PENINSULA CLEAN ENERGY

OUR PATH TO 24/7 RENEWABLE ENERGY BY 2025

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Why we are pursuing 24/7 renewable power

Since our inception, Peninsula Clean Energy has pushed the boundaries in clean energy procurement and deployment to significantly reduce greenhouse gas (GHG) emissions. In 2016, we set an unprecedented goal for a California load serving entity at the time: to procure 100% renewable energy. However, we knew this goal in and of itself was not sufficient to drive the long-run transformation needed to achieve a fully decarbonized grid. So, we decided to push the boundaries even further. In 2017, we adopted a goal to deliver 100% renewable energy on a 24/7 basis by 2025, matching our renewable energy supply with our load every hour of every day to reduce our demand signal for fossil fuels from the grid.[1]

From the beginning, we also committed to affordable pricing and have maintained prices consistently below those of Pacific Gas & Electric (PG&E). We believe this is important for widespread consumer adoption of clean energy. This is because, even though research indicates that nearly half of Americans say they are willing to pay more for clean electricity, we have found that only a very small percentage of our customers choose to do so.[2]

Peninsula Clean Energy was already delivering 50% renewable energy to our first customers in 2016, 14 years ahead of California's goal of 50% renewable by 2030. In 2021, we procured 100% renewable or carbon-free power for all our nearly 300,000 customers.

We have done this while building a financially strong organization and providing this cleaner electricity at a consistently lower price than what our customers would pay at PG&E rates, demonstrating that we can reduce GHG emissions and save consumers money at the same time.

This is the cornerstone of the challenge we set for ourselves: How to cost-effectively deliver 100% renewable energy on a 24/7 basis by 2025.

This is the cornerstone of the challenge we set for ourselves: How to cost-effectively deliver 100% renewable energy on a 24/7 basis by 2025. Because our load profile is similar in shape to the system-wide load profile in the state, we believe that achieving this goal would demonstrate that this approach is scalable state-wide. If we can achieve this goal, we can provide a model for other load serving entities to follow and accelerate further reductions of GHG emissions in the electricity supply.

The need to do this is urgent, a fact recognized by many since we set our goal in 2017. The following year, Google described its vision of a 24/7 carbon-free goal for their data centers and campuses, and in 2020 set a goal to achieve this by 2030.[3] Cities such as Los Angeles, Sacramento, and Des Moines have now set similar goals, and researchers at RMI (formerly Rocky Mountain Institute) and Princeton have begun studying the trend.[4] Earlier this year, the United Nations started building a global coalition for 24/7 carbon free energy.[5] Our goal still remains the most ambitious in terms of its timeline and commitment to renewable energy.

This white paper introduces Peninsula Clean Energy's vision for 24/7 renewable energy, our progress to date, and at a high level how we are planning to achieve it by 2025. This paper will be followed in the next few months with a report containing the results of our modeling, including details about the expected costs and resource mix required to achieve this unprecedented goal.

Renewable energy vs. carbon-free energy

Renewable energy is produced from resources that are naturally replenished as they are used, while carbon-free energy is produced from resources that do not emit greenhouse gases into the atmosphere. Many resources are both renewable and carbon-free (such as wind and solar), some resources are renewable but not carbon-free (such as biomass), and others are carbon-free but not renewable (such as nuclear). In our case, when we talk about renewable energy, we are using the definitions set by California's Renewables Portfolio Standard.[6] As we develop our mix of resources to meet our goal, we will consider renewable baseload resources such as geothermal and biogas, which may emit small amounts of carbon but generate electricity on a continuous basis in all hours of the day.

SUPPLY RESOURCE	RENEWABLE	CARBON-FREE	BASELOAD	MEDIAN EMISSIONS FACTOR[7] ($lbCO_2e/MWh$)
SOLAR PV	●	●		0
WIND (ONSHORE AND OFFSHORE)	●	●		0
GEOTHERMAL	●	Certain types	●	126*
SMALL HYDROELECTRIC (<30 MW)	●	●		0
BIOGAS	●		●	8
WAVE/TIDAL	●	●		0
BIOMASS	●		●	52
LARGE HYDROELECTRIC		●	●	0
NUCLEAR		●	●	0

* Peninsula Clean Energy's currently contracted geothermal resource has an emissions factor of 79 $lbCO_2e/MWh$.

What is 24/7 procurement and why is it important?

To better understand what it means for Peninsula Clean Energy to deliver renewable energy to our customers, it is first necessary to explain generally how the electric grid works. In physical terms, the electric grid is a system of wires that transmits and distributes electricity throughout the state, connecting our customers with the renewable energy generators under contract with us. As an analogy, it can be helpful to think of the electricity grid as a river. Just as streams and tributaries add their water flow to larger rivers, power plants throughout California add their energy to the electricity grid. Just as downstream customers can draw water from the river to use in their homes and businesses, our customers consume energy from the grid. The key point of this analogy is that just as it is impossible to track the source of a single molecule of water drawn from a river, it is similarly impossible to track exactly where each electron you consume comes from.

The electricity that we deliver to customers is therefore tracked based on contractual terms, rather than physical terms. We know how much metered energy our contracted generators deliver to the grid, and we make sure that it is the same amount of metered energy that our customers use. While in contractual terms we currently deliver a specific mix of renewable and carbon-free electricity to our consumers, the physics of the power grid means that everyone consumes a mix of electrons from both the carbon-free and fossil-based resources that deliver energy to the grid.

In addition, the timescale that we use to track our contractual renewable energy deliveries matters.

California's current regulatory standards for procuring and reporting clean electricity, such as the Renewables Portfolio Standard and Power Source Disclosure program, are tracked on an annual basis. We count how many megawatt-hours (MWh) of electricity our contracted generators produce in a year and match that to the number of MWh that our customers consume in a year. This annual accounting framework is how we are required to report our procurement to the state and report in our Power Content Label sent to our customers.[8]

However, this annual accounting standard ignores whether our contracted generators produce electricity at the same time our customers use it. At certain hours, our contracts generate less clean energy than our customers are using. During those times, we must rely on generic grid electricity (most of which in California comes from methane gas power plants) to make up the difference.* In other hours, our contracts generate more clean energy than our customers use. Under the current standards, we can "credit" this excess clean generation to the hours when we rely on fossil-based grid energy and net out our grid energy use on an annual basis. While the excess renewable generation we contribute to the grid in some hours generally displaces fossil generation, we continue to send a demand signal for fossil-based energy in those hours when our clean energy contracts do not match the timing of our customers' energy demand (figure 1).

This is why a 24/7 renewable energy approach, which matches renewable energy supply with demand on an hour-by-hour basis, is so important for the success of our state

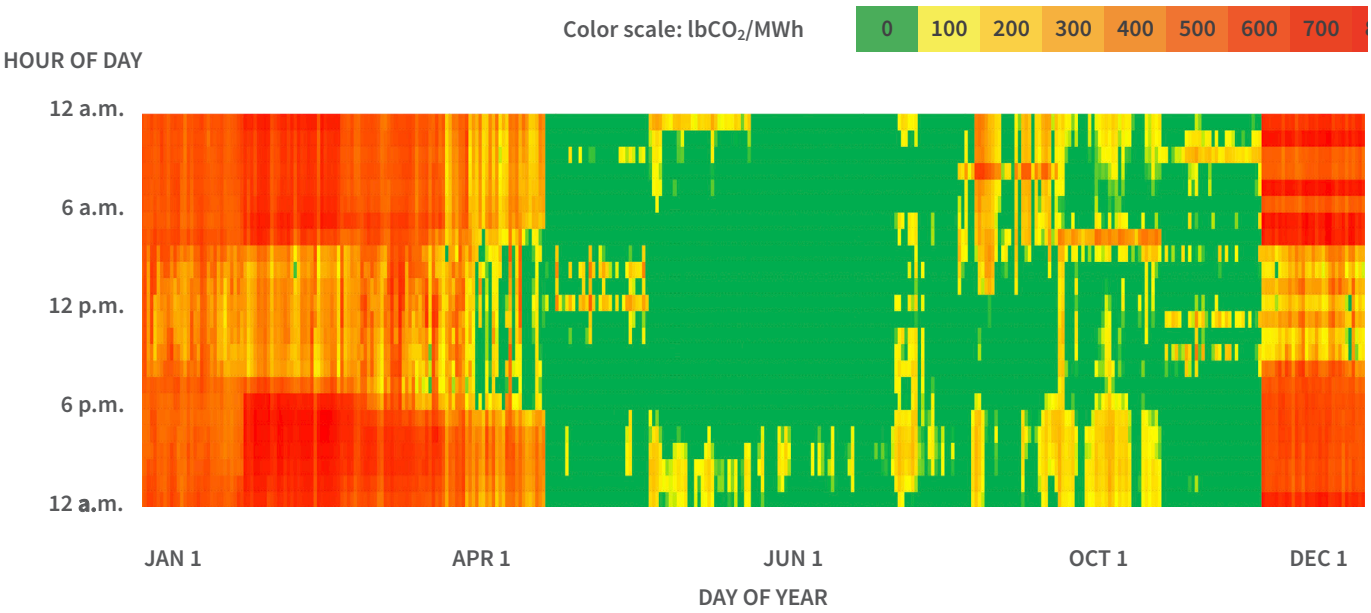
* Methane gas is also marketed as "natural gas."

and global decarbonization goals. It enables us to help eliminate the demand signal for fossil-based electricity from the grid that our customers' electricity consumption presently provides at the times when our contracted renewable generation does not match our load. Reducing demand for this fossil-based electricity generation means that these generators run less frequently and become less economic to operate, ultimately helping to expedite the retirement of these resources. The 24/7 procurement approach also helps address the state's grid reliability needs, helping to ensure that there is enough renewable capacity on the grid at the times when it is needed, and helping to address the state's renewable integration challenges characterized by the "duck curve."[9]

2020 Peninsula Clean Energy 24/7 estimated emissions intensity

This heatmap shows the estimated carbon intensity of Peninsula Clean Energy's delivered electricity for every hour of the year in 2020, considering the emissions intensity from our renewable energy and greenhouse gas-free contracts as well as the use of generic (fossil-based) grid energy. When available, we used the actual hourly generation data from our contracts to develop this heatmap, otherwise, we used the CPUC Clean System Power Calculator to estimate the hourly generation.

FIGURE 1. Hour-by-hour emissions intensity for 2020



Although Peninsula Clean Energy is just a small part of the California grid, if we can demonstrate that 24/7 procurement can be achieved practically and cost-effectively, it will create a blueprint for others to follow. If scaled, this collective action to achieve 24/7 goals can ultimately lead to a carbon-free electricity supply for the whole state and beyond.

Our progress to date

As of 2020, based on the annual accounting standard, Peninsula Clean Energy delivered 52% renewable energy and 47% large hydro to our customers.[10] Our delivered electricity had a GHG emissions intensity of 12 lbCO_2e/MWh, compared to the California utility average of 466 lbCO_2e/MWh.*

Also as of 2020, 47% of our hourly load was matched by contracted renewable energy generated in the same hour. That is slightly lower than our annual renewable percentage (52%) because in some hours our contracted generators produced more renewable energy than we consumed, which we do not count toward meeting our goal. This excess renewable energy is still delivered to the grid. However, although the excess renewable energy offsets emissions from the grid as a whole, it is not being used to offset the emissions from generic grid energy that *our customers* consume in those hours when consumption exceeds what our contracted renewables produce. Using an hourly, time-coincident accounting method, we estimate that the GHG emission intensity of our delivered electricity was closer to 187 lbCO_2/MWh.**

Calculations based on different accounting methods

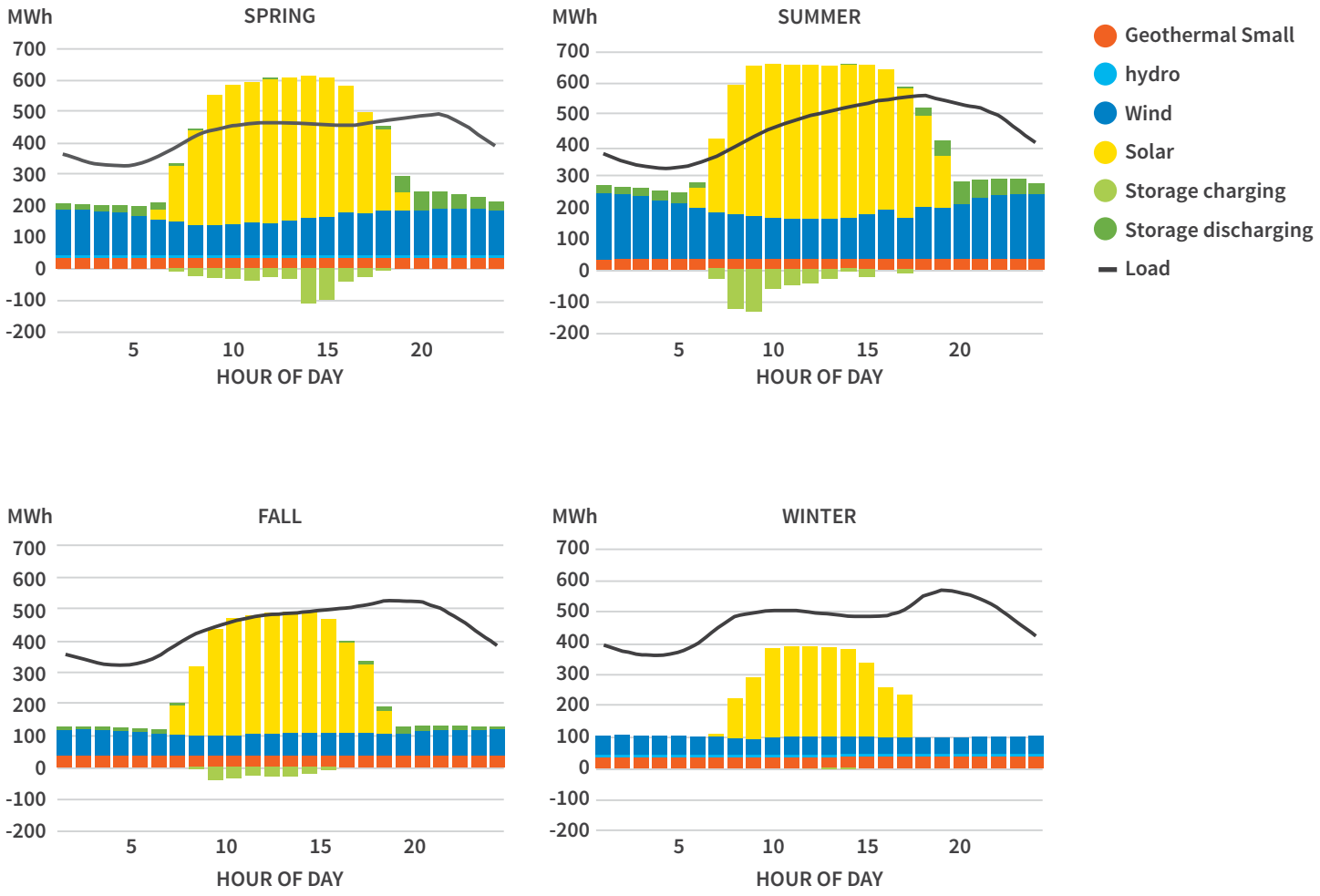
	RENEWABLE PERCENTAGE	GHG EMISSION INTENSITY
ANNUAL ACCOUNTING METHOD	52%	12 lbCO_2e/MWh
TIME-COINCIDENT ACCOUNTING METHOD	47%	187 lbCO_2/MWh

Based on contracts signed to date, we are currently on track to be 64% renewable on a time-coincident basis in 2025, and we are actively working to plan and procure the remaining 36% by that year (figure 2).

* 12 lb/MWh is a load-weighted average of our "ECOplus" product with a GHG intensity of 13 lb/MWh, and our "ECO100" product, which had a GHG intensity of 0 lb/MWh. The non-zero emission footprint of our portfolio on an annual basis is related to small emissions associated with geothermal and biomass energy sources.

** We assigned grid mix electricity a residual mix emissions factor, which we estimated to include a mix of all non-renewable and non-carbon free system CO_2 emissions in each hour as reported by CAISO's "Today's Outlook" dashboard.

FIGURE 2. Seasonal load profile and contracted resources for 2025
For each season of the year 2025, this plot shows the average hourly match between our forecasted load and currently contracted resources, as well as hypothetical energy storage dispatch. This puts us on track to be 64% renewable on a time-coincident basis in 2025 if we were to take no further actions.



Starting in 2020, we began developing a novel 24/7 portfolio planning model to identify the most cost-effective portfolio of renewable energy and energy storage resources that can meet our goal. The results of this modeling will be shared in the second part of this white paper, to be published in early 2022. We have also convened an advisory group of external experts from industry and academia, with whom we meet regularly to review our approach.

Overview of our load and supply options

In planning for 24/7 procurement, Peninsula Clean Energy must consider the characteristics of our load and various renewable resources, while keeping costs affordable, ensuring a diverse portfolio that mitigates risk and conforms with our inclusive and sustainable workforce policies. Although we are considering a wide variety of renewable resources, along with energy storage, to help meet our 24/7 target, we expect most of our portfolio in 2025 will consist of four primary renewable resources: wind, solar, geothermal, and small hydro. Of these resources, our current guideline is that at least 50% of the capacity we procure by 2025 comes from new or repowered resources, rather than from existing generation capacity. We also procure resources with varying term lengths in order to mitigate risk and to provide flexibility to contract with new technologies as they come to market.

A majority of Peninsula Clean Energy's load is in coastal San Mateo County, where the mild summers mean our load seasonally peaks in the winter. Starting in 2022, we will start serving the city of Los Banos, which is located in the hotter Central Valley and will add summer-peaking load. The daily pattern of our load changes throughout the year, but generally follows the pattern of system-wide load in California that peaks between 4 p.m. and 9 p.m.

Wind power

Wind turbines are a mature technology and have been operating in California for 40 years. There are several specific areas in the state well suited for wind development (both due to the wind resource and permitting restrictions), and most of these areas have already been developed. While there are limited opportunities for new wind in California, some existing wind farms are being repowered with newer, more powerful turbines. There may also be opportunities to procure from out-of-state projects that deliver to the California grid, such as from New Mexico and Wyoming. By the end of the decade (though not in time for 2025), a significant amount of new offshore wind is expected to be developed off the coast of California.

When we think about how wind fits into our 24/7 portfolio, we need to consider seasonal and locational fluctuations in generation. Depending on its location, each wind farm will generate energy at different times of day and more or less energy in different seasons. Wind is also a variable and intermittent resource, making it potentially more difficult to accurately forecast than other resources over the long term and more difficult to rely on to generate electricity at specific times.

Solar power

Solar projects are currently the most cost-effective resource to build in California, due to the low cost for solar panels, abundant land area for development and favorable weather conditions.

Solar energy is generally predictable (we often know when the sun will be shining) but has some intermittency due to cloud cover and other weather conditions (including increasing wildfire smoke). Generally solar production varies seasonally, with greater production in the summer and less in the winter. Since Peninsula Clean Energy's load is typically higher in the winter, this seasonal mismatch with peak solar production will be one of the challenges to meeting our 24/7 goal.

Geothermal power

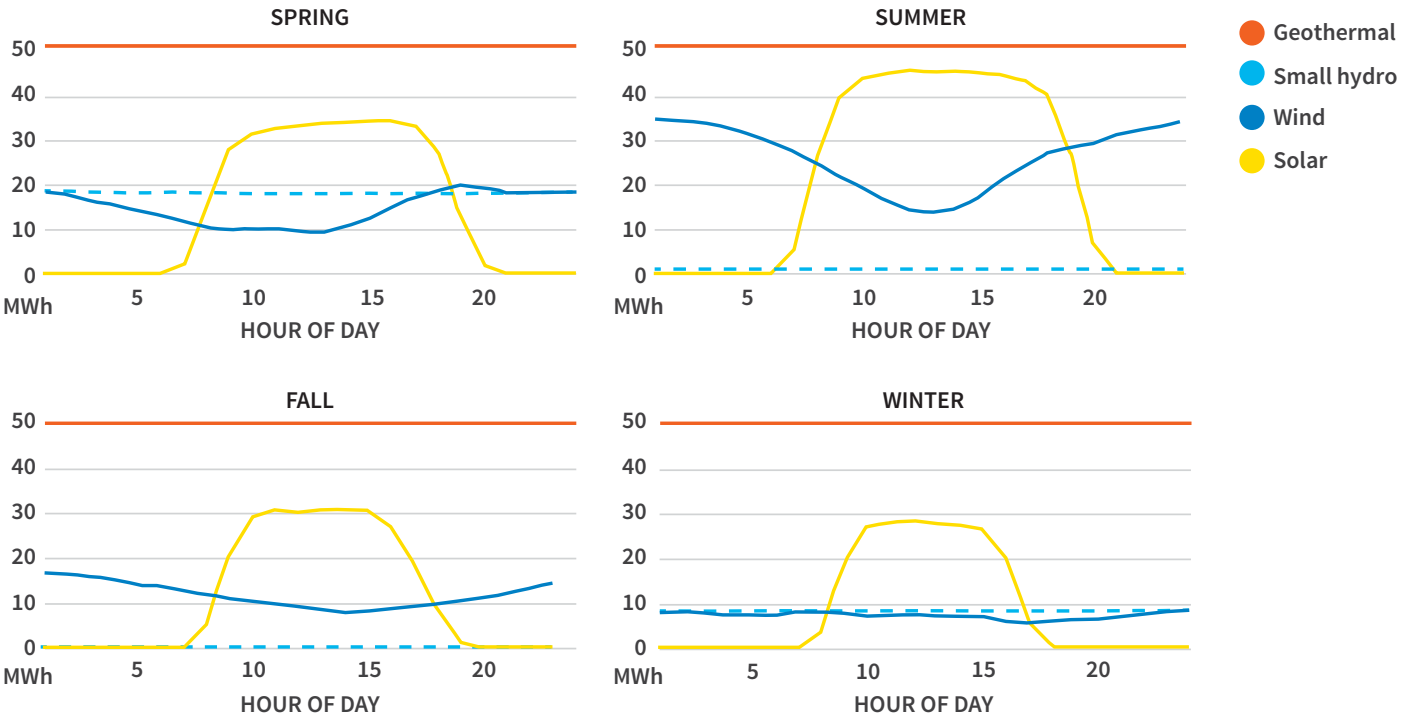
Geothermal energy is a source of baseload power, generating reliable electricity around the clock, albeit at a higher cost than other renewable resources. While its reliability is extremely valuable for meeting a 24/7 goal, there are limited opportunities to develop additional geothermal generation based on scarce naturally occurring geology. Most locations with the best geothermal resources in California have already been developed, although Nevada, Idaho and other nearby Western states have far greater untapped geothermal potential. Certain geothermal technologies based on a closed-loop design are zero carbon, while other open-loop designs emit small amounts of GHG into the atmosphere.

Small hydroelectric power

Small hydroelectric resources are defined as renewable in California if they are under 30 megawatts and generally sourced from "run of river" facilities rather than large dams. Larger, dammed hydroelectric resources are considered carbon-free but not renewable. As most of the small hydro resources in California have already been developed, there is little opportunity for expansion.

When water is available, the daily generation profile of small hydro tends to be quite steady. However, water availability depends heavily on year-to-year hydrology and the season. During wet years, energy production is much higher than dry years. Likewise, small hydro resources tend to produce more energy during the winter and spring, when rain and snowmelt are available, and very little to no energy in the summer and fall (figure 3).

FIGURE 3. Generation profiles of 50 MW of different renewable sources
Conceptual plot comparing the hourly average generation profile from 50 MW of hypothetical wind, solar, geothermal, and small hydro generators in each season of a year.



Energy storage

While energy storage is not a source of electricity on its own, it enables more flexible use of renewable power. Energy storage can be charged from renewable generation when it is available and can then discharge that power when it is later needed. Energy can be stored using a range of technologies, each of which has its own tradeoffs in cost, responsiveness, and capacity.

Short-duration storage can supply energy for up to two to four hours on a full charge and is primarily provided by lithium-ion batteries. These batteries are most useful for shifting renewable generation from one time of day to another.

There remains a massive need for long-duration storage, which can shift energy across multiple days, weeks or even months, and help overcome some of the seasonal mismatches between renewable supply and demand. Some long-duration storage, such as pumped hydro, is technologically mature but is limited in availability and where it can be built. Other long-duration types that rely on gravity, compressed air, hydrogen, or chemical batteries are more flexibly located but less technologically or commercially mature. And even with viable and cost-effective long-duration storage, massive amounts would need to be built to shift any meaningful amount of energy from one season to another. In addition to large-scale energy storage, we are interested in exploring how customer-sited, behind-the-meter energy storage, and even vehicle to grid technologies, could play a role in shaping our load to match renewable availability.

Overview of 24/7 strategies

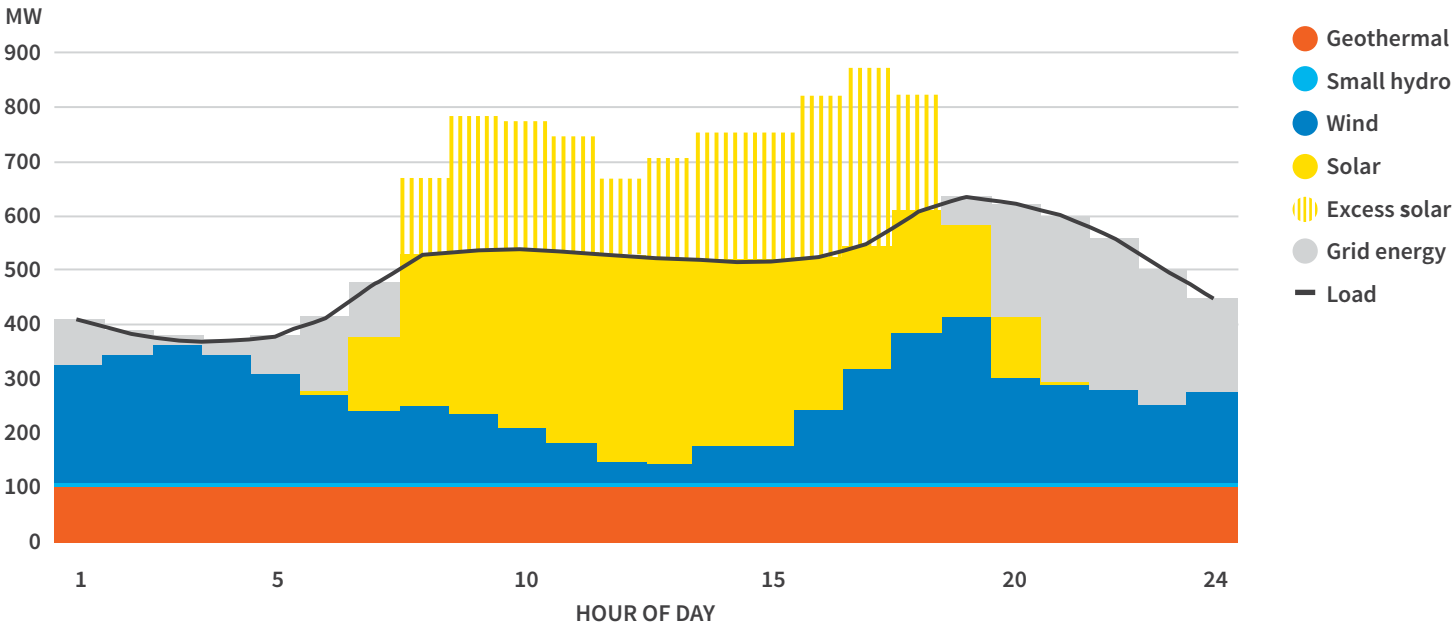
Meeting our 24/7 renewable energy target will require a combination of supply-side and demand-side strategies that together can help match supply and demand around the clock. On the supply side, we plan to procure a diverse portfolio of resources that most closely match our load and utilize energy storage to shift excess generation to the times when we need it.

On the demand side, we can use load shaping and load shifting to better match the timing of our energy demand to the times when renewables are more available. By evaluating these strategies together, we can design a portfolio that most cost-effectively allows us to meet this goal.

Diversify our generation portfolio

The first strategy is to procure energy from a diverse set of generation resources. Each type of resource—wind, solar, geothermal, or small hydro—produces energy at different times of day and in different seasons. We will also pursue geographic diversity. Wind resources have different power production profiles depending on location. Emerging technologies, such as offshore wind, may have distinct generation profiles that fill a gap left by existing, proven resources and technologies. The challenge of this strategy is finding the right combination of resources that together can generate electricity at the times when we need it and at the lowest cost. Even with a diverse portfolio, it would be nearly impossible to exactly match our generation with our load in every hour of the year. There will be some hours or seasons when we will have more supply than we need, and other hours or times of years when we may fall short. This is why this first strategy is only part of the solution to achieving a 24/7 match (figure 4).

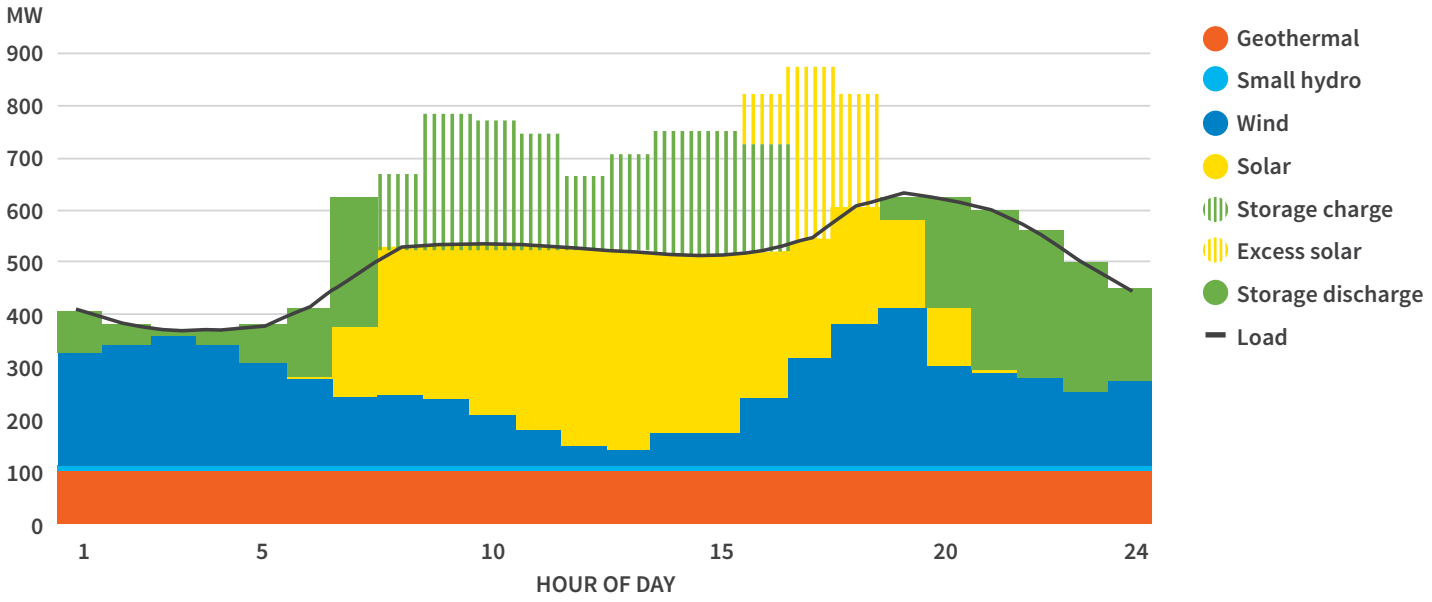
FIGURE 4. Diversify renewable portfolio
A hypothetical day demonstrating a mix of renewable resources being used to try and match hourly load. In some hours, there is excess solar generation, and in other hours, this example load is still relying on generic grid energy.



Use storage to fill the gaps

The second strategy is to leverage energy storage to help shift excess renewable generation to the times when there is not enough generation to meet our load. In California, most storage is charged midday and stored energy is discharged in the evenings as solar production decreases and power is most needed (figure 5). As resources and load profiles change over time, storage systems provide significant flexibility to charge and discharge at times when it is most needed.

FIGURE 5. Use storage to shift renewable energy timing
By adding storage to the hypothetical example, some of the excess solar generation in the middle of the day can be stored and discharged in the evening and early morning to reduce reliance on generic grid energy.



Most storage today is capable of shifting energy between hours of a day or days in a week. As part of our storage strategy, we are evaluating both short duration and long-duration energy storage that is capable of filling unexpected renewable production gaps in our portfolio.

Our specific storage dispatch strategy will involve responding not only to matching our net load, but also to wholesale electricity price signals. This ensures that our energy storage will not only be working to meet Peninsula Clean Energy's needs, but also the needs of the broader electric grid. This strategy also helps maximize the economic benefits of energy storage, keeping costs low for our customers.

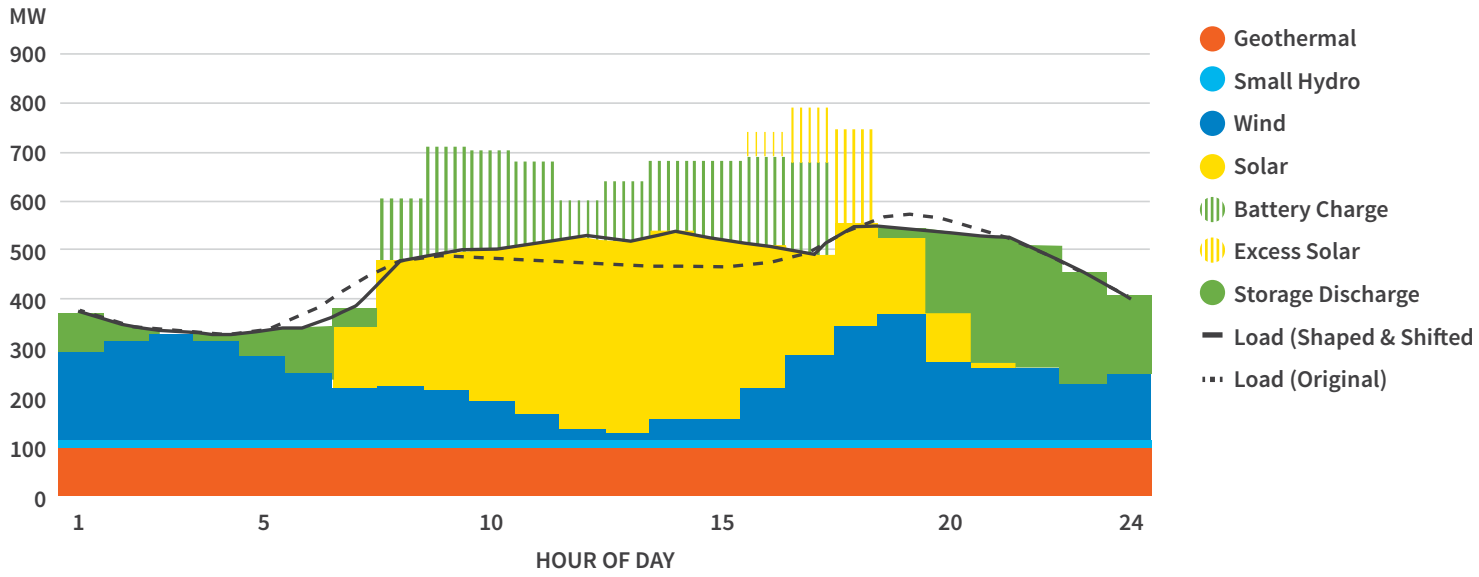
Shape and shift load

The final strategy involves approaching the challenge from the opposite direction: If it is challenging to match supply to load, how can we better match our load to the available supply of renewable energy? This demand-side approach involves both shaping and shifting our load (figure 6).

Load shaping refers to actions that permanently modify the shape of our load profile, such as transportation and building electrification, energy efficiency, and time-of-use electricity rates. For example, setting high commercial rates during the peak hours of the day will lead businesses to modify their energy use to minimize their energy bill.

Load shifting, in contrast, refers to shifting load between hours of a single day in response to specific signals, and may be useful to help respond to shorter-term intermittency of renewable resources. For example, customers with smart thermostats could shift their heating and cooling to match the availability of renewable resources each day.

FIGURE 6. Shape and shift load to match renewable availability
Using demand-side resources can help further align load with the timing of renewables to reduce the need for as much storage.



The challenge of this strategy is these demand-side resources are often distributed, take time to develop, and represent a relatively small portion of our overall load. As opposed to signing a contract for a single 200 MW solar farm, which may help match up to half of our midday load, demand-side resources may only affect single-digit percentages of our load. The largest opportunities for load shaping may come from strategically shaping the charging of the increasing number of electric vehicles on the road (for example, through encouraging mid-day workplace charging rather than overnight at-home charging), as well as the electrification of our homes and buildings as we transition away from methane gas.

Challenges in meeting 24/7 renewable energy

As we blaze a trail toward achieving 24/7 renewable energy, we have uncovered both technical and policy barriers that require creativity and innovation to overcome. While these make the process more challenging, we are confident we can address these and help reduce these barriers for others who follow.

Technical challenges

Seasonal mismatches between renewable energy and load

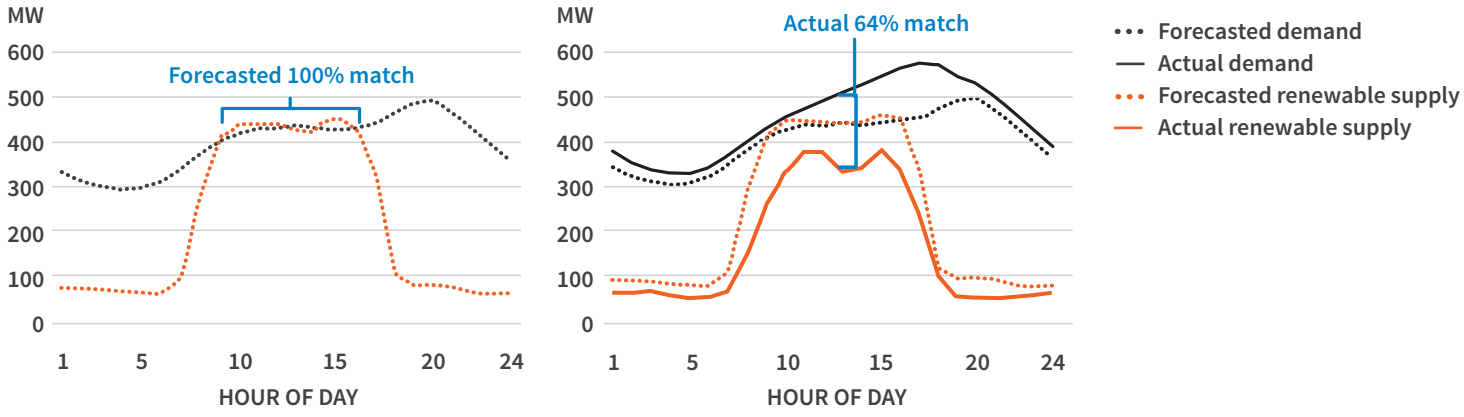
Even with all three of our strategies working in tandem, there are likely to be mismatches in supply and demand at certain times. The largest mismatches between renewable supply and demand are likely seasonal in nature. For example, because solar energy is more available in the summer, if we procure enough solar to match our wintertime demand, we would have a large amount of excess solar generation in the summer.

We can partially address this challenge by procuring non-solar resources such as wind and geothermal. We could also sell the excess solar to another entity that has a need for more summer resources. Storage may also be able to help address this in the future, however at this time, most seasonal storage technologies are immature or not widely available.

Implications of forecasting limitations

There are also likely to be mismatches between load and supply due to errors in our forecasts. Peninsula Clean Energy prepares forecasts on an hourly basis for how much electricity our customers are likely to consume (plus any distribution losses that occur to deliver the electricity), as well as how much generation our resources are likely to produce.* However, our actual demand and generation in each hour of the year is often going to differ from our forecasts (figure 7).

FIGURE 7. Forecasted vs. actual supply and demand – October 2, 2020
An example showing how our actual renewable supply and demand on October 2, 2020, differed from our forecasts for that day.



* Our goal currently seeks to match our generation to our loss-adjusted load, which includes retail sales plus distribution losses, but not transmission system losses. We are interested in better understanding how we could consider dynamic and locational transmission losses in our approach.

Years ahead of when power is actually consumed, Peninsula Clean Energy produces a long-term forecast of our hourly load to try to match generation procurement with the anticipated need. Both our demand forecasts and generation forecasts are based on historical data, models, and future assumptions. Our estimates improve as we get closer to the real-time hour. However, climate change is making long-term forecasting even more difficult by introducing more extreme and unprecedented weather events, as well as worsening climate-driven disasters such as wildfires that introduce unpredictable factors affecting both our supply and load.

In the days before the real-time hour, we know more about what the weather may be that day and can produce a short-term forecast reflecting the impact of weather on our load and supply. For example, if the real-time day is forecasted to be cloudy, we know to expect less generation from our solar plants and can change the charging and discharging schedule of our storage assets and/or decide whether to call for some form of load shifting from our customers.

One factor complicating our ability to match all this in real time is Peninsula Clean Energy currently does not have access to our customers' load data in real-time. Typically, we do not receive preliminary load data from PG&E until about a week after the fact and it can be months until we receive our actual load data.

Uncertainty surrounding demand-side resources

Making effective use of demand-side resources requires us to plan for and understand when and how these resources would perform, and how much it would cost to deploy them. At this time, we have limited information about these characteristics for load in our territory, which makes it challenging for us to model demand-side resources and understand how big a role they might play in our 24/7 strategy.

Policy barriers to tracking and reporting 24/7 clean energy

As mentioned previously, California requires procuring and reporting renewable energy on an annual rather than hourly basis. There is a need for an official system to track and report renewable energy on an hourly basis. The Western Renewable Energy Generation Information System (WREGIS), the organization responsible for tracking renewable energy in California, issues monthly renewable energy certificates (RECs).* One option is for WREGIS to modify its process to issue hourly RECs. Another tracking system called M-RETS has established a process for tracking renewable energy on an hourly basis, which could provide an alternative solution. The lack of an hourly tracking system makes it difficult for Peninsula Clean Energy to communicate about our progress or report the time-coincident renewable content of electricity to our customers. And while annual-only reporting standards exist, it creates confusion for customers about how 100% renewable energy delivered on a time-coincident basis differs from 100% renewable energy delivered by other electricity retailers on an annual basis. Fortunately, these issues have not gone unnoticed by policymakers and are actively being discussed in Sacramento.[11]

* A renewable energy certificate (REC) is issued by WREGIS for every megawatt-hour of metered renewable energy generated and reported into this system.

Phased approach to delivering 24/7 renewable energy

Peninsula Clean Energy plans to take a phased approach to meeting its 24/7 goal. The first phase, which aligns with our 2025 target, is to procure 24/7 renewable energy from proven technologies based on our forecasted hourly load and generation. This recognizes that in real time our actual renewable generation may not perfectly align with our actual load due to forecast errors. However, because we are part of a larger power system with a centralized balancing authority who can draw on systemwide resources to balance supply and demand, these relatively small mismatches due to forecast error may be more efficiently managed by the balancing authority than they would be by us.

Once we meet our 2025 goal of matching supply and demand on a forecasted basis, the second phase is to evaluate the costs and benefits of more closely matching our load and generation on a real-time basis. This will require improving our real-time data pipelines with PG&E, the California ISO, and our generation projects. We will need to develop more sophisticated portfolio management and dispatch tools. We will also need to continue to scale our demand-side flexibility resources and make room in our supply portfolio for emerging technologies that may better match our load shape than currently available resources.

Next steps toward our goal

Peninsula Clean Energy expects to complete a first round of modeling of our 24/7 portfolio in early 2022. We plan to release the results of this modeling in a follow-up white paper to be published early in 2022. This modeling will take a rigorous approach to exploring some of the more complex questions about our 24/7 procurement approach: How much will it cost to achieve? What types of resources will be needed to match our load? How can this approach help address grid reliability challenges? What are the short-run and long-run emission impacts of pursuing this goal? How should storage and demand flexibility be dispatched to balance grid needs, emission impacts, and 24/7 balancing?

Join us in the journey

After publishing the second part of our paper, we plan to release the modeling tool itself. Others can use it to evaluate their own 24/7 goals and hopefully join us in this journey to accelerate the decarbonization of the electric grid.

Appendix: About Peninsula Clean Energy

Peninsula Clean Energy is a Community Choice Aggregator (CCA) and the official electricity provider for San Mateo County and all twenty of its towns and cities, located just south of San Francisco, California. Additionally, in April 2022, Peninsula Clean Energy will provide electricity service to the city of Los Banos in California's Central Valley. Founded in 2016 with a mission to reduce greenhouse gas emissions in the county, Peninsula Clean Energy serves a population of approximately 765,000 people with annual retail sales totaling approximately 3,500 GWh. As a community-led, not-for-profit agency, Peninsula Clean Energy makes significant investments in our communities to expand access to sustainable and affordable energy solutions.

As a CCA, Peninsula Clean Energy is responsible for planning for and securing commitments from a diverse portfolio of energy-generating resources to reliably serve the electric energy requirements of its customers over the near-, mid-, and long-term horizons. The energy which Peninsula Clean Energy procures is delivered on power lines and infrastructure managed by Pacific Gas & Electric, the investor-owned utility which serves much of Northern California. Peninsula Clean Energy is a locally controlled Joint Powers Authority and is governed by a Board of Directors consisting of elected officials from each of the jurisdictions to which we supply energy.

As of November 2021, we have long-term contracts for 500 MW of solar, 102 MW of storage, 357 MW of wind and 35 MW of geothermal. As of 2021, with these and other contracts, we procured 100% renewable and carbon-free electricity for our consumers on an annual basis. Since we started in 2016, we have provided this clean energy to our customers at a 5% discount to PG&E for generation, saving our customers over $70 million through 2020.

Appendix: Peninsula Clean Energy's 24/7 external advisory group

To date, Peninsula Clean Energy is engaging with the following individuals who have agreed to serve as part of our external advisory group for our 24/7. We look forward to expanding this group and hearing from those who may be interested in joining us on this journey.

- Vince Battaglia, PhD, Lawrence Berkeley National Laboratory
- Mark Dyson, RMI
- Mike Della Penna, Google
- Ben Gerber, M-RETS
- Andy Satchwell, Lawrence Berkeley National Laboratory
- James Sweeney, PhD, Stanford University
- Christine Vangelatos, zGlobal

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