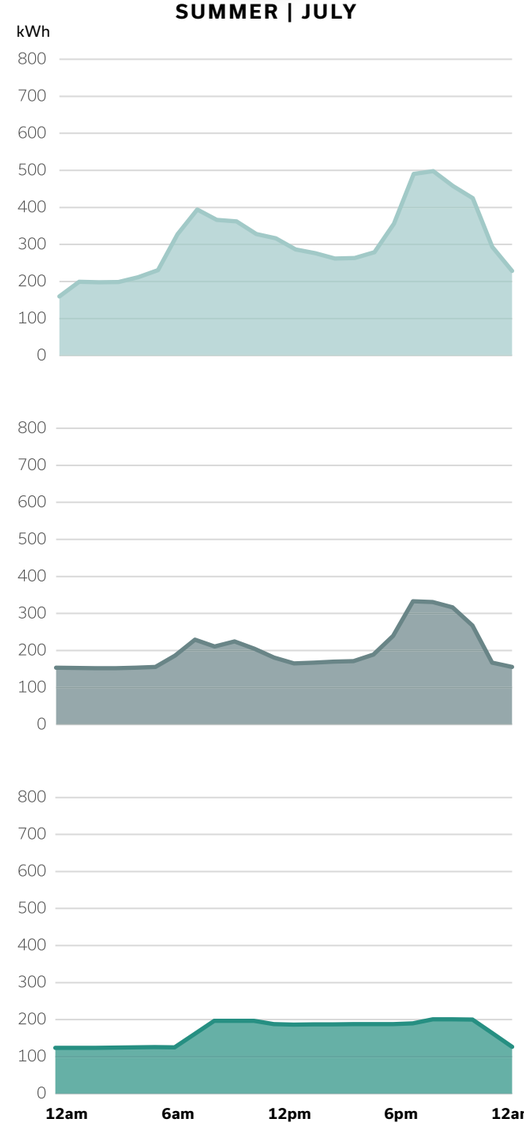
For more details see the section, *Resiency: A Deeper Look*.



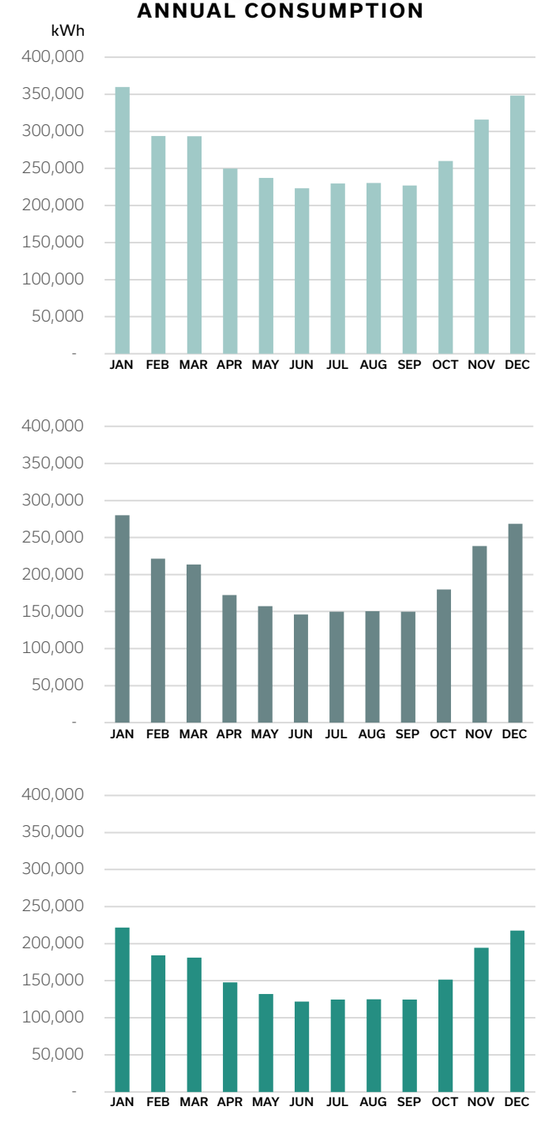
WINTER | JANUARY



SUMMER | JULY



ANNUAL CONSUMPTION



Note: Load profiles are showing only the apartment buildings as they are controlled with load shedding. Total loads in the shelter-in-place scenario also include the clubhouse and transportation hub.

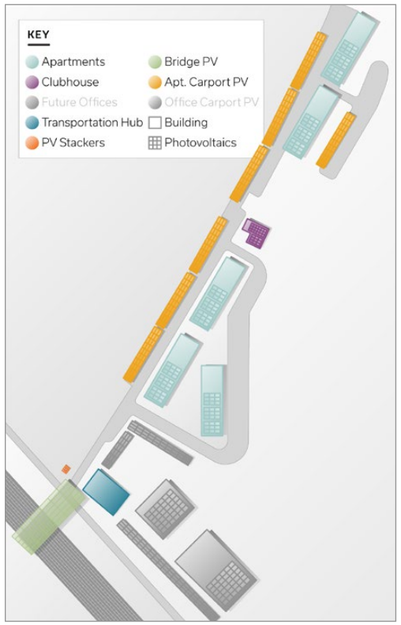
PV Production

SHELTER IN PLACE

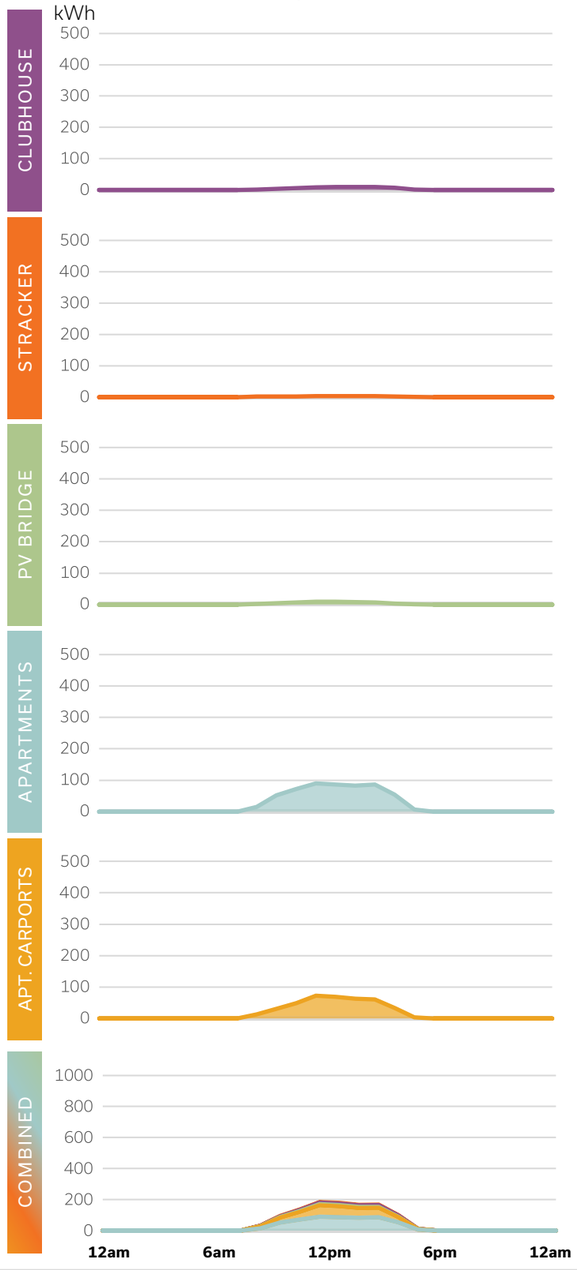
LOAD	OUTAGE TYPE
Full Load	4 hours
Partial Load	Full Day, 4 Days, 7 Days

KEY TAKE AWAYS

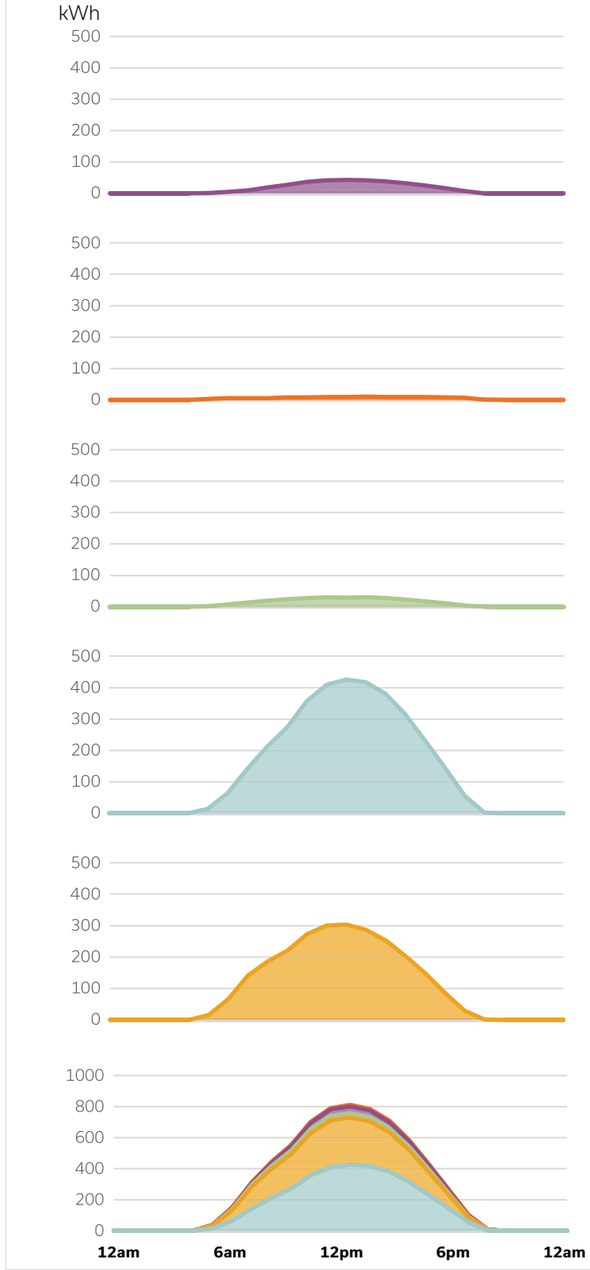
In these scenarios we focus on a Residential District so the office PV production was excluded. Without the office PV, the apartment roof and parking lot PV becomes the primary source of energy.



WINTER | JANUARY

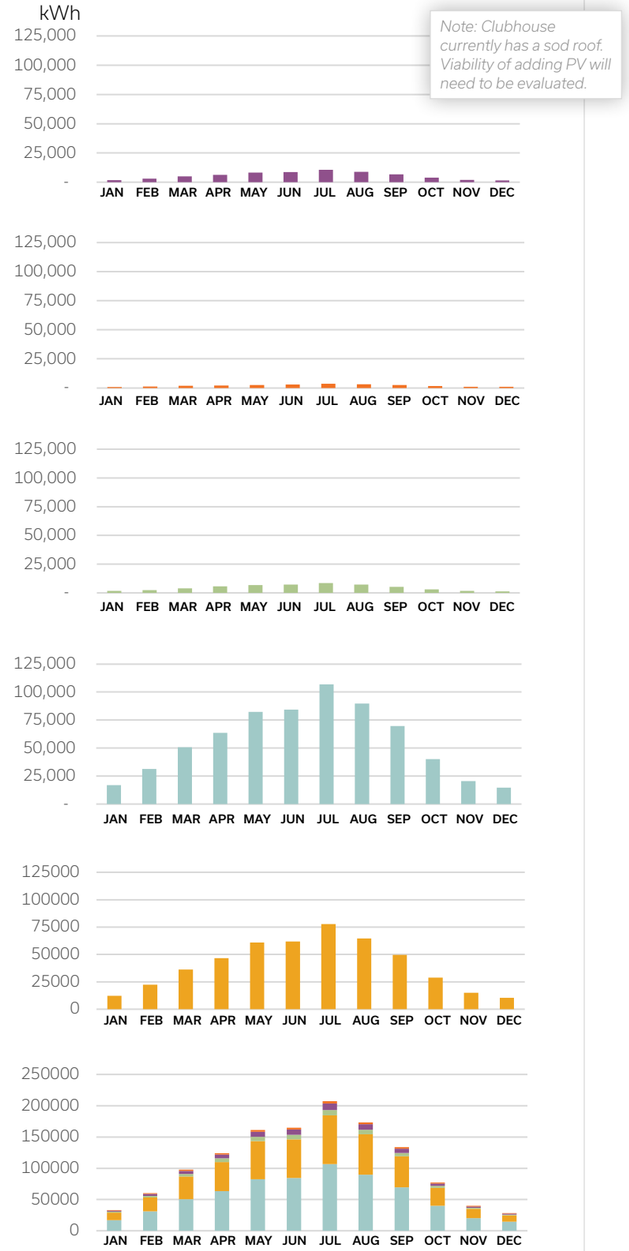


SUMMER | JULY



ANNUAL PRODUCTION

Note: Clubhouse currently has a sod roof. Viability of adding PV will need to be evaluated.



Loads + PV

SHELTER IN PLACE

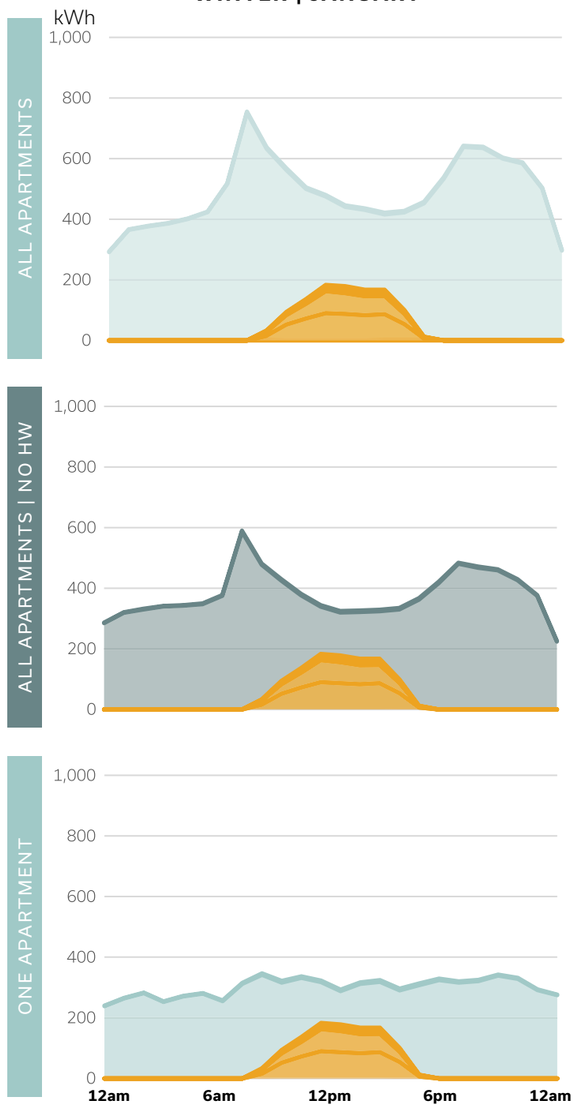
LOAD	OUTAGE TYPE
Full Load	4 hours
Partial Load	Full Day, 4 Days, 7 Days

KEY TAKE AWAYS

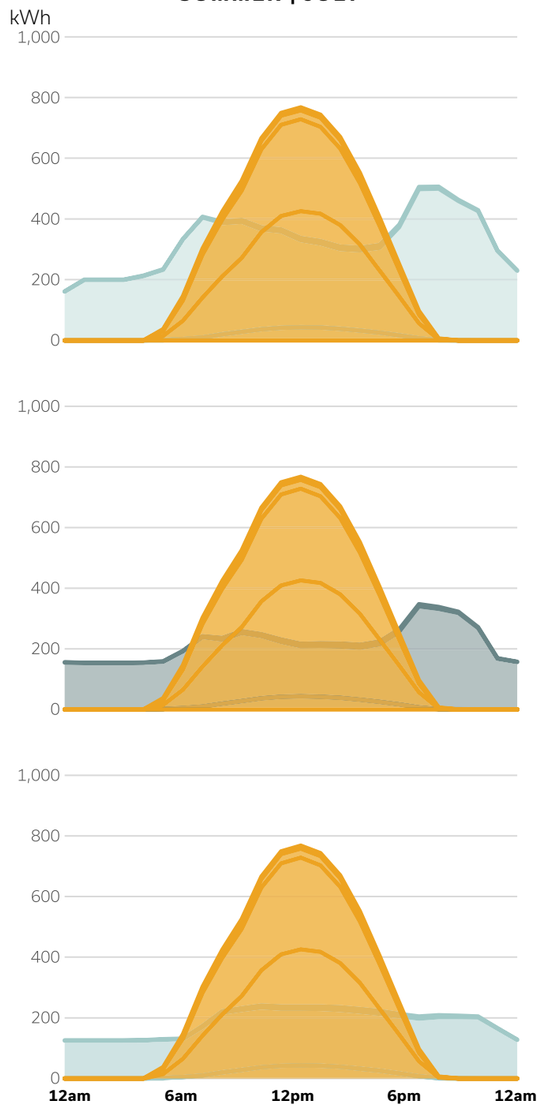
In this scenario, loads outpace PV production, especially in winter months. The apartments have the highest loads due to their size and usage. Overall, loads are highest in winter due to space heating. If cooling were added to the apartments, this could result in a second peak in summer.



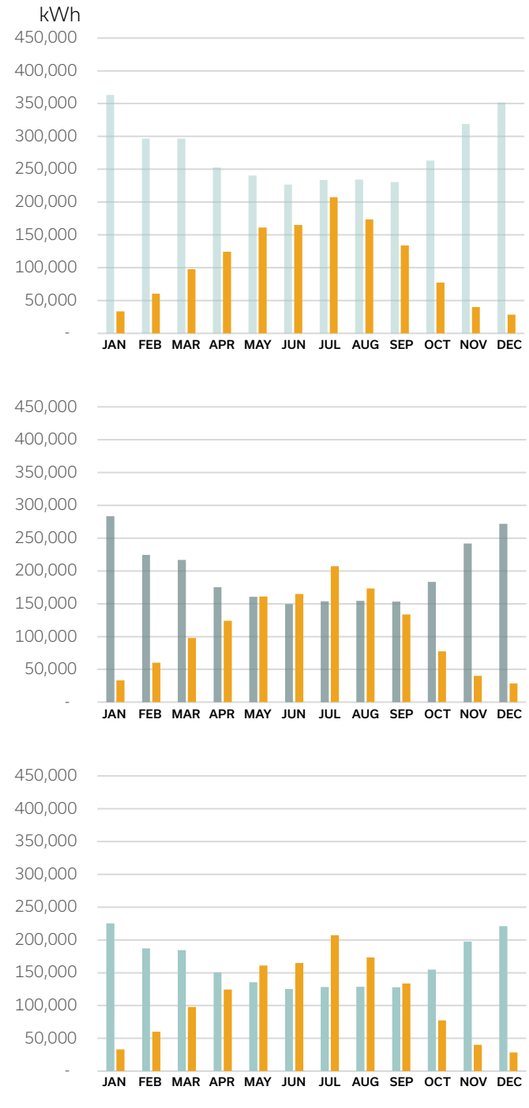
WINTER | JANUARY



SUMMER | JULY



ANNUAL CONSUMPTION VS PRODUCTION



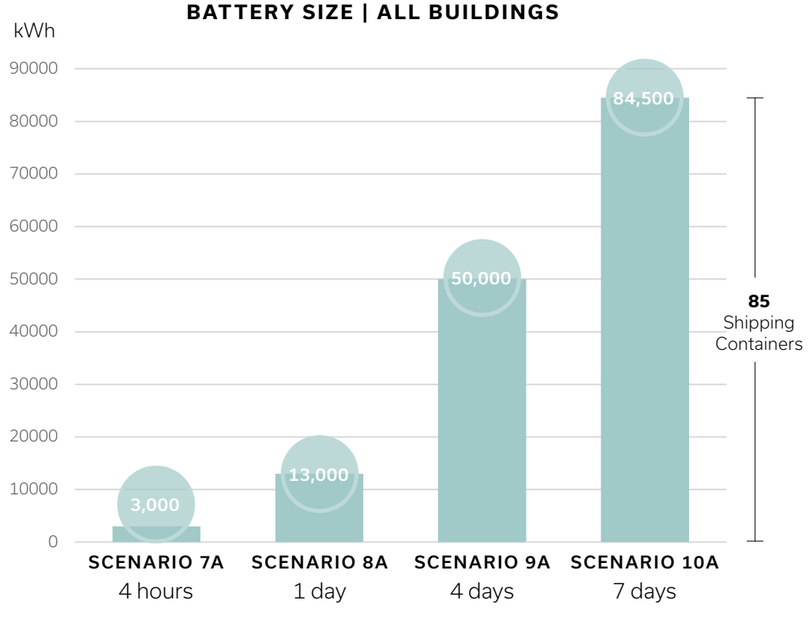
Note: Load profiles are showing only the apartment buildings as they are controlled with load shedding. Total loads in the shelter-in-place scenario also include the clubhouse and transportation hub.

LEGEND Loads PV

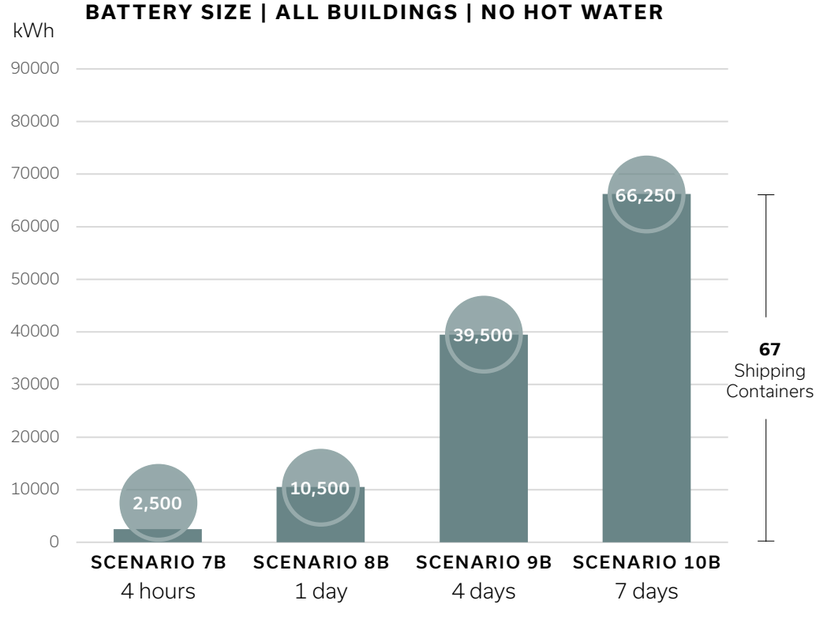
Battery Size

SHELTER IN PLACE

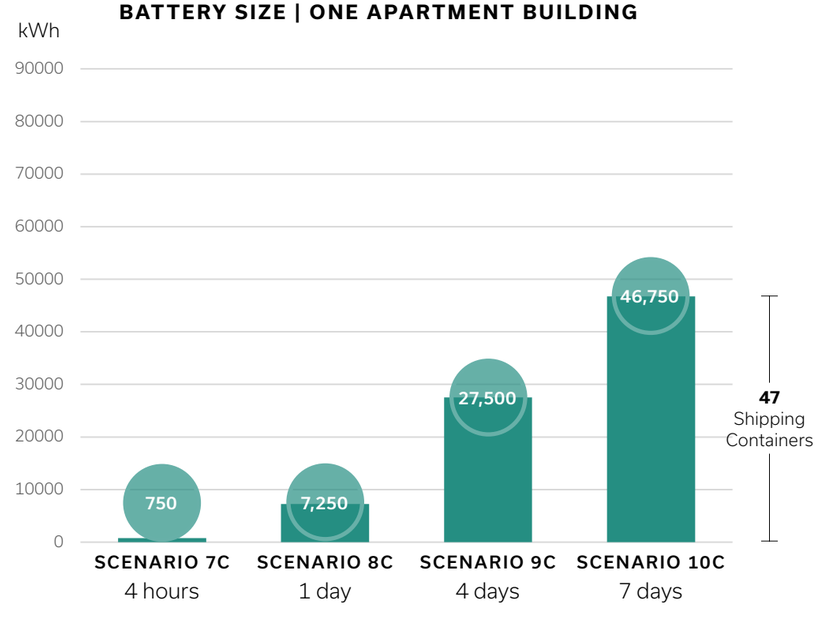
BATTERY SIZE | ALL BUILDINGS



BATTERY SIZE | ALL BUILDINGS | NO HOT WATER



BATTERY SIZE | ONE APARTMENT BUILDING





INPUTS

FULL RESILIENCY
a solution that maintains the eintirety of the normal electrical load even during an outage.

FULL LOAD
the normal electrical load when the grid is providing power.

Key Findings

The battery size necessary to support the entire District load is exceptionally large

The apartment buildings use a large amount of energy, especially in wintertime. When analyzing the clubhouse, transportation hub, and apartment buildings, **the apartments use 97% of the energy throughout the year**. In order to reduce the battery size, reducing the load of the apartments should be considered. There are multiple methods of reducing the load:

1. Turning off hot water heaters in all units.
2. Use a rolling blackout between the five apartment buildings only powering a single building at a time.

BENEFITS

Reducing load reduces battery size and increases resiliency durations.

Consistent Load Limitations across the community creates equity and solidarity of the community as everyone must cooperate with the program to ensure success.

For more information on load shedding ideas, see section *Resiliency: A Deeper Look*.

DRAWBACKS

It is important to note that **peak power is expected to increase using rolling blackouts.** As a single building gains power, the heating, refrigerators, and water heaters would turn on to make up for the temperature drift that has occurred during the outage. This means that all units in the powered building would be running for a longer duration than a building that has consistent power. Because of this, the load reduction (50%) doesn't match the powered area reduction (80%). See page 35 graphic for more information.

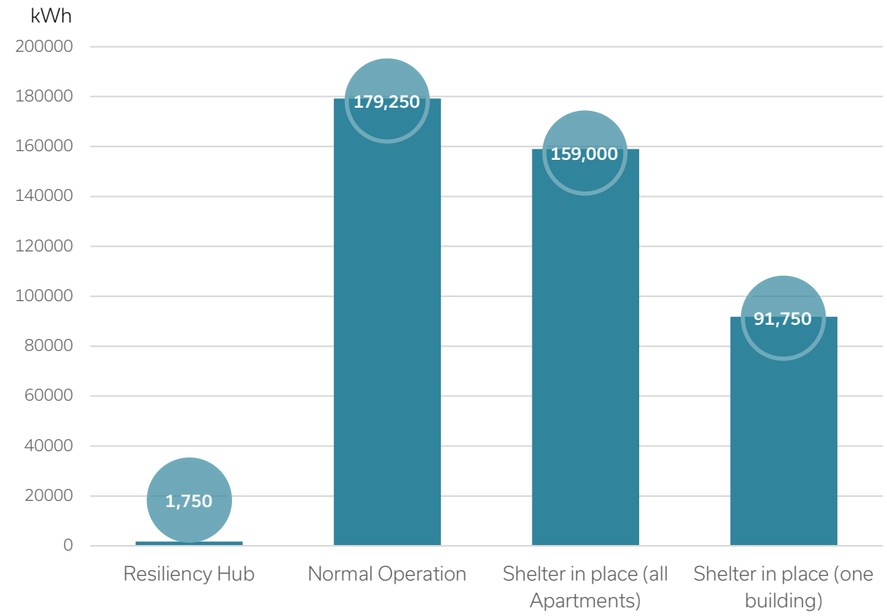
Even with the reduced loads, the battery size required remains high. Resilient buildings work most effectively when they use passive techniques such as high performance envelopes to reduce consumption year round. Because this building was not designed for a resilient mode during design, it will be a challenge to balance the loads against the limited PV roof area in order to maintain a reasonable BESS size.

Cascadia Event

BATTERY SIZE

In the case of a catastrophic event, such as a major earthquake that cripples basic infrastructure, utilities would be down for weeks. For a two week outage, this would require extremely large batteries.

Due to the size and cost implications, a more targeted resiliency is recommended.



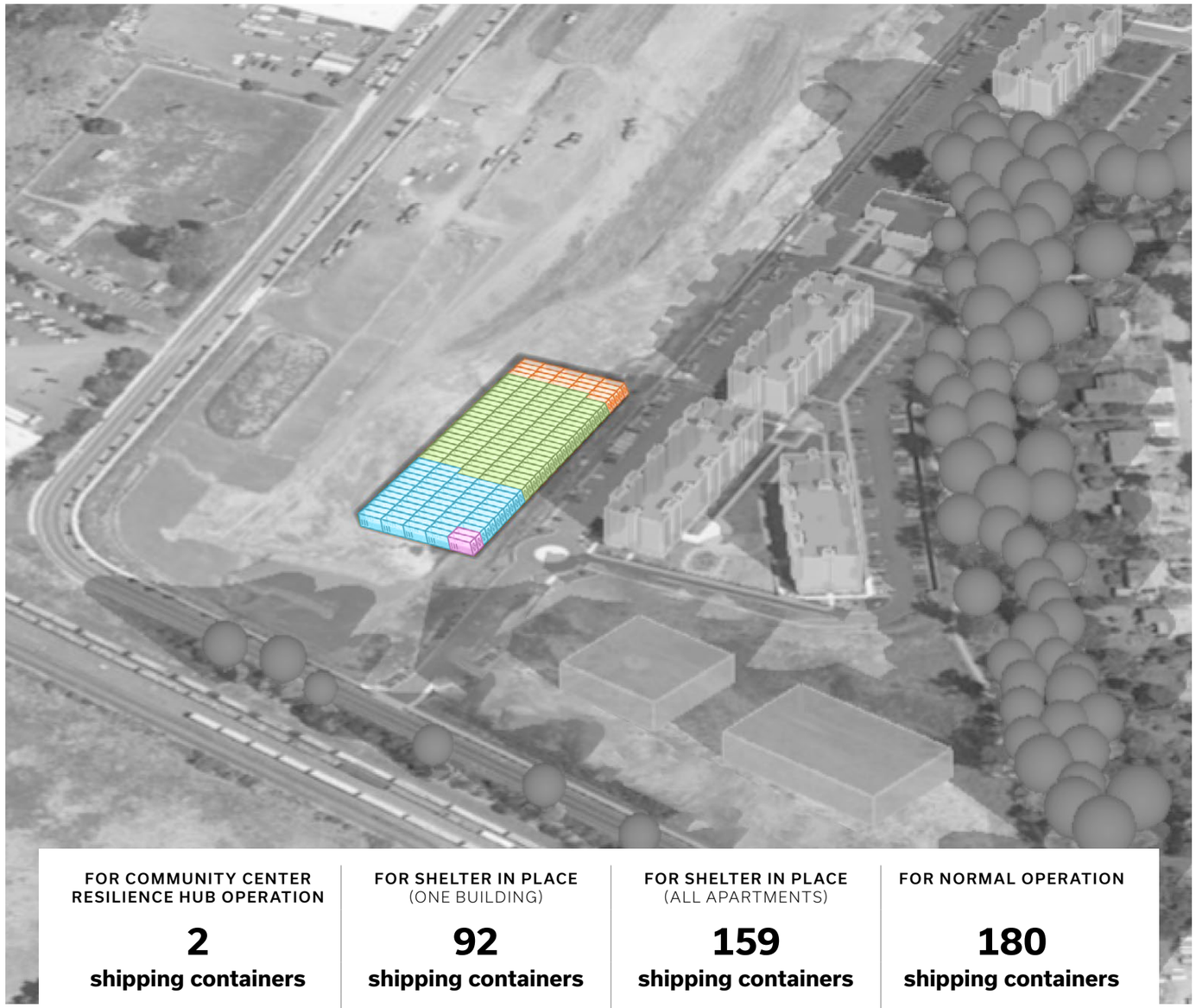
Planning for an event like the expected Cascadia Earthquake brings with it a different set of challenges. Chief amongst those concerns is how does one plan for a once in a generation outage event?

The study necessary to sufficiently analyze a catastrophic outage is beyond the scope of this report. However, the team felt it prudent to consider the battery size needed to stopgap such an occurrence.

As expected, the size of the battery is significant both in terms of size and cost. The battery array necessary to provide the power to maintain full resiliency of the site during a two week outage would cover a football field in shipping containers.

Additionally, it is worth considering that battery warranties are often between 10 and 20 years. It is important to consider the maintenance and replacement needs for the system, especially if it is not being used for additional purposes - such as grid support and decarbonization — and is only serving as resilience for a once in a generation outage.

A system of this size is normally reserved for utility scale systems. A unique funding and ownership partnership with PGE and/or a energy system developer could make this a possible option, although a more targeted resilience strategy is likely a better approach.



TIER II TIGARD COMMUNITY

Resiliency: A Deeper Look

Understanding the Impact of Battery Size on Resilience Duration

AN EXAMPLE CASE

Resiliency Achieved by Different Battery Sizes

4 HOUR OUTAGE | ANNUAL SUFFICIENCY SCALED PASSING + FAILING HOURS

1,500 kWh

With a 1,500 kWh battery, the battery will not be sufficient for periods of the day all year round.

2,500 kWh

With a 2,500 kWh battery, the battery has enough energy to withstand a 4 hour outage for most times of the year. During the winter months, the higher building loads and reduced PV production lead to periods of the day where the 2,500 kWh will not be sufficient for 4 hours.

3,500 kWh

With a 3,500 kWh battery, the battery has enough energy to withstand a 4 hour outage for all times of the year.



INPUTS

Using all-electric office.

LOAD	RESILIENCY
Full Load	Partial Resiliency

LEGEND

Meeting Needs | Not Meeting

Understanding the Impact of Load Shedding on Resilience

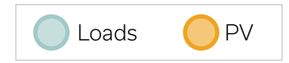
There is no single solution that solves every resiliency scenario. In that way, a resiliency strategy is only as good as its ability to address the issues that the strategy is intended to overcome. **For the case of the proposed district microgrid, the biggest obstacle to overcome is the large loads incurred by the electrical system as a result of the Apartments.**

As such, in this section we will provide some probable strategies to cope with the large loads created in the Apartments through means that attempt to keep equity between those who live there and to provide some level of livability during a prolonged outage.

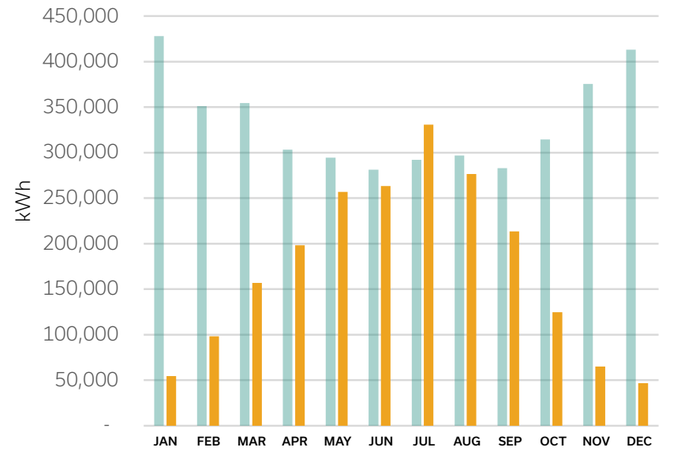
Addressing power needs when the grid goes down requires a measure of creativity mixed with the right tools. As such, we need first to frame the issue clearly. On the best day of the year, the proposed PV system on site can on average provide 5,000-6,000 kWh worth of power to the site. The site, on the other hand, uses on average 11,000 kWh's worth of energy on the average day.

The cost of a battery to provide power to maintain the entire site under normal operation can be prohibitive from a cost standpoint as well as a space standpoint.

But, there are ways to provide a level of livability that allows those living and working on this site some level of normalcy during a prolonged outage. Four different mitigation frameworks are proposed that could add a level of control that could help reduce the overall power needs of the site in a prolonged outage scenario. It is assumed the Offices have been evacuated and the power remains off for the duration of the outage. The focus is on the control and reduction of the apartments loads unless stated otherwise.

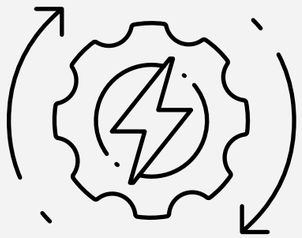


CAMPUS WITH ALL ELECTRIC OFFICE LOAD VS PV



Manual Load Setting

ROLLING RESILIENCY



THE FRAMEWORK:

- One apartment building is powered at a time on a rolling basis throughout the day.
- When powered, each building remains on for the duration of 45 minutes.
- Device power is uninhibited and what is turned on is at the discretion of the individual tenant.
- Hot water heaters and refrigerators will kick on automatically when power is restored.

BENEFITS

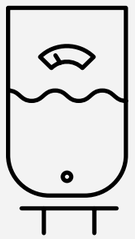
- Each building receives power once every 3 hours
- Food in refrigerators remains safe to eat
- HWHs maintain their temp so long as residents don't use hot water while their power is out
- Tenants have the ability to cook, albeit quickly, in their own homes throughout the day.
- Manually switching buildings on and off doesnt require an expensive retrofitting of the electrical system

DRAWBACKS

- Tenants are limited to using power for 45 minute intervals throughout the day that may not comport with their usual schedule
- In the winter it can be very cold, in the summer very hot.
- This strategy depends on willing participants and can be derailed by tenants who abuse their 45 minute power windows.
- The complex will need a licensed Electrical Professional to oversee the load switching.

Understanding Load: What happens when an appliance turns on?

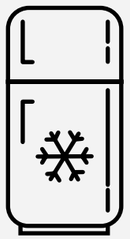
HOT WATER HEATER DUTY CYCLE

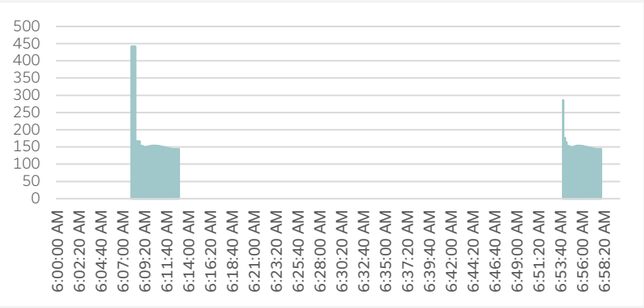


The average hot water heater, if unused, goes into idle mode after three hours to maintain water temperature set point.

During a prolonged outage the amount of energy needed to get back to the unit's set point increases as the outage leads to the water tank cooling more than it would under normal operation.

REFRIGERATOR DUTY CYCLE





In the above graph, the first section denotes a cycle where the fridge and freezer both cycle on together. In the second only one has cycled on.

Under normal operating conditions a refrigerator can take from 4-6 minutes to cycle on and bring a fridge back within temperature range. With an outage this time can be extended depending on the length of the outage.

According to the USDA, food in a closed refrigerator can maintain a safe temperature for up to 4 hours during a power outage.

Rolling Resiliency

AUTOMATIC LOAD SHEDDING



Smart Electrical Meter

LOAD SHEDDING SCENARIO #2

THE FRAMEWORK

- The building is retrofitted with smart meters in each unit that are under the control of the microgrid controller during an outage.
- The same parameters hold true with rolling blackouts

BENEFITS

- Each building receives power once every 3 hours
- Food in refrigerators remains safe to eat
- HWHs maintain their temp so long as residents dont use hot water while their power is out
- Tenants have the ability to cook, albeit quickly, in their own homes throughout the day.
- Switching can be overseen remotely by someone trained to oversee the system, but does not necessarily require a licensed Electrical Professional on site.
- A preplanned energy allotment for each tenant could be built into the programming.

DRAWBACKS

- Tenants are limited to using power for 45 minute intervals throughout the day that may not comport with their usual schedule
- In the winter it can be very cold, in the summer very hot.
- This strategy depends on willing participants and can be derailed by tenants who abuse their 45 minute power windows.
- Smart Meters are an expensive retrofit for an existing building.



Prepaid Electrical Meter

LOAD SHEDDING SCENARIO #3

THE FRAMEWORK

- The building is retrofitted with smart pre-paid meters in each unit that only operate during an outage.
- No rolling black out, power availability is up to the individual tenant.

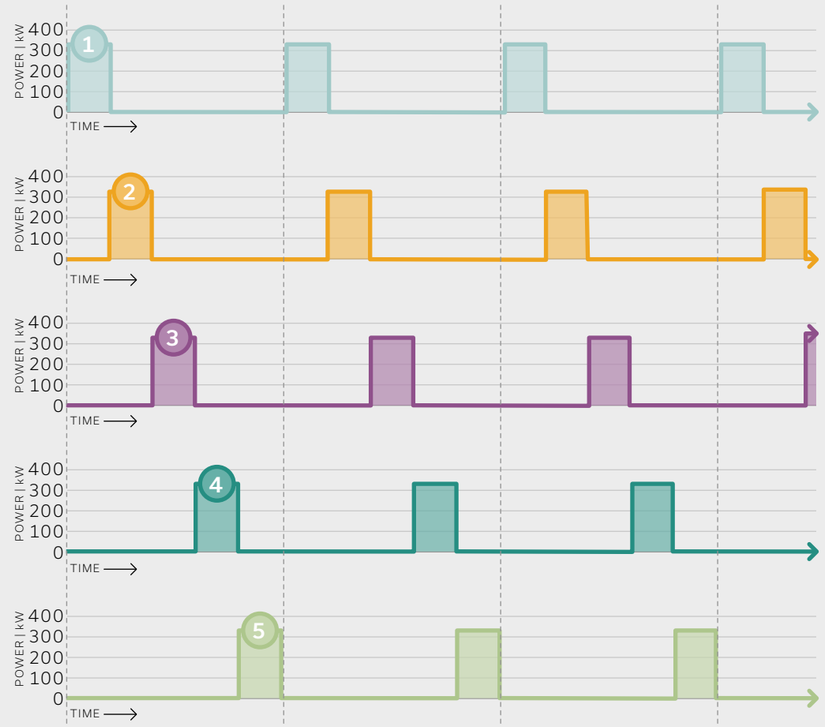
BENEFITS

- Tenants have access to power throughout the outage
- Tenants are able to have power when they need it to maintain their normal patterns and habits.
- Tenants only pay for the power they use.
- Battery power and charge are handled by the utility or a third party so access to resilience power is guaranteed.
- Offices have the ability to purchase power so business can resume on site during outage.

DRAWBACKS

- Tenant access to power is based on availability of the funds to spend on access to battery backup.
- Prepaid meters are an expensive retrofit for an existing building.

HOW DOES ROLLING RESILIENCY WORK?





Rolling Resiliency

AUTOMATIC LOAD SHEDDING

Resilient Spaces

LOAD SHEDDING SCENARIO #4

THE FRAMEWORK

- Each Apartment Building has its house panel retrofitted with its own small Microgrid system
- PV Array size is limited to 60 kW
- Battery Size is limited to 50 kWh
- The House Panel supports only the common areas in each building

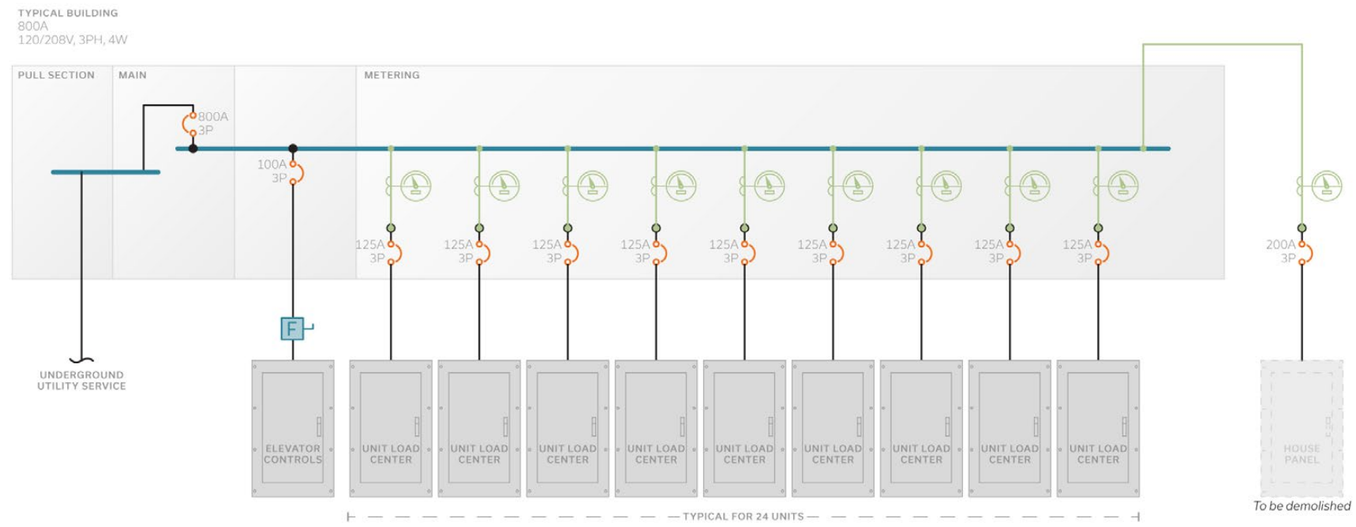
BENEFITS

- Limiting the size of the PV and BESS reduces cost of the overall retrofit.
- This approach doesn't require retrofitting every panel in a building.
- During a prolonged outage, tenants have a place to remain cool or warm, depending on the season

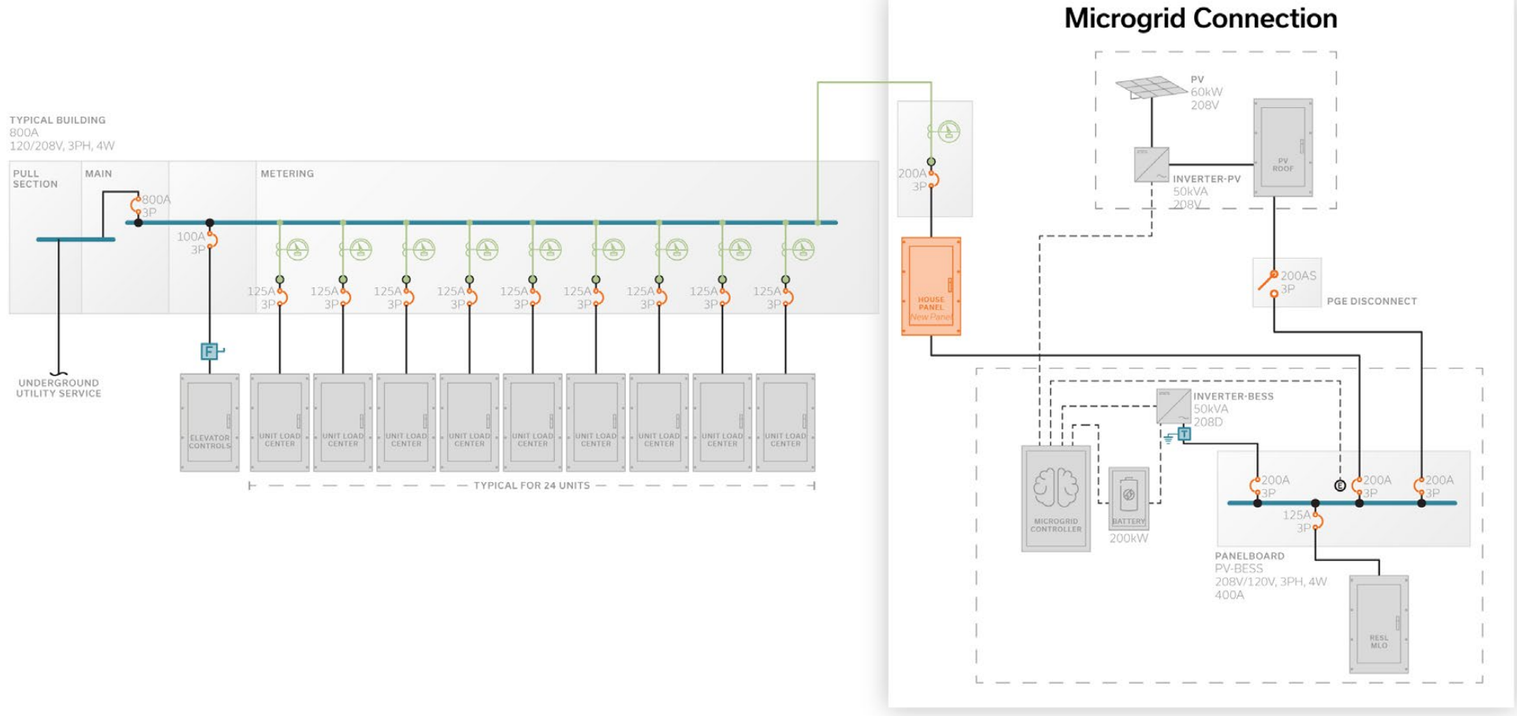
DRAWBACKS

- Building ventilation calculations assume around 5 people in the hallway at any given time. A mechanical engineer will need to be hired to assess the ventilation needs of this scenario
- Receptacles in hallways are limited and may not be sufficient to supply everyone looking for an outlet.
- Everyone is in the hallway at once, sleeping on the floor if they so choose.
- The ability of the system to maintain temperature in the hallway is an unknown. The system is not designed for a full hallway so the unit may not be able to maintain its usual temperature with the increased number of people in the hallway.

EXISTING ONE LINE DIAGRAM



HOW TO RETROFIT THE HOUSE PANEL



TIER II TIGARD COMMUNITY

A Vision for Tomorrow, Today

A Vision for a Resilient Future

The Field Campus Microgrid

The Fields Campus is an opportunity to bring together buildings, PV, batteries from private and public properties to create a small-scale community grid. When combined in aggregate, community microgrids can work to alleviate grid overloading, replace transmission with local production, and create local spaces for the community.

However, in order to work, we first need to understand how this district microgrid can be connected to PGE's current infrastructure.

The lot was broken down into three parcels for analysis. The parcels are outlined on the map to the right. As it stands now, the entire area is served by 2 different feeders. The West Portland - 72nd feeder and the Tigard - 13337 feeder. The West Portland - 72nd feeder currently services the two northernmost Fields apartment buildings as well as a collection of 6 residences directly adjacent to the apartment complex. See the area circled in orange. The rest of the Fields Apartment buildings as well as Parcels 2 and 3 are (or could be) served by the Tigard - 13337 feeder. See the area circled in yellow. As Parcel 2 and 3 are currently unoccupied, no conduit has been run in those areas, but they would be served by the Tigard -13337 feeder.

In order for this District Microgrid to become a reality, the entire area would need to be shifted onto the Tigard - 13337 feeder, which has the capacity to add around 6 MW of load as well as 1.5 MW of generation without the need for upgrades. The feeder would be able to accommodate the PV arrays proposed in this report as well as the current and future loads proposed.

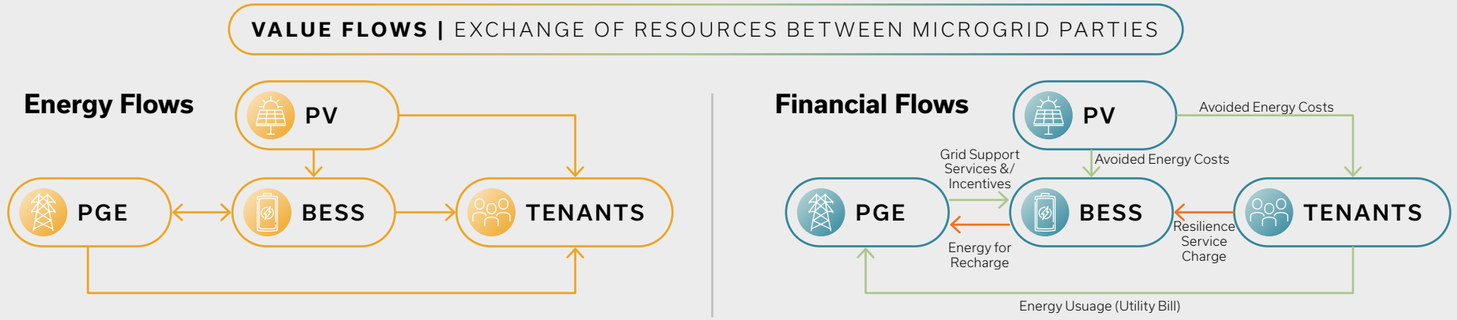
The existing Points of Interconnection (POI) for the two feeders can be seen on the map to the right in the orange and yellow dots. The green dot marks the general location where a pad mounted switch will need to be installed to switch the Northern Apartment buildings as well as the six adjoining residences from the West Portland - 72nd to the Tigard - 13337 feeder.

Once switched, the yellow dot at the corner of S Wall St would become the POI for the entire district and would serve as the point from which the area gets islanded in the event of a loss of grid power.



Potential Fundings Pathways

Due to the scale of batteries being proposed for the Fields Property, funding will play a key role in making the microgrid possible. Three funding pathways are outlined below to show the possible involved parties and value streams in each scenario, as well as the potential advantages and considerations.





MICROGRID OWNER/OPERATOR

Property Owner

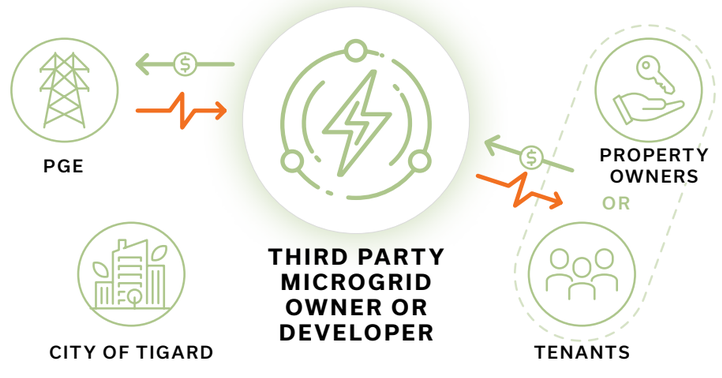
Property owner will own and operate the microgrid assets. Resilience services will be provided to tenants. Grid-support services will be provided to PGE. These services will create the microgrid revenue stream for the Property Owner.

CONSIDERATIONS

Significant upfront cost to property owner

ADVANTAGES

— Offering energy resilience could help attract a diverse tenant base and serve as a market differentiator



MICROGRID OWNER/OPERATOR

Third Party

A third party energy developer finances and owns the microgrid. The microgrid provides grid support services during normal grid operation and campus resilience services during an outage. These services will create the microgrid revenue stream for the third Party Owner/Operator. Property Owner will be able to offer resiliency as a tenant amenity and market differentiator.

CONSIDERATIONS

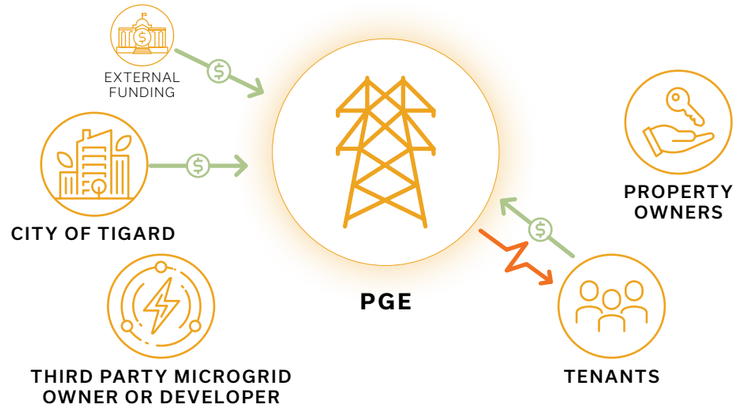
PGE doesn't currently have a tariff option that makes this approach straightforward but there are signs this could change in the coming years. Depending on what programs become available will influence the feasibility of this option.

ADVANTAGES

— First cost and ongoing operations and maintenance is absorbed by the microgrid third-party. The property owner has no upfront or ongoing costs associated with the system.

— Offering energy resilience could help attract a diverse tenant base and serve as a market differentiator.

— In addition to the social benefit of resilience, it's possible this approach could also provide lower costs of energy to tenants by allowing the campus to collectively avoid peak time of use utility rates.



MICROGRID OWNER/OPERATOR

PGE

PGE will own and operate the microgrId for use in grid-interactions and resilience scenarios. Additional funding would be needed from the City of Tigard, private equity firms, and/or grant funding.

CONSIDERATIONS

The City will need to lead the funding effort for this scenario. PGE's investment options are limited so the remaining cost will need to be filled by state and/or federal grants or other funding mechanisms.

ADVANTAGES

— First cost is covered by PGE and the City of Tigard via outside funding sources (such as state or federal grants). The ongoing operations and maintenance is absorbed by PGE. The property owner has no upfront or ongoing costs associated with the system.

— The tenant experience is identical to a standard utility service since all utility bills are still through PGE.

— Offering energy resilience could help attract a diverse tenant base and serve as a market differentiator

TIER II TIGARD COMMUNITY

Appendix | Modeling Assumptions

Modeling Assumptions

To create the building models, PAE started with a typical apartment building model in IES VE 2022 energy modeling software then used the known mechanical system types and envelope constructions to simulate the models to represent the studied Tigard buildings. Representative prototype models from PNNL for the future offices were used to estimate energy as the design of these buildings has not started. Assumptions for the building envelope and HVAC systems used in the model are given in this section.

LIMITATIONS

For this study, the building assumptions stated on this page were used. The actual values could differ. This could affect the modeled buildings and projected energy use. A more in-depth study during design should be completed to identify any gaps before construction.

The following information is unknown:

- Apartment setpoint temperatures
- Apartment operating schedules
- Actual Tigard weather data
- Future office size and energy use
- Operable window impacts on energy

UTILITY AND WEATHER

Simulation Software	IES VE 2022
Weather File *for model simulations*	Portland, OR

		THE FIELDS APARTMENTS	THE FIELDS CLUBHOUSE	FUTURE OFFICES
ROOFS	**Typical Roof**	Attic roof with wood joints	Attic roof with wood joints	Insulation above deck
	Insulation	R-49 batt insulation	R-60 batt insulation	R-30 c.i.
	Assembly U-Value	U-0.021	U-0.014	U-0.032
FLOORS	**Ground Floor**	Concrete slab	Concrete slab	Concrete slab
	Insulation	R-10 perimeter 24″ below	R-10 perimeter 24″ below	R-15 perimeter 24″ below
	Assembly F-Value	F-0.540	F-0.540	F-0.520
WALLS	**Wall Type**	Wood framing with batt insulation, no c.i.	Wood framing with batt insulation, no c.i.	Metal framing with batt insulation, continuous insulation
	Insulation	R-21 between frame members	R-21 between frame members	R-13 batt + R-7.5 c.i.
	Assembly U-Value	U-0.052	U-0.052	U-0.054
VERTICAL GLAZING INCLUDING GLAZED DOORS	**Window to Wall Ratio**	24%	33%	40%
	Pane + Frame	Double pane glass, vinyl framing	Double pane glass, metal framing, curtainwall	Double pane glass, fixed metal framing
	Assembly U-Value	U-0.27	U0.45	U-0.35
	Assembly SHGC	0.40 SHGC	0.40 SHGC	0.36 SHGC

Modeling Assumptions

ROLLING BLACKOUT FOR FIELDS APARTMENTS

To reduce energy use of the residential apartments during a power outage, a rolling blackout scenario could be used. Each apartment building has electricity available for 45 min at a time, leaving each building out of power for 3 hours at a time. This allows for refrigerators to keep safe temperatures, for residents to be able to cook, and to maintain safe room temperatures.

It is not expected that refrigeration and cooking energy would be reduced. All refrigerators and water heaters in the building would be expected to operate for about 30 min out of the 45 minute block to maintain setpoints at the same time. The expectation is that all residents would cook during the morning and evening power on times. This leads to higher than normal energy use during these blocks for each building as there is less diversity of equipment spread out over time.

During the rolling blackout scenario, it is assumed the following equipment would be in use. Appliances such as dishwashers, washing machines, and dryers have cycles that are longer than 45 min and would not be expected to be in use during this scenario.

- Refrigerator
- Stove/Oven/Microwave
- TV
- Other Misc. (cell phone charging, etc.)
- Water Heater

Apartment Building	Start	End
B1	0:00	0:45
B2	0:45	1:30
B4	1:30	2:15
B5	2:15	3:00
B6	3:00	3:45
B1	3:45	4:30
B2	4:30	5:15
B4	5:15	6:00
B5	6:00	6:45
B6	6:45	7:30
B1	7:30	8:15
B2	8:15	9:00
B4	9:00	9:45
B5	9:45	10:30
B6	10:30	11:15
B1	11:15	12:00
B2	12:00	12:45
B4	12:45	13:30
B5	13:30	14:15
B6	14:15	15:00
B1	15:00	15:45
B2	15:45	16:30
B4	16:30	17:15
B5	17:15	18:00
B6	18:00	18:45
B1	18:45	19:30
B2	19:30	20:15
B4	20:15	21:00
B5	21:00	21:45
B6	21:45	22:30
B1	22:30	23:15
B2	23:15	24:00

Modeling Assumptions

MODELED PV CAPACITY



The PV capacity and modeled production was completed using Helioscope.

LOCATION	PV CAPACITY KW	LAYOUT	PERFORMANCE	
			PRODUCTION DENSITY KWH/KW	ANNUAL PRODUCTION KWH
Clubhouse Roof	64.7 kW	Flush-Mount Racking	1,037	67,090
Apartment Roofs	566.3 kW	Single Tilt (South Racking)	1,183	670,000
Apartment Carports	454.7 kW	Flush-Mount Racking	1,068	486,000
Office Building Roofs	297.0 kW	Single Tilt (South Racking)	1,192	354,200
Office Carport Arrays	376.2 kW	Flush-Mount Racking	1,140	429,200
Strackers	12.6 kW	Dual Tilt Axis	2,000	25,200
Transportation Hub/ Bridge	54.7 kW	Flush-Mount Racking	999	54,700

**Note: Clubhouse currently has a sod roof. Viability of adding PV will need to be evaluated*