

OCTOBER 26, 2023

Improving Kaiser Permanente's sustainability footprint with enhanced energy efficiency, visibility, and optimization

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AVEVA

Kaiser Permanente at a Glance

Recognized as one of America's leading health care providers and not-for-profit health plans



Kaiser Foundation Health Plan



Permanente Medical Groups

Kaiser Foundation Hospitals

> 12 million members

> \$80 billion annual operating revenue

200,000+ employees

More than 70 million square feet of occupied space

**40 hospitals
More than 700 medical offices and other facilities**

Business Challenges for Kaiser Permanente

- Kaiser Permanente is a very large entity with more than 1,200 buildings nationally – hospitals, medical office buildings, data centers, administrative space, warehouses/distribution centers and even a manufacturing facility (eyeglasses).
- More than 1.5 million MWHs of consumption per year.
- We have exactly two people in the 200,000+ person organization to focus solely on energy issues.
- How to find the opportunities to save energy and identify the best places to deploy solar and other distributed energy resources?
- How will we know how those DERs are performing?
- This last point is key – you actually can have too much of a good thing.
- How do we know we're on the right tariff? They keep changing all the time.
- How do we know how much money we're saving from DERs?

Fuel Cell Net Metering

“...too much DER can be a problem; properly size DER and take into account potential for energy efficiency, which will lower DER needs...”



CHALLENGES

- Excessive on-site generation from fuel cells.
- Collecting and analyzing data was too difficult and expensive from utilities or other vendors.
- Some vendors required hardware installation, which can be disruptive.

SOLUTIONS

- DERNetSoft platform to monitor Net Energy Metering.
- Easy-to-use dashboard readily identified where, when and how much NEM took place.
- Scaled over multiple facilities in 4 different utilities territory.

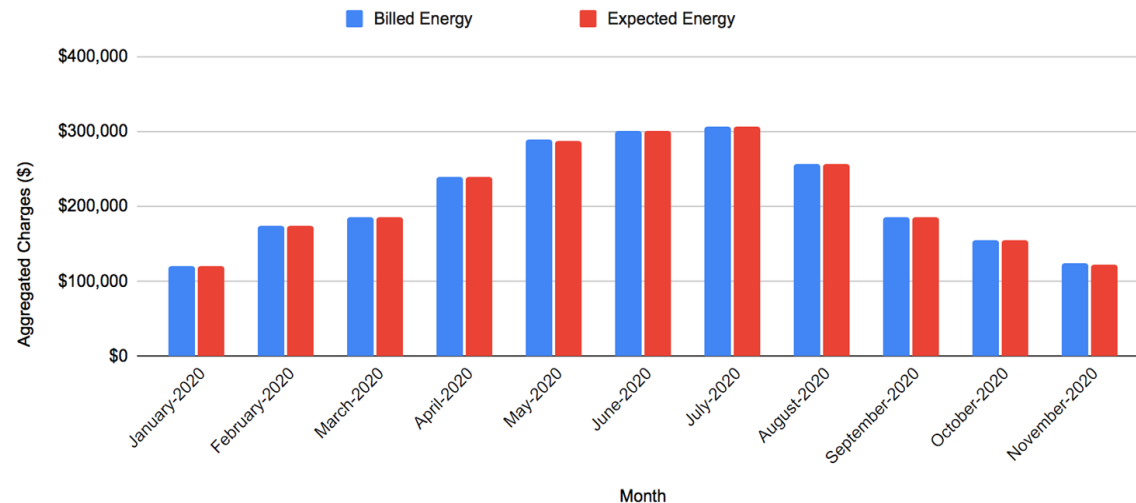
RESULTS

- Some fuel cell capacity being downsized and moved to other sites, saving Kaiser Permanente M\$.

Auditing of Solar PPAs

Occasional billing errors

Billed and Expected Energy Charges (\$) - 2020



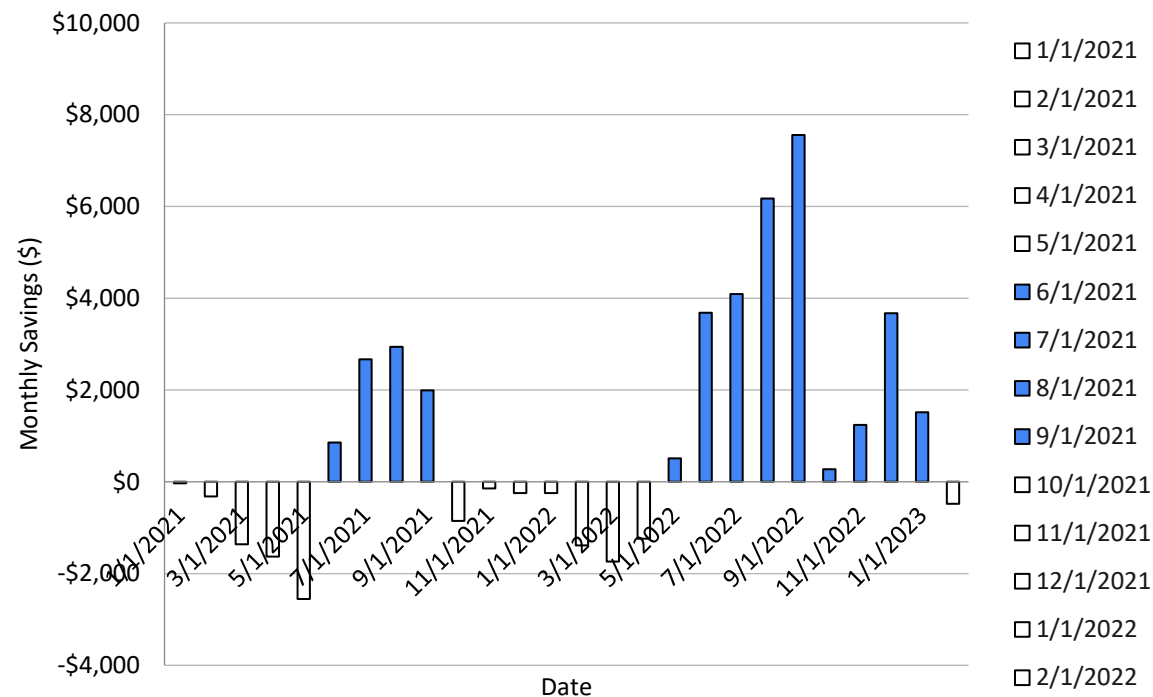
| Site | Actual Generation (KWH) | Expected Generation: Pre-Adj. (KWH) | Adj. Expected Generation: Locus (KWH) | % Expected Output Met |
|---|-------------------------|-------------------------------------|---------------------------------------|-----------------------|
| CA3941 - Harbor-MacArthur Medical Offices | 41,858.9 | 434,753.3 | 57,544.0 | 72.74% |
| CN2203 - Napa Medical Offices | 33,074.6 | 572,659.8 | 42,216.2 | 78.35% |
| CN1301 - Union City Medical Offices A | 44,348.3 | 943,438.2 | 55,967.3 | 79.24% |
| CN2450 - Livermore Medical Offices | 93,281.3 | 716,099.9 | 112,064.8 | 83.24% |
| CN3501 - S. San Francisco Hospital | 27,302.8 | 502,016.3 | 32,993.6 | 82.75% |
| CA6051 - East Hills Medical Offices | 479,755.2 | 563,971.7 | 578,375.0 | 82.95% |
| CN9201 - San Leandro Medical Center | 72,710.3 | 1,271,174.9 | 92,834.7 | 78.32% |

Sometimes there is under production

Solar Tariff Optimization

Savings from on-site solar projects can vary greatly depending on the selected utility rate, which can change.

- Option E would have saved \$18,110
- Option R would have saved \$31,125



| | TOU-GS-2R | | | TOU-GS-2B (Current) | | |
|------|-------------------|--------------------|-------------------------|---------------------|--------------------|-------------------------|
| | Delivery w/ Solar | Delivery w/o Solar | Delivery Charge Savings | Delivery w/ Solar | Delivery w/o Solar | Delivery Charge Savings |
| 2021 | \$29,620 | \$73,011 | \$43,391 | \$44,250 | \$66,965 | \$22,715 |
| 2022 | \$37,454 | \$90,146 | \$52,692 | \$53,949 | \$79,125 | \$25,176 |

| | TOU-GS-2E | | | TOU-GS-2B (Current) | | |
|------|-------------------|--------------------|-------------------------|---------------------|--------------------|-------------------------|
| | Delivery w/ Solar | Delivery w/o Solar | Delivery Charge Savings | Delivery w/ Solar | Delivery w/o Solar | Delivery Charge Savings |
| 2021 | \$35,239 | \$78,431 | \$43,192 | \$44,250 | \$66,965 | \$22,715 |
| 2022 | \$44,850 | \$96,416 | \$51,566 | \$53,949 | \$79,125 | \$25,176 |

Night-time Set Back Opportunities

| | Setback Percentage: 4 AM Divided by 2 PM Loads | | |
|---|--|---------|----------|
| Building Name | Max (%) | Min (%) | Avg. (%) |
| MOB (Medical Office Building – 9 am – 5 pm occupancy) | 95.1% | 39.7% | 63.1% |
| Hospital | 100.8% | 47.1% | 71.0% |
| Hospital | 93.9% | 43.9% | 69.6% |
| MOB | 114.2% | 49.8% | 72.1% |
| Hospital | 192.3% | 60.6% | 74.2% |
| MOB | 101.9% | 23.8% | 50.5% |
| Hospital | 90.0% | 54.9% | 69.6% |
| Hospital | 94.1% | 56.6% | 69.6% |
| Hospital | 91.3% | 59.0% | 69.8% |
| Hospital | 97.0% | 65.9% | 82.5% |
| Central Utility Plant | 80.5% | 50.3% | 61.8% |
| MOB | 100.0% | 55.0% | 70.7% |
| Data Center | 107.0% | 82.0% | 91.5% |
| Admin Building | 101.4% | 19.6% | 27.2% |
| Admin Building | 103.1% | 34.9% | 41.6% |
| Call Center | 113.5% | 37.2% | 78.6% |
| MOB | 62.0% | 20.0% | 34.3% |
| MOB | 683.5% | 46.1% | 76.7% |
| MOB | 130.9% | 45.1% | 73.6% |
| MOB | 78.6% | 33.3% | 41.4% |
| MOB | 58.6% | 31.7% | 41.9% |
| MOB | 125.9% | 41.2% | 73.5% |
| MOB | 1802.0% | 35.6% | 97.7% |

Hospitals are in a tight range

This is what's possible

This is what's avoidable

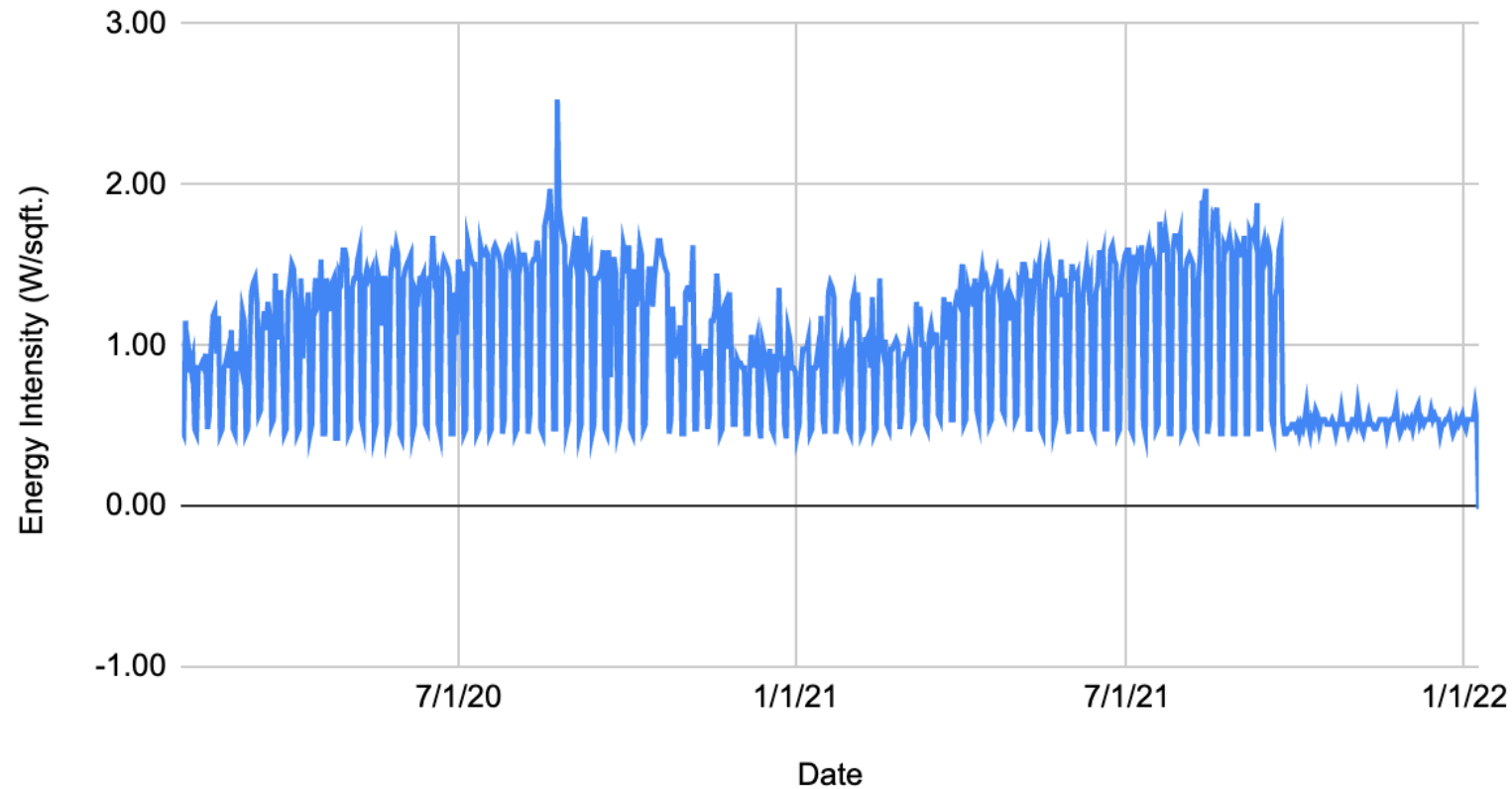
By EUI Metric

| Building Groups | Avg 4 AM (W)/RSF |
|-----------------|------------------|
| Admin | 0.45 |
| MOBs | 0.80 |
| Admin | 0.81 |
| MOBs | 1.12 |
| MOBs | 1.14 |
| MOBs | 1.59 |
| MOBs | 1.73 |
| MOBs | 1.74 |
| MOBs | 1.93 |
| MOBs | 2.02 |
| Hospitals/CUPs | 2.32 |
| Hospitals/CUPs | 2.53 |
| MOBs | 2.56 |
| Hospitals/CUPs | 2.64 |
| MOBs | 3.26 |
| Hospitals/CUPs | 3.32 |
| Other | 4.30 |
| Admin | 6.23 |

One MOB Example

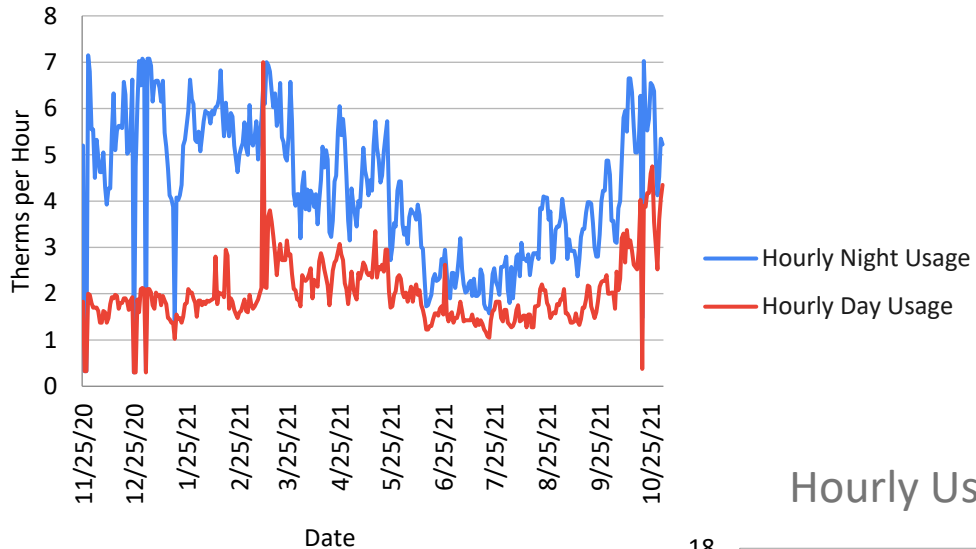
If every KP building evaluated in this study got down to 1 w/sq foot from 10 pm to 4 am, the savings would be \$1.7M/year.

4 AM Energy Intensity (All Days): W/sqft.

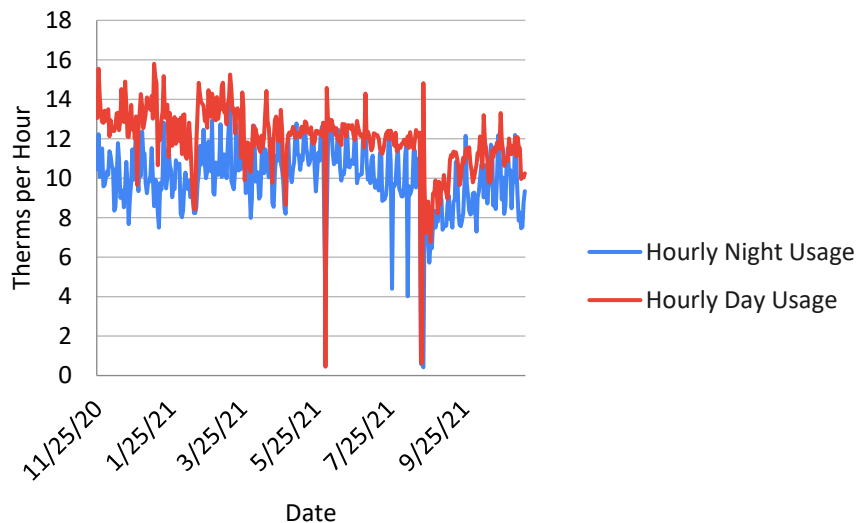


This can be done for natural gas too

Hourly Usage (Therms/hr)



Hourly Usage (Therms/hr)



| Building | Avg. Usage Ratio |
|----------------------|------------------|
| Regional Service Ctr | 0.33 |
| Administrative | 0.36 |
| Call Ctr | 0.51 |
| Data Center | 0.60 |
| MOB | 0.63 |
| MOB | 0.75 |
| MOB | 0.81 |
| MOB | 0.85 |
| Service Center | 0.89 |
| Hospital | 0.96 |
| MOB | 0.99 |
| MOB | 1.01 |
| Hospital | 1.04 |
| Warehouse | 1.07 |
| Hospital | 1.12 |
| Hospital | 1.22 |
| MOB | 1.37 |
| MOB | 1.42 |
| MOB | 1.52 |
| MOB | 1.69 |
| MOB | 1.82 |
| MOB | 2.17 |
| MOB | 2.25 |
| MOB | 2.37 |
| MOB | 2.86 |
| MOB | 3.05 |
| MOB | 3.12 |
| MOB | 3.37 |
| MOB | 4.24 |
| MOB | 5.00 |

Again, a wide range of average day/night gas usage

SOLUTION

ENERGY COMMUNITY ECOSYSTEM

AVEVA Product Portfolio use case

Alberto Colombo



Energy Information System As A Service Provider



1800+ Total Customer Sites across the US

200 Total Distributed Energy Resources

65M+ Total Square Foot

30+ Utilities, CCAs, Municipalities & Cooperatives

109MW DER Capacity across all customer base

490GWh Annual DER Generation



Distributed Energy Resources (DERs): Challenges

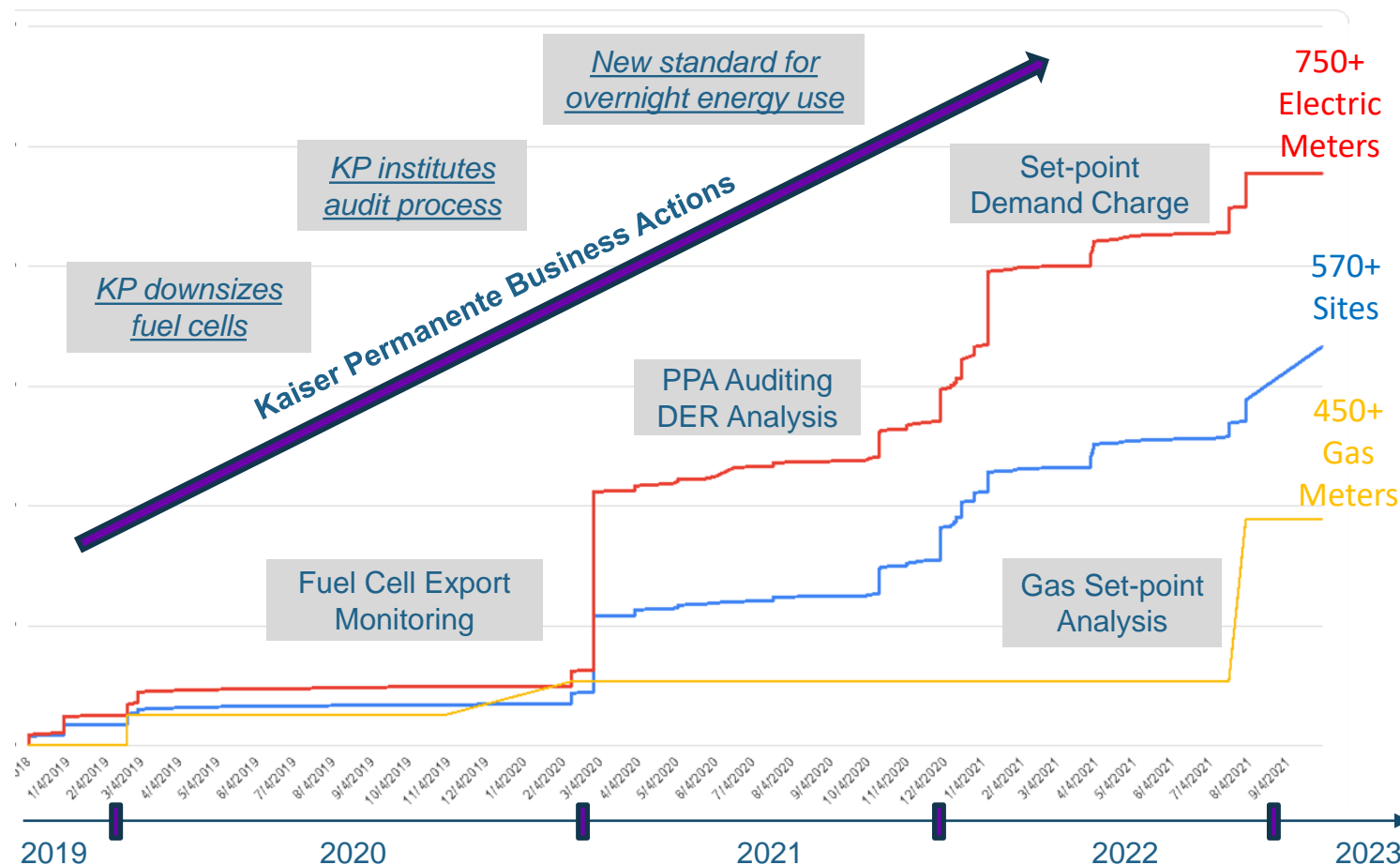
The fast growth of DERs such as PV Solar, Energy Storage System, Fuel Cell, Electric Vehicle is causing new challenges in the 'behind the customer meter' environment.

- Behind the meter environment is changing and has become much more complex.
- Challenging sustainability goals are driving large deployment of DERs.
- Lack of digitization, data availability and standardization across multiple utility territories.
- Multiple DERs managed by different vendors creates DER data silos behind the meter.
- Data sharing between internal and external teams.

Solution: Energy Community Ecosystem

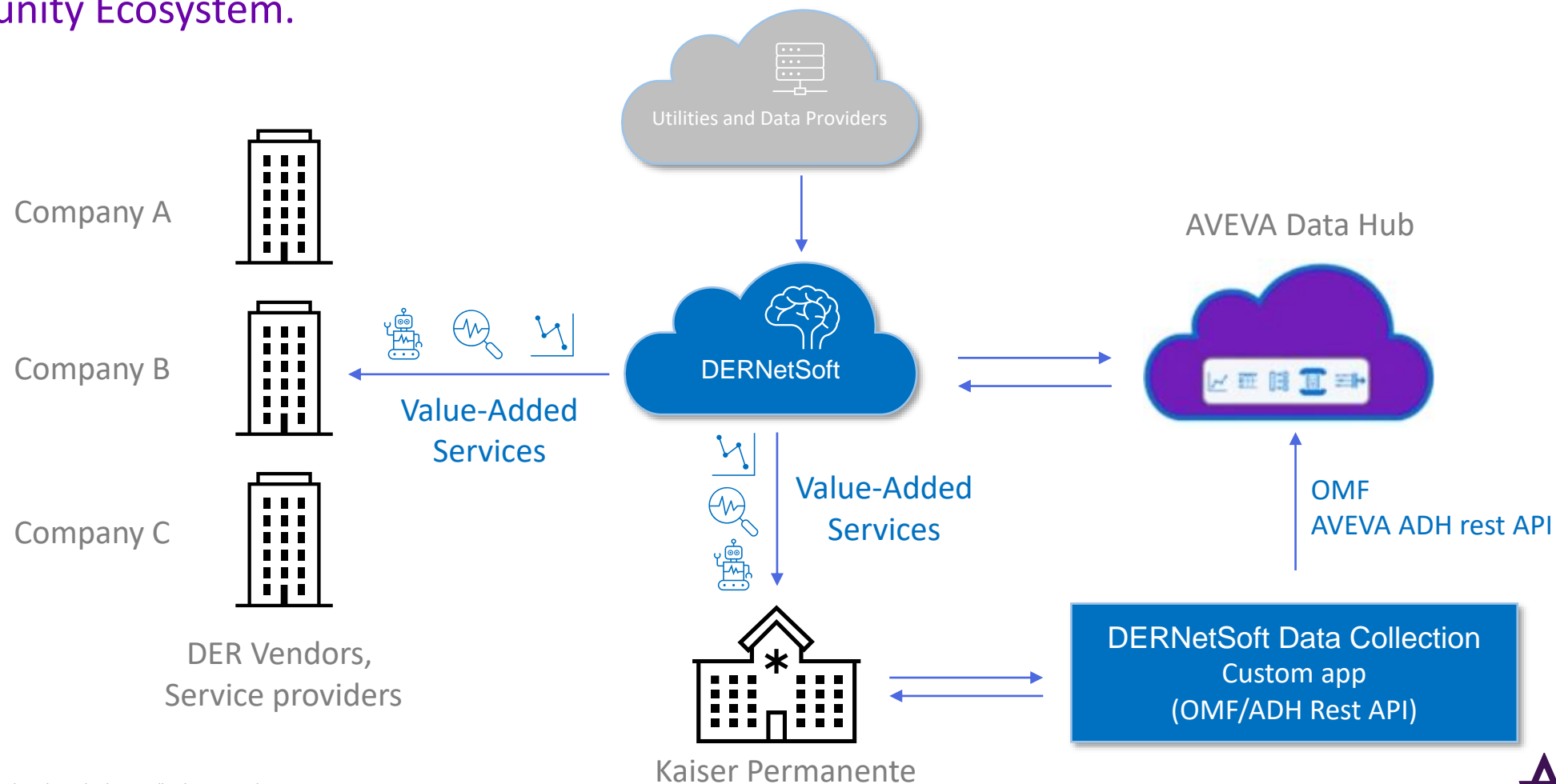
A scalable and replicable solution to support large corporations in achieving their prosumer and sustainability goals.

- Scalable platform by design.
- Software As A Service model.
- Data collection automation, digitization and standardization.
- Behind the meter DERs data integration.
- Advanced energy analytics suite.
- Secure data sharing.



Energy Community Ecosystem: Architecture

The DERNetSoft SaaS platform is built on top of AVEVA Data Hub (PaaS) and enables the Energy Community Ecosystem.



Energy Community Ecosystem: User Interface

The screenshot displays the user interface for the Energy Community Ecosystem, specifically for the Mass General Brigham aggregation. The interface is organized into several key sections:

- Header:** Includes the DERNetSoft logo, the aggregation name "Mass General Brigham", and summary statistics: 10 BUILDINGS, 16 ELECTRIC METERS, and 27 GAS METERS.
- Service List:** A sidebar on the left contains "Energy Awareness" (Get into the energy awareness tool) and "Time Comparison" (Compare building electric load).
- Assets:** A list of three assets is shown: "Assembly Row" (399 Revolution Drive, Somerville, Ma, USA), "Spaulding Rehab Hospital Cambridge" (1575 Cambridge St, Cambridge, Ma 02138, USA), and "Spaulding Rehab Hospital- Charlestown" (300 1st Avenue, Charlestown, Ma 02129, USA).
- Building Map:** A map view showing the location of "Assembly Row" and "Lucky Strike Somerville".
- Consumer Awareness:** A section titled "CONSUMER Awareness" with a "Usage Point(s)" field containing "2913093ATL (Electric) - Acct: 29130930018".
- Key Performance Indicators (KPIs):**
 - Time-of-Day Power Intensity:** 0.1 W/sqft AVG.
 - Energy Use Intensity:** Site EUI 85.9 KBTU/sqft.
 - Metered Electricity Imports:** 1,764,521 kWh (Electricity flowing into the meter from the grid).
 - Net Metered Electricity:** 1,764,521 kWh (Imported - Exported Electricity at the Meter).
 - Annual GHG Emissions:** 488.23 mT Co2 (Metric Tons of CO2 Equivalent).
 - Annual GHG Emissions:** 54,804 Gal. Gasoline (GHG eq. Gallons Gasoline).
- Load Profile:** A detailed line chart showing "Load (kW)" and "Temperature (F°)" over time. The chart includes a "Flow Direction" dropdown set to "Import (Consumption)", a "Time Range" selector (2023-08-22 to 2023-09-22), and toggle switches for "Emissions" and "Weather". The x-axis shows dates from 08-26-2023 to 09-21-2023. The y-axis for Load (kW) ranges from 0 to 1200, and for Temperature (F°) from 48 to 108.
- Summary Charts:** A bar chart at the top shows electricity usage by building, and a pie chart on the right shows a distribution of values, with a prominent green slice at 693% and a red slice at -375%.

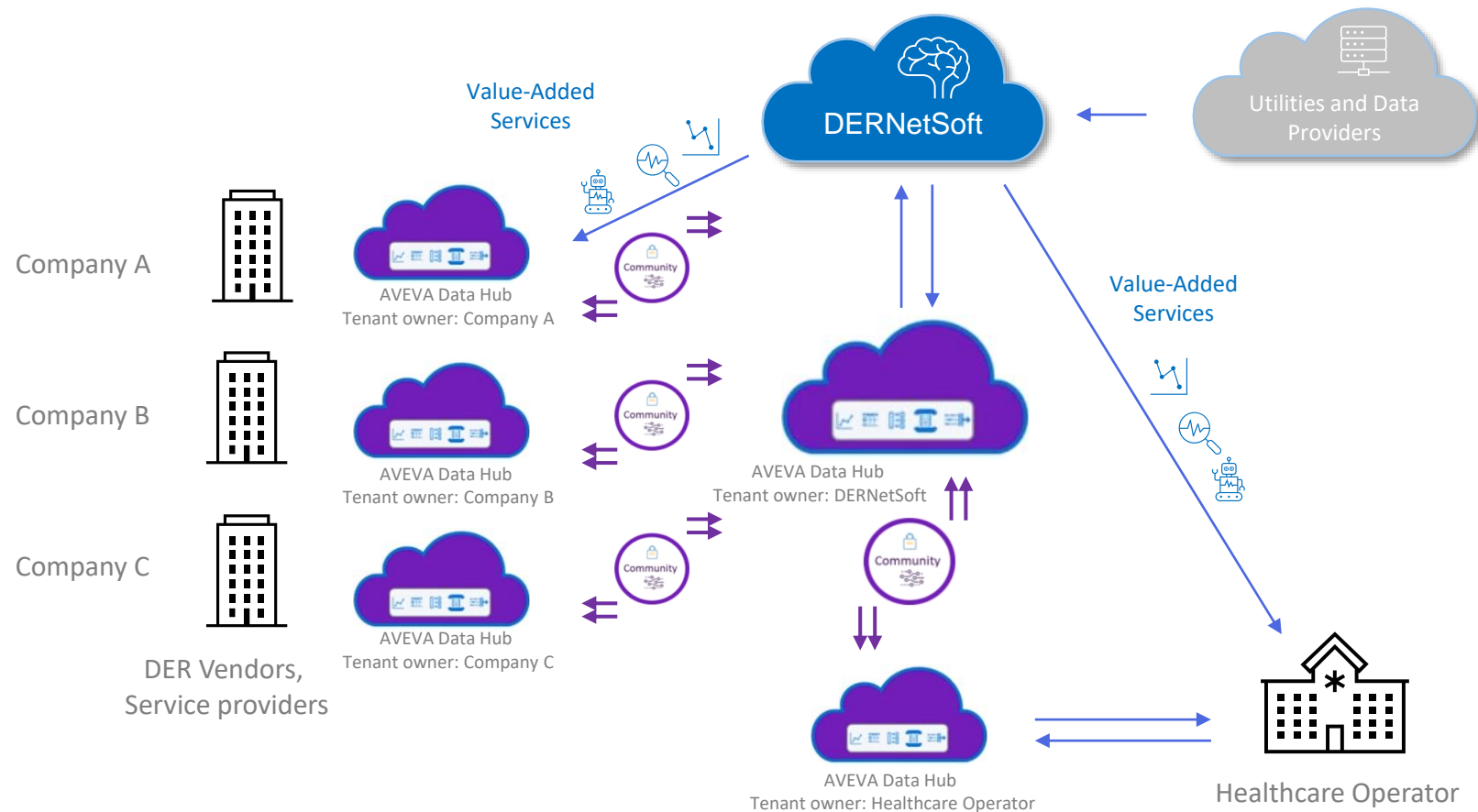
Energy Community Ecosystem: Benefits

A replicable model to be adopted by other industries.

- The subscription model allows a company to access the service without large upfront cost (i.e., hardware installation).
- The platform approach guarantees scalability over large number of sites and across multiple utility territories.
- AVEVA Data Hub and DERNetSoft provide the energy domain expertise to collect, digitize and standardize meters and DERs data.
- The fully integrated solution breaks the existing behind the meter data silos and enables innovative energy services.
- AVEVA Data Hub community system feature enables data sharing and unlocks the network effect.

Building the Network Effect

Leveraging the AVEVA Data Hub community feature we can scale this approach to other industries and make an impact on the digital transformation.



Energy Community Ecosystem: Impact / Savings

Very quick Return on Investment (ROI)

- This initiative has saved Kaiser millions in energy savings and reimbursements for over production.
- If all of the identified measures were implemented, the savings would be into the tens of millions of dollars.
- KP is now talking about implementing policies/standards around nighttime setbacks in non-hospital buildings.
- This is a key tool to educate facility directors, chief engineers and regional executives about the benefits of our sustainability programs, such as being precise on the economic savings of solar power.
- When someone asks, “so how much are we really saving”, we have a firm answer.
- The next steps in the journey: integrating EV charging, expanding natural gas analytics to focus on Scope 1 emission reductions and substantially adding energy storage assets.

Conclusion

Doing more with less

- The platform enables Kaiser and other customers to hold vendors' feet to the fire (solar, fuel cells, battery, etc.). Sometimes interests aren't always aligned, and this tool provides assurance that the DER investments are the right size and scope.
- Energy management teams may be relatively small in large, decentralized organizations. No one has the ability to do everything – so we need to find those needles in the haystack (and there are a lot of needles).
- Having this intelligence greatly expands the reach and ability of small teams to augment their impact, to focus their time on the easier-to-implement opportunities. It increases our ability to have a much larger impact that a small team would normally have.
- What has enabled this low-cost/high-impact opportunity? A combination of much easier access to utility interval data and advanced analytics/machine learning. And this will only improve over time.
- Highly replicable in other sectors (network effect) to make a bigger impact on the decarbonization of the planet.



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Questions?

Please wait for the microphone.
State your name and company.



Please remember to...

Navigate to this session in the mobile app to complete the survey.



Thank you!

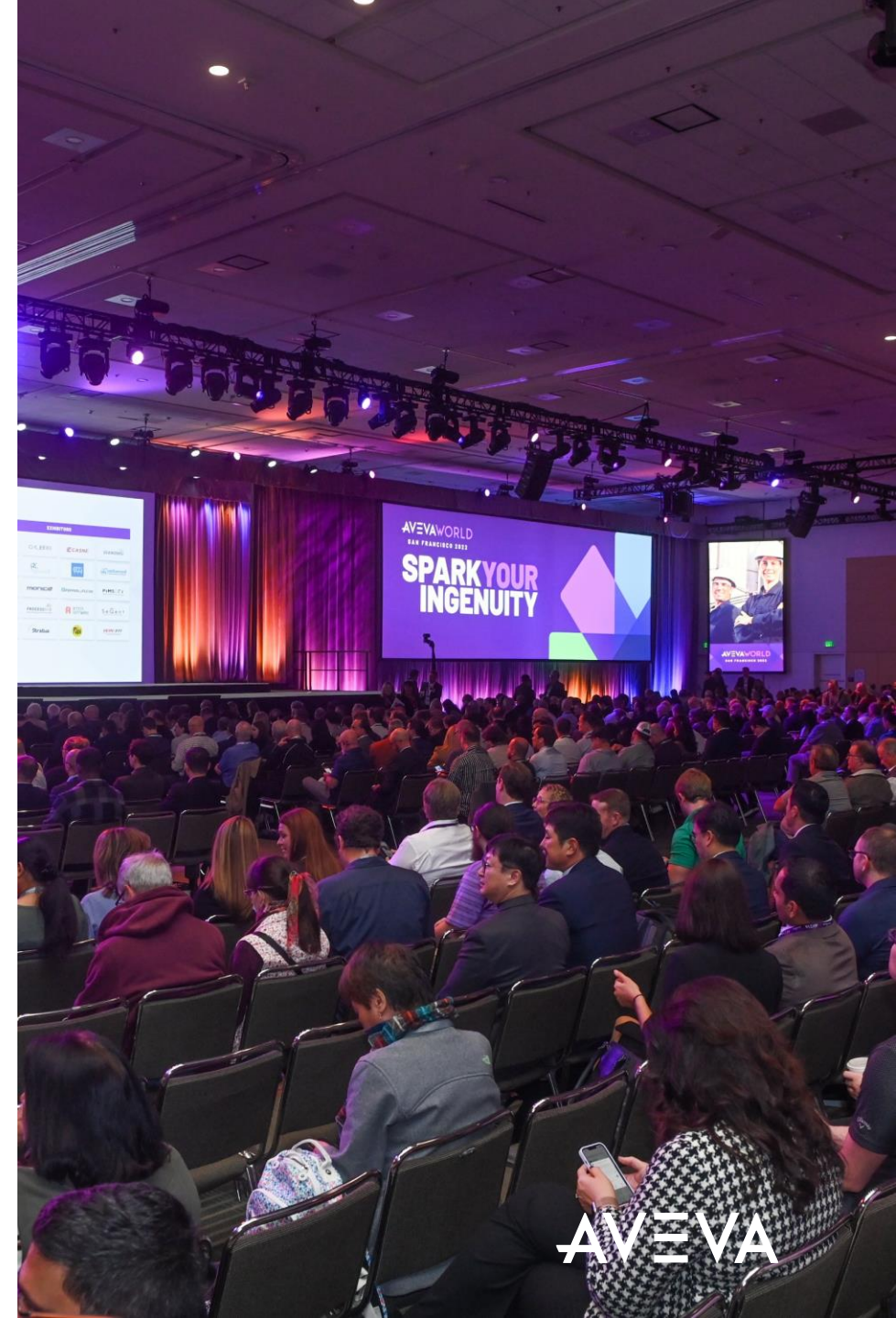
Upcoming Sessions

Platform Developer Deep Dive: Getting the most out of AVEVA's Industrial Platform

Thursday, October 26 @ 1:30-2:30pm
Room 2004

Platform Developer Roadmap: Leveraging new capabilities within AVEVA's Industrial Platform

Thursday, October 26 @ 2:50-3:50pm
Room 2004



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Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

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