



Morro Bay Energy Storage Opportunity

April 24, 2024: Community Presentation



Welcome and introductions

- Brad Watson – Vistra Sr. Director, Community Affairs

Project Overview

- David Yeager – Vistra Director, Project Development

Safety and operations overview

- Mark McDaniels – Vistra VP, Renewables and Energy Storage

Offsite Consequence Analysis

- Dr. Shari Libicki – Chemical Engineer; Ramboll

Community impact and benefits

- David Yeager - Vistra Director, Project Development

Listen and engage in dialogue – questions from floor



David Yeager

Director, Project Development



Why We Are Here: Goals For Renewing & Redeveloping Site

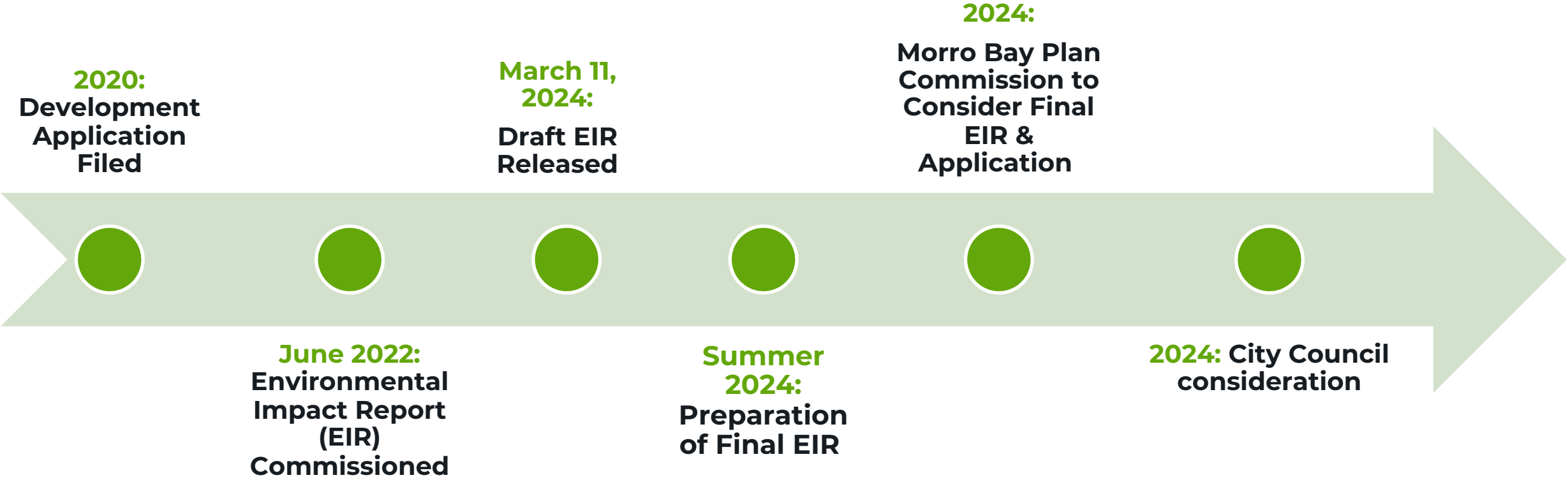


Our goals for the site:

1. **Put Ratepayers First** by Reusing a Portion of the Site & Existing Infrastructure to **Improve Grid Reliability & Stability**
2. **Responsibly Demolish & Remediate** the Legacy Power Plant to Provide Opportunity for **Future Redevelopment**
3. **Improve the Embarcadero & Harbor-Front** for Future Generations



Current Status: Listen, Engage, & Follow Process in State Law



What Is the Project?



- » **Battery energy storage system (BESS)**
 - 24 acres of 107-acre property
 - Originally proposed in 3 buildings
 - Alternative: containers configuration

- » **Removal of the power plant building and stacks**
 - 19 acres of 107-acre property
 - Unlock future development on premier site
 - Any future development guided by Master Plan

- » Project ***has not*** been approved by the City
 - Initial approvals are just the first step
 - Further review by City, Fire Department, City's expert consultants, and expert state agencies before anything can be built

- A **Master Plan** will be prepared before the City makes a decision on Vistra's project
 - Vistra is funding the City's preparation of the Master Plan
 - Master Plan will establish a vision for future development on the Vistra property and surrounding areas
- The City must comply with the **California Environmental Quality Act (CEQA)** before making a decision on Vistra's project. CEQA requires:
 - Thorough consideration of a project's potential environmental impacts
 - Across 18+ topic areas, each with sub-topics
 - Feasible **mitigation** to avoid or minimize significant impacts
 - Analysis of **alternatives** that would potentially reduce impacts
 - A transparent public process

About Vistra Corp.

Vistra Corp. is a leading Fortune 500 integrated retail electricity and power generation company that provides essential power resources to customers, businesses, and communities across the United States.

For nearly 140 years, our company has adapted to changes in technology to ensure our plants and facilities safely and reliably produce electricity for the benefit of society.

Vistra is the **largest competitive power generator in the country**, with 41,000 megawatts (MW) of installed generation capacity.

The company is a **leader in the energy transition and expansion**, operating a variety of energy assets including:

- Four nuclear generation facilities totaling more than 6,400 MW of capacity
- The second-largest network energy storage capacity in the country with ~1,020 MW
- A growing portfolio of solar power plants
- A fleet of traditional power plants



POWER

Is America's Electric Grid Equipped for the Electrification of Everything?

yahoo!finance

Two-thirds of the U.S. is at risk of power outages this summer—but it's not stopping Americans from electrifying everything in their homes

THE TRIBUNE

Will rolling blackouts hit SLO County?
'Yes, it is possible,' PG&E says

THE TRIBUNE

California avoided rolling blackouts for two decades. What went wrong on the grid?

CBS NEWS

Can the US rely on the electric grid? Some lawmakers say time is running out

FOX BUSINESS

Clean tech, AI boom straining US energy supply

Grid Operators Raise Reliability Concerns

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

“In recent years, we’ve witnessed a **decline in reliability**, and the future projection does not offer a clear path to securing the reliable electricity supply that is **essential for the health, safety and prosperity of our communities**.”

- John Moura, Dir. Reliability Assessment & Performance Analysis,
December 2023



“The **growing storage capacity is critical** in decarbonizing the bulk power system and to **our ability to keep the power flowing** as California transitions to a carbon-free system.”

- CAISO, July 2023



“The projected total capacity from generating resources **would not meet projected peak loads**..The amount of generation retirements appears to be more certain than the timely arrival of replacement generation resources..”

- Energy Transition in PJM



“Data shows for the first time that peak demand this summer will exceed the amount we can generate from on-demand dispatchable power...There is **no longer enough dispatchable generation to meet the demand** of the ERCOT system”

- Former PUCT Chairman Peter Lake, May 2023

The Rapid Change of California's Generation Mix & Capacity

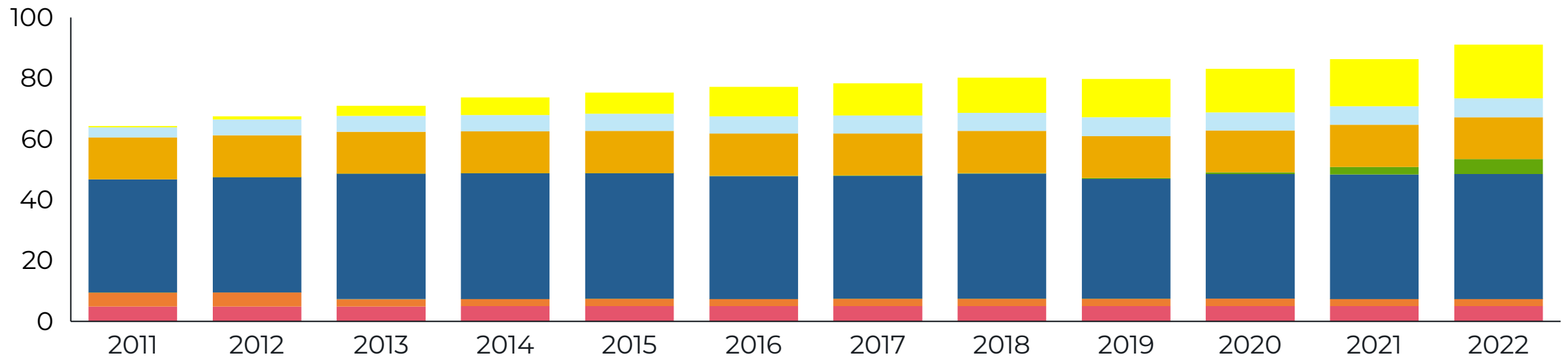
California installed capacity 2011-2022, GW



**Data Show Clean Power Increasing,
Fossil Fuel Decreasing in California**



Solar Generation In California Increased Almost 20-Fold In The Last 11 Years



1. Includes biomass, geothermal, oil, waste heat and petroleum coke

Source: EIA, Press Search

Energy Storage Is A Solution To Reliability Concerns & Enabler of Clean Energy Growth

HOW IT WORKS:



GENERATION EXCEEDS DEMAND
ENERGY IN
CAPTURE RATHER THAN WASTE ZERO-CARBON RESOURCES



ENERGY STORAGE FACILITY
ENERGY STORED
BATTERIES STORE EXCESS RENEWABLE ENERGY UNTIL IT IS NEEDED



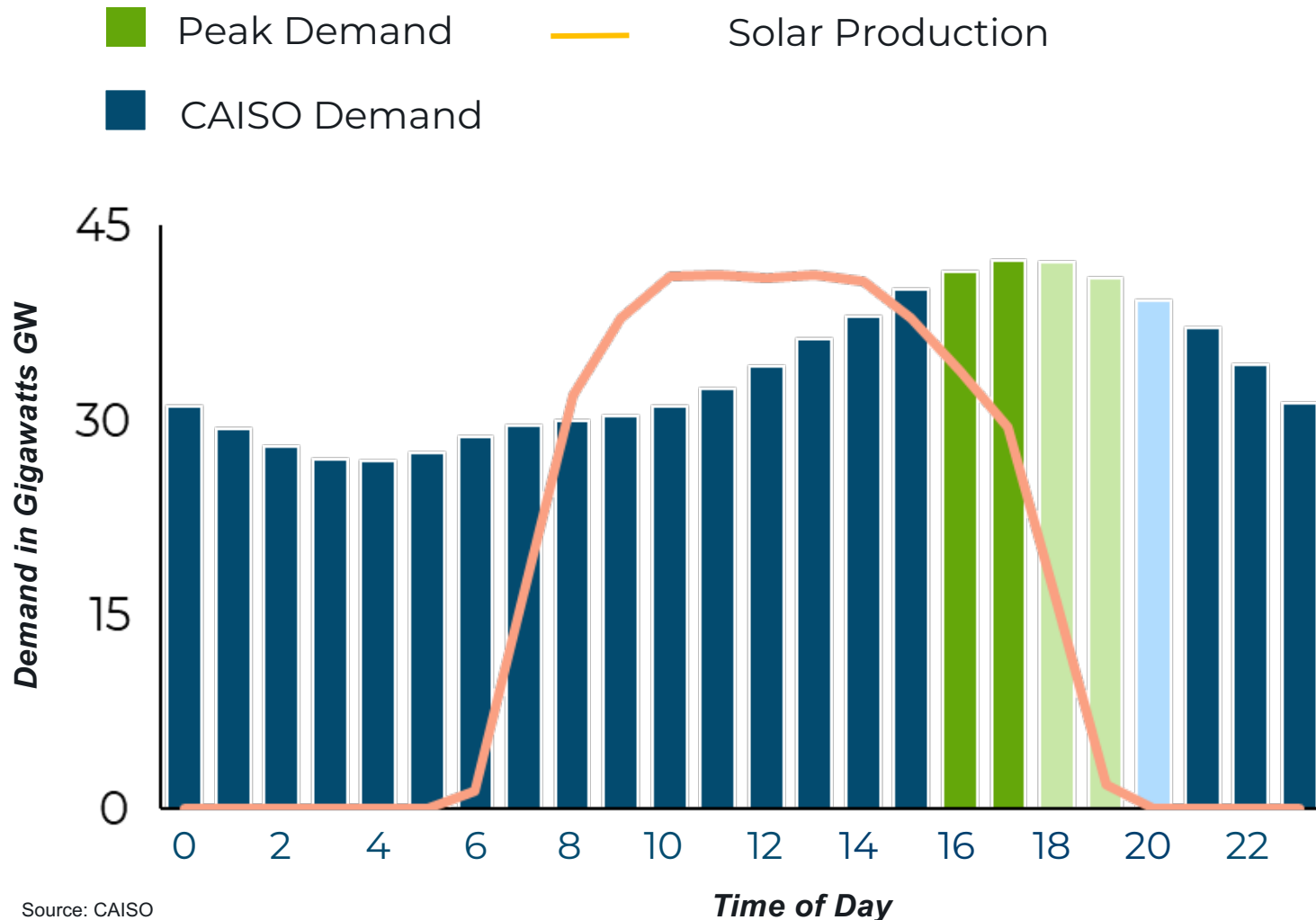
CONNECTED TO GRID
ENERGY OUT
FACILITY RELEASES ENERGY DURING PERIODS OF PEAK DEMAND

August Summer Day: Snapshot

Increase in solar has brought shift of scarcity period

Electricity Demand vs. Solar Production

August 17, 2023



Source: CAISO



The Washington Post
Democracy Dies in Darkness

ECONOMIC POLICY

California is awash in renewable energy — except when it's most needed

The state has moved quickly to increase solar power, but can't store it all for peak demand hours

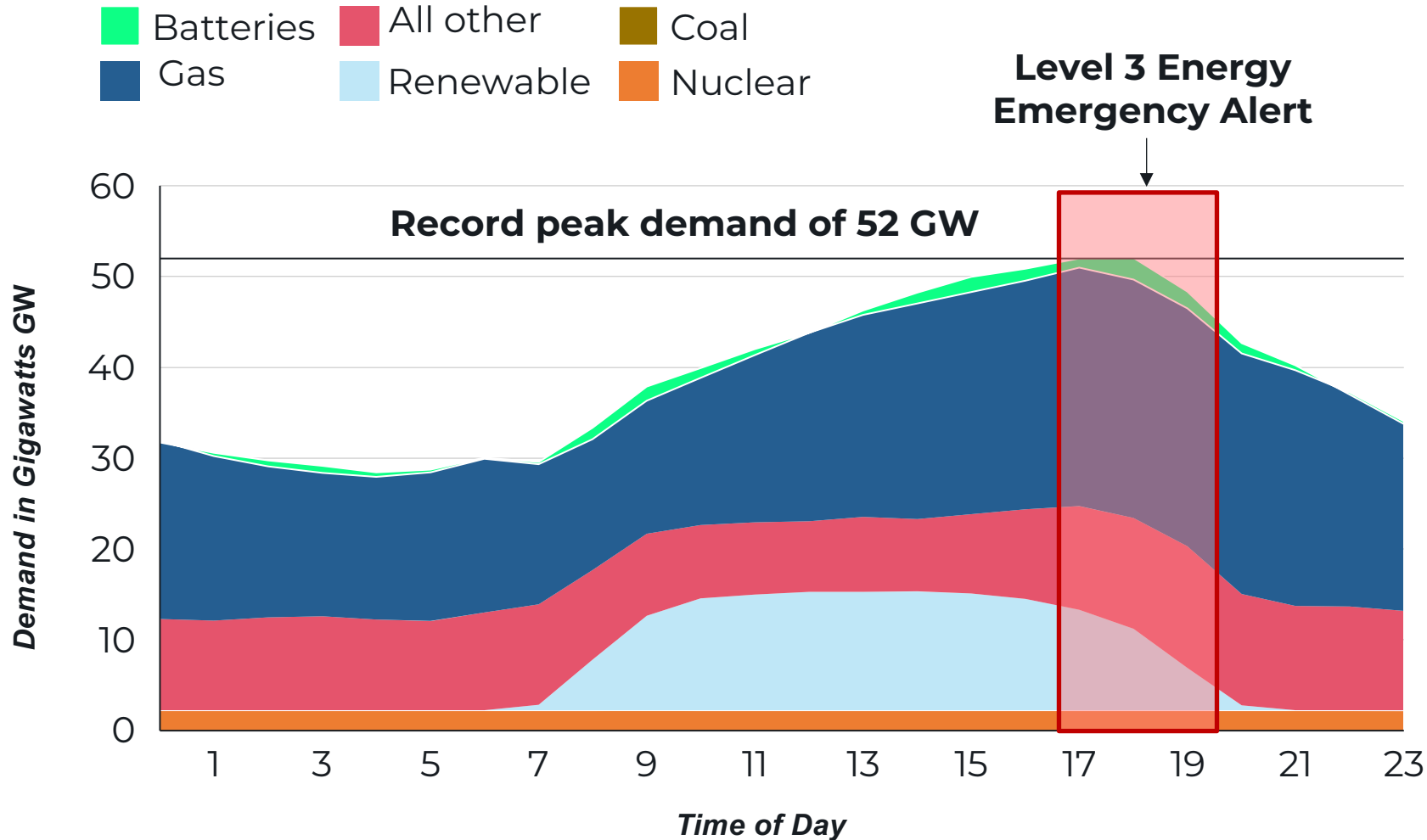
The Washington Post
Democracy Dies in Darkness

Rooftop solar panels are flooding California's grid. That's a problem.

As electricity prices go negative, the Golden State is struggling to offload a glut of solar power

Extreme Condition: Batteries helped to avoid blackout during '22 heat wave

CAISO hourly generation by technology on Sept. 6, 2022



Source: CAISO

NEWS

California's fleet of battery storage working to avert energy crisis

By [Andy Colthorpe](#)

September 8, 2022

Los Angeles Times

Op-Ed: California's giant new batteries kept the lights on during the heat wave

SCIENTIFIC AMERICAN

SEPTEMBER 16, 2022 | 5 MIN READ

How California Kept the Lights On during Monster Heat Wave

A combination of rapid growth in battery storage and efforts to reduce power demand helped California avoid blackouts during an intense heat wave

Energy Storage Is A Solution To Reliability Concerns

At 4 pm, **batteries provided more power** than Diablo Canyon nuclear plant, the state's largest generator



Diablo Canyon



Batteries

Average output at 4 pm on Sept. 6, 2022



An Experienced Redeveloper of Power Plant Sites

- » Across America, **power plants are closing** as part of the energy transition, while the **demand for electricity is growing.**
- » **Reusing and revitalizing land** that has historically been used for power generation:
 - Is **least impactful to the environment** by reusing existing materials & equipment
 - Contributes to the **stability of the grid**
 - **Avoids** need for **new ratepayer-funded transmission** equipment
 - **Rebuilds the property tax base** to fund local services & infrastructure





450%
Increase

After investing ~\$1+ billion in energy storage technologies at the Moss Landing Power Plant facility, property tax revenue has increased from ~\$1.8 million in 2018 to an estimated ~\$10 million in 2024.



Mark McDaniels

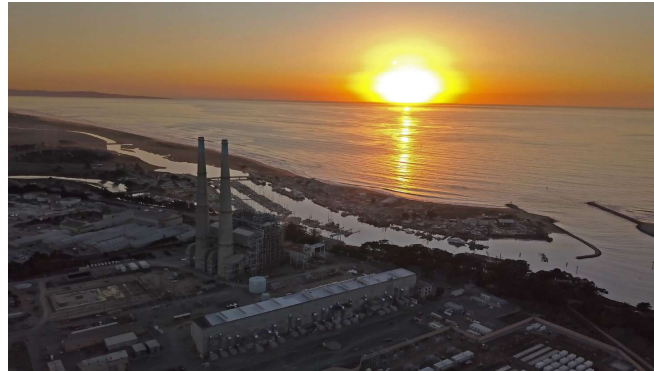
Vice President, Renewables and Storage



Personal History at Morro Bay



An Experienced Redeveloper of Power Plant Sites



» Moss Landing gas plant – three of five phases of energy storage complete



» DeCordova gas peaker plant with energy storage



» Converting fleet of 9 legacy coal power plant sites to renewable energy centers, including deploying solar + storage technologies

Vistra's Approach to Safety

- There is **no higher priority at Vistra than the safe operation** of our power plants.
- The company is an **experienced developer and operator** of power plants of every fuel source and size.
- Each plant has an extensive emergency plan and **partners with local first responders** ensuring their familiarity with the facilities.
- Vistra's design and operation of our energy storage facilities is planned around the company's **three safety principles**:
 - Prevention
 - Detection
 - Mitigation



Many guidelines and standards go into designing a battery energy storage system:

Industry Codes

- Underwriters Laboratories (UL)
- Institute of Electrical and Electronics Engineers (IEEE)
- American Society of Testing and Materials (ASTM)
- National Fire Protection Association (NFPA)
- North American Energy Reliability Corporation (NERC)
- Federal Energy Regulatory Commission (FERC)
- California Independent System Operator (CAISO)

Local, Regional & State Permitting / Codes

- State of California, Senate Bill 38 – Sen. Laird
- Section 3220 of Title 8 and California Code of Regulations
- California Environmental Quality Act
- Local Standards and Decisions
- Morro Bay Plan Commission & City Council

Vistra Standards

- Energy Storage Design Guideline
- Substation Design Guideline
- Renewables Control System Guideline
- Nomenclature Standard

Gas and Flame Detectors - Early detection of smoke and explosive gas
NFPA 855



Fire Alarm Control Panel - Sends an alarm to BESS control systems and site operators
NFPA 72, 855, 68, 69

M-Dampers - Releases heat and gas to minimize propagation
NFPA 69

Deflagration Panels - Automatically opens with predetermined pressure to prevent explosion
NFPA 68

For nearly 140 years, our company has adapted to changes in technology and regulatory requirements to ensure our plants and facilities safely and reliably produce electricity for the benefit of society.

Evolution of Technology: Vistra Is An Experienced Developer & Operator



Reliable access to electricity is essential for your energy security. Given the crucial role storage will play in the stability and reliability of our nation's energy grid going forward, the field is rapidly evolving.

Commercially available **products, technologies, and chemistries have evolved** since Vistra's first energy storage project in 2018.



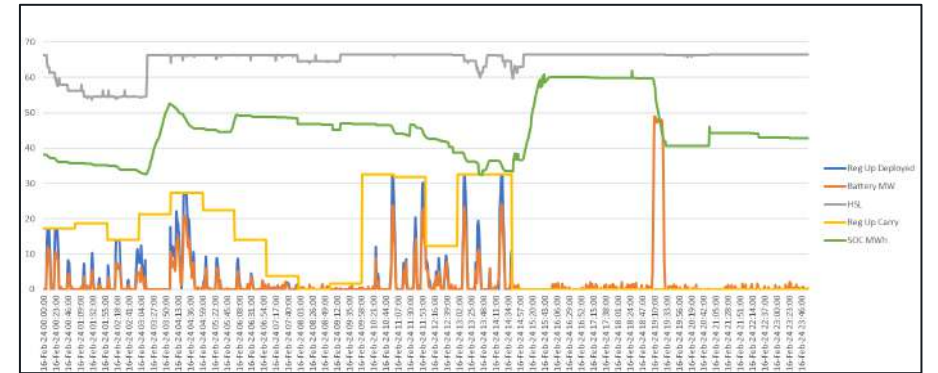
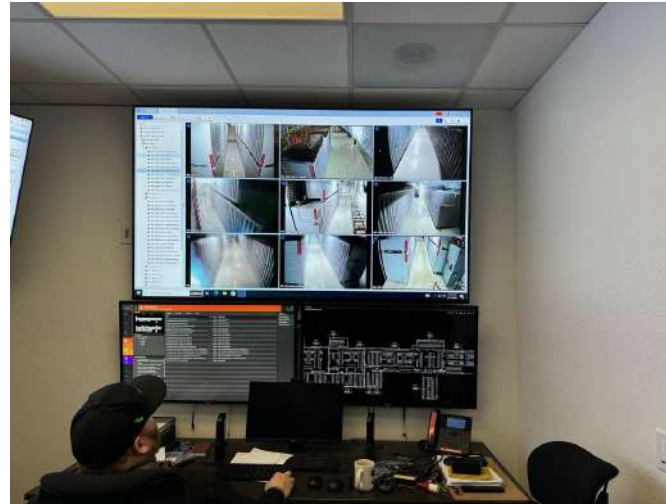
» 2018: Upton Co. TX



» 2020 Phase I
2021 Phase II
2023 Phase III
Moss Landing, CA



» 2022: DeCordova, TX

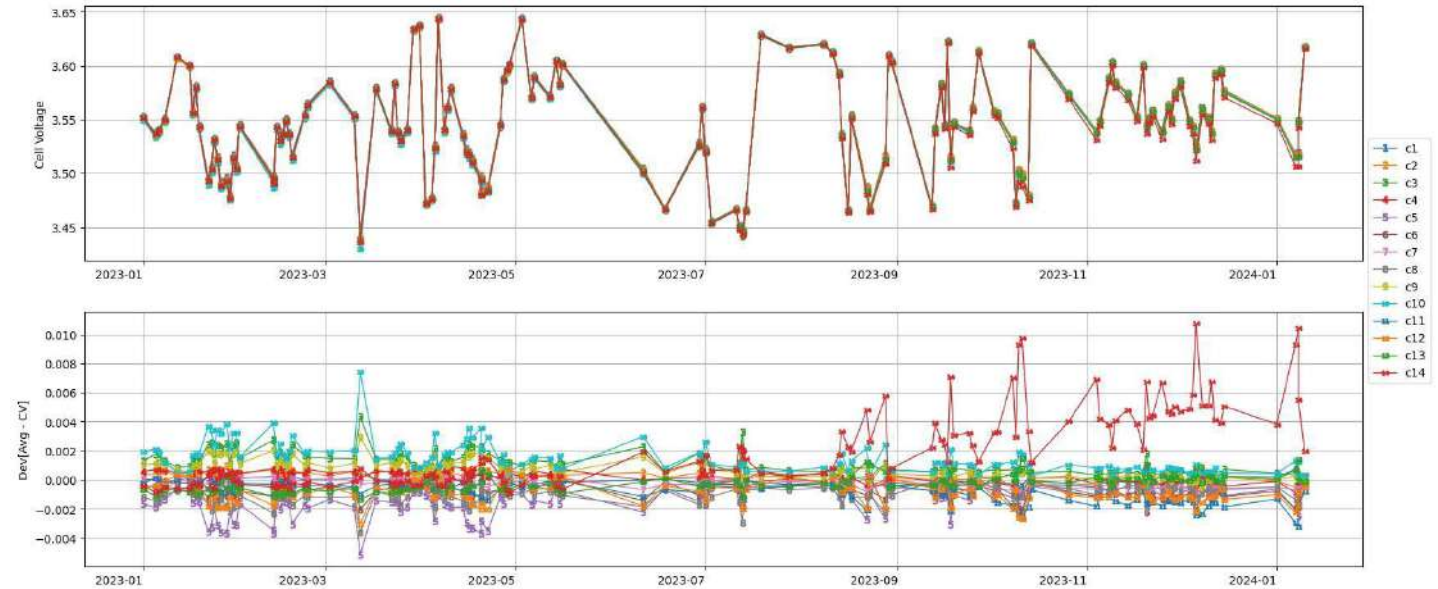


On-site Control Room Monitors Real-Time BESS Operations

» Serves as a 24/7 central control and monitoring station for BESS monitoring, control, and safety systems.

» Plant control systems monitor, trend, alarm, and provide automatic response (e.g., unit shutdown, safety system actuation, etc.) in the event of off-normal operations.

Vistra's Approach to Safe, Reliable Operation of Our Assets



» **Off-site Remote Monitoring** – Vistra’s Power Optimization Center provides 24/7 real-time monitoring, staffed by engineers, of the company’s assets across the country.

» **Real-Time Performance:** The POC monitors BESS real-time performance and uses sophisticated software programs to trend and analyze battery health down to the cell level.

» **Pre-Detection Algorithms:** Vistra utilizes pre-detection algorithms that analyze cell data trends looking for any deviations within the pack over extended periods of time.

Moss Landing 2021 Overheating Incident:

- At time of first activation of safety systems, all battery modules were operating within established temperature limits.
- Smoke detectors alarmed, causing the release of water to the battery heat suppression system.
- Hoses on heat suppression system disconnected when couplings came undone and improperly sprayed water on batteries.

Response/Learnings/Sharings:

- Enhancements to water-based heat suppression system couplings and hoses

Contributing Knowledge to the Regulatory Environment

- Vistra supported and encouraged the adoption of California's new law regulating and establishing safety standards for energy storage facilities.

Continuous Improvement to Reduce Risk

- Vistra works closely with manufacturers to incorporate system safety, operations, and monitoring improvements in future product offerings.
- Vistra participates and/or supports numerous industry groups (e.g., Electric Power Research Institute, United Laboratories, etc.) focused on improving design and operations of BESS systems.



How Do Energy Storage Systems Work?

HOW IT WORKS:



» **Inverters** convert the transmission grid current from Alternating Current (AC) to Direct Current (DC) for use in the battery



» **Battery Containers** comprised of racks of storage cells which store energy





Dr. Shari Libicki

Chemical Engineer, Ramboll



Proposed Morro Bay Battery Energy Storage System

Summary of Community Safety Report: Offsite Consequence Analysis

Presenter: Dr. Shari Libicki

April 24, 2024

6:00 p.m.

RAMBOLL

Bright ideas.
Sustainable change.

Overview

- Who is Ramboll?
- Objective of report and key finding
- What is an Offsite Consequence Analysis (OCA)?
- Risk assessment concepts: hazard versus risk
- Safety regulations: thresholds of significance
- Methodology of OCA
 - Fire events
 - Conservative assumptions designed to over predict potential impacts
 - EPA-recommended models
- Discussion of results

Ramboll

- Founded 1945 in Denmark
- Independent engineering, architectural, and consultancy company
- Advisor to public agencies and private businesses on various industries, including: energy, infrastructure, transportation, water, waste, and technology



Insight & Excellence

By virtue of our knowledge, experience and ingenuity we develop solutions that meet client demands and fit human needs.

We give our best to surpass the ordinary and deliver high quality.



Integrity & Empathy

Decency is the hallmark of our business. We behave responsibly by keeping to our high ethical standards.

We put ourselves in the place of other people – clients, colleagues and stakeholders alike – to work out the best solutions for everyone.



35

Countries covered by global office network



18,000

Experts



Dr. Shari Beth Libicki

- More than 30 years of experience evaluating potential health and safety impacts to the public.
- Trained engineer:
 - Stanford University: PhD and MS in Chemical Engineering
 - University of Michigan: BSE in Chemical Engineering
- Advisor to both public agencies and private entities, including:
 - California Air Resources Board (CARB)
 - Bay Area Air Quality Management District
 - South Coast Air Quality Management District
 - City of Richmond



Purpose and Big Picture

- The community safety concern evaluated in OCA is a potential fire event and resulting emissions
- Broader context:
 - Lithium-ion batteries are widespread (e.g., cell phones, laptops, cars) and well-understood
 - Emergency response plans are required for facilities like the BESS
 - Government agencies have decades of experience managing greater risks
 - BESS facilities have been sited in urban environments

Ultimate Finding: No Adverse Safety Impacts to the Community

- Offsite Consequence Analysis (OCA):
 - Detailed 65+ page technical report
 - Thorough literature review
 - Hundreds of computer simulations
 - 100+ scientific references
 - Available to the public
- **Conclusion:** No significant risk to the community
 - Conservative assumptions to over-predict potential impacts to community
 - Based on EPA-recommended models
 - Well-accepted approach used to inform siting decisions across many industries

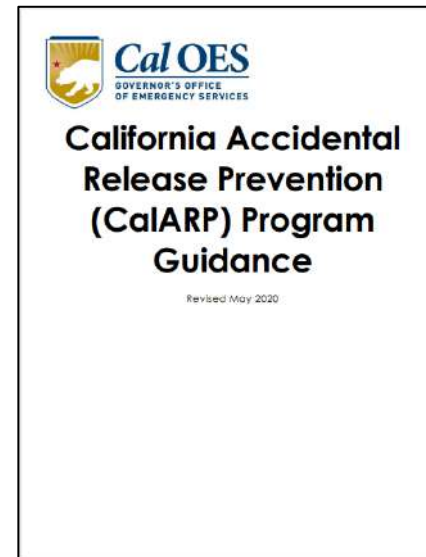
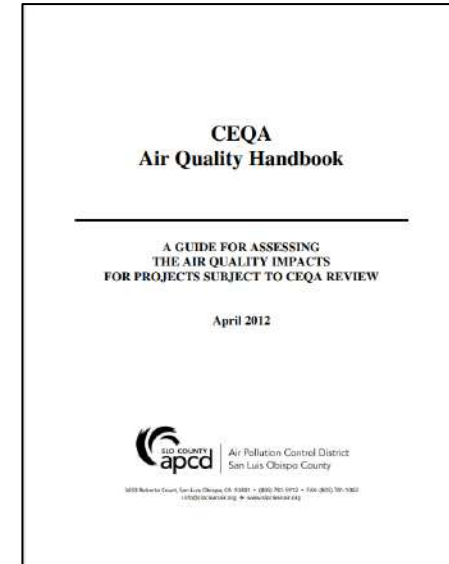
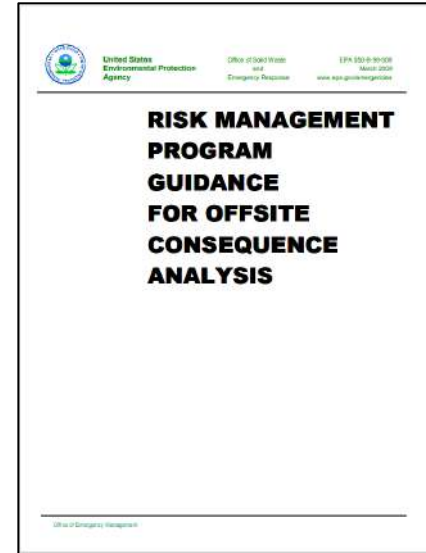
OCA's Predict Potential Impacts To Protect Public Health

- OCA's inform decision-making regarding siting and safety measures for battery storage installations
- OCA results can inform emergency response plans and evacuation procedures
- OCA's can be used to improve overall safety and risk management practices for the industry



OCA: The Basics

- **Objective:** Identify hazards and risks from unplanned releases of hazardous chemicals
- *How* is an OCA prepared?
 - Guidance from expert agencies: US EPA, California EPA, San Luis Obispo County
 - Uses dispersion modeling software (AERSCREEN)
- *What* does an OCA analyze?
 - A maximum credible release event over a given time frame
 - Conservative assumptions to over-predict potential impacts, e.g., meteorological conditions

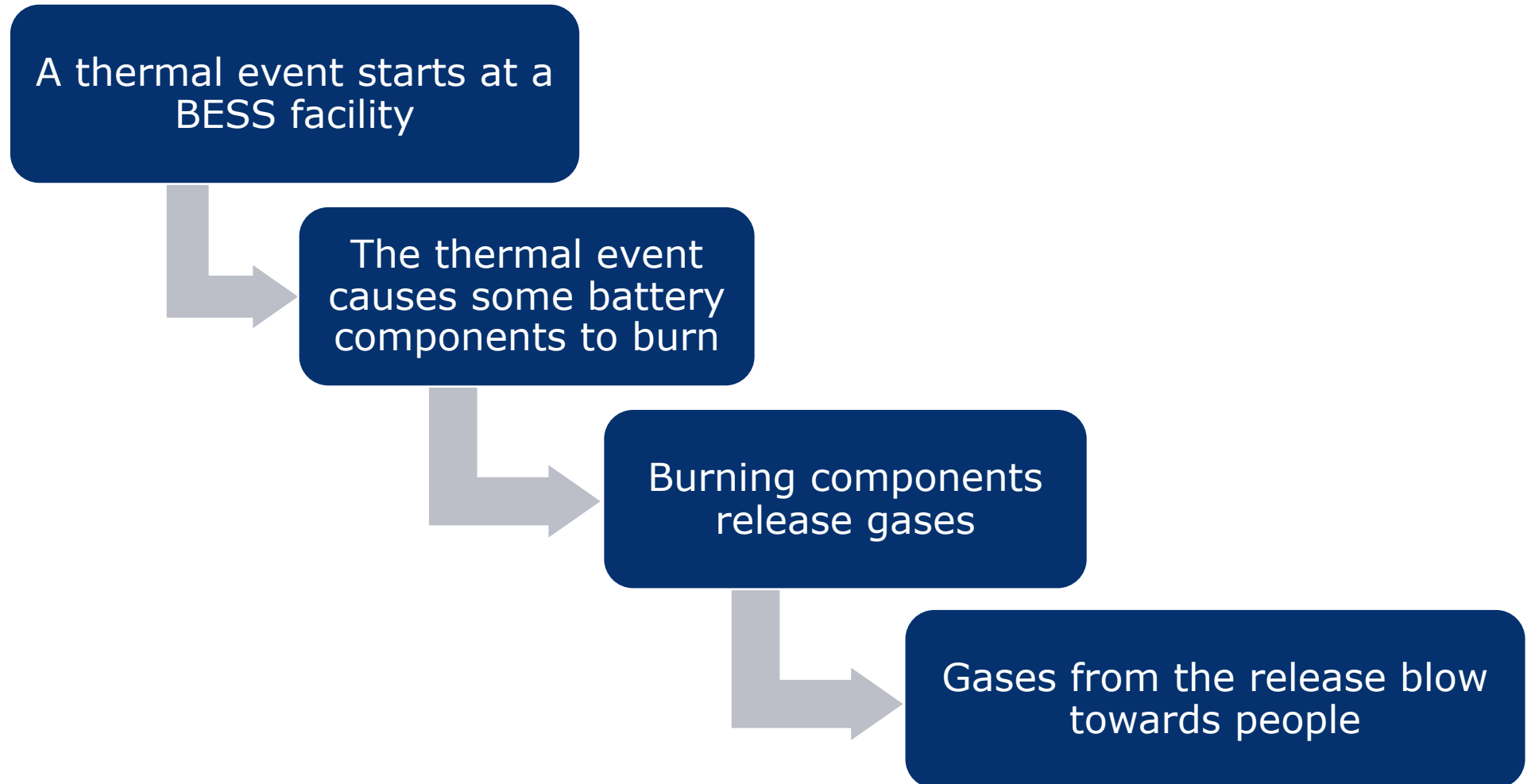


OCA Considers the Health of Entire Community



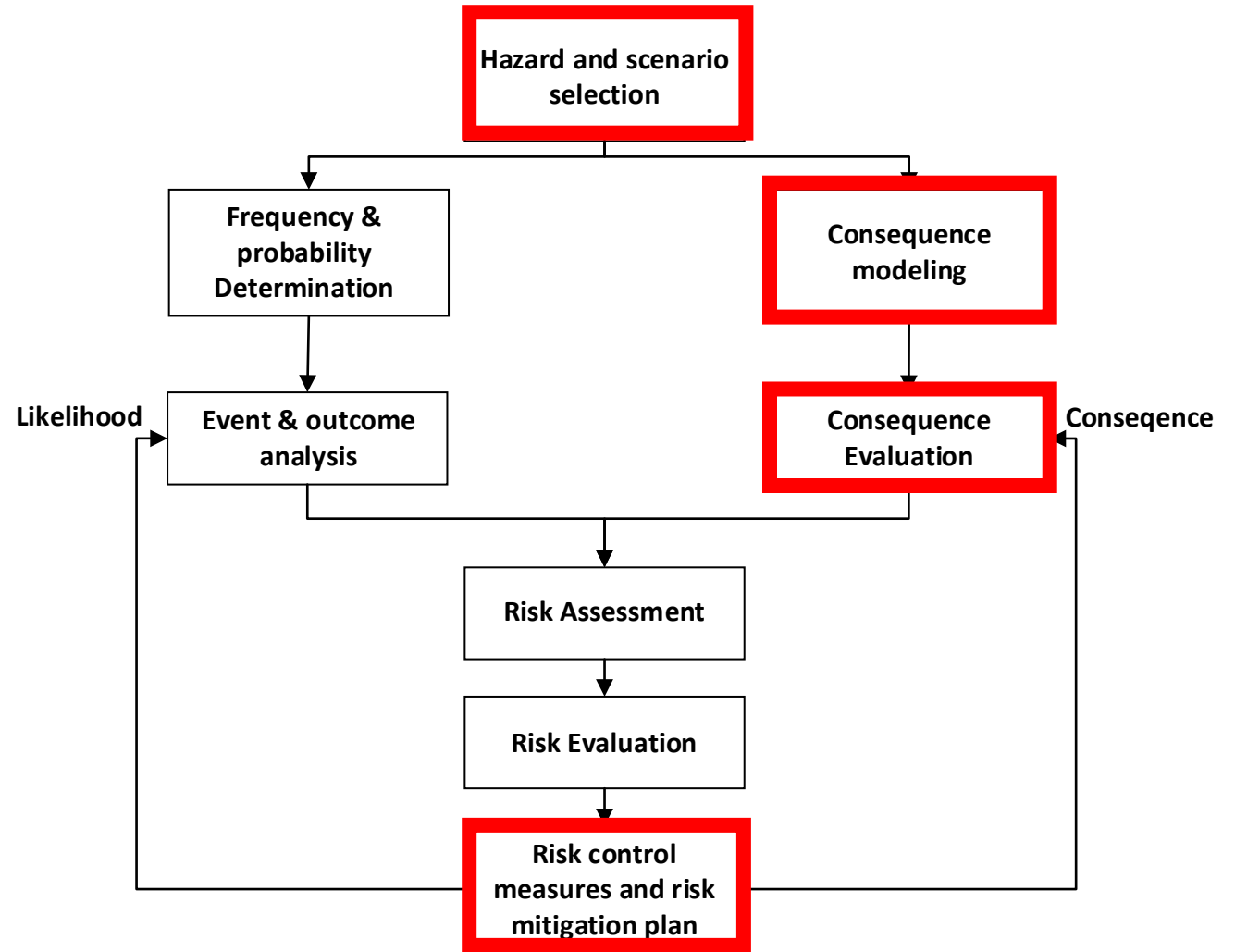
VISTRA MORRO BAY BESS OCA
SENSITIVE RECEPTORS

What Is the Potential Hazard?



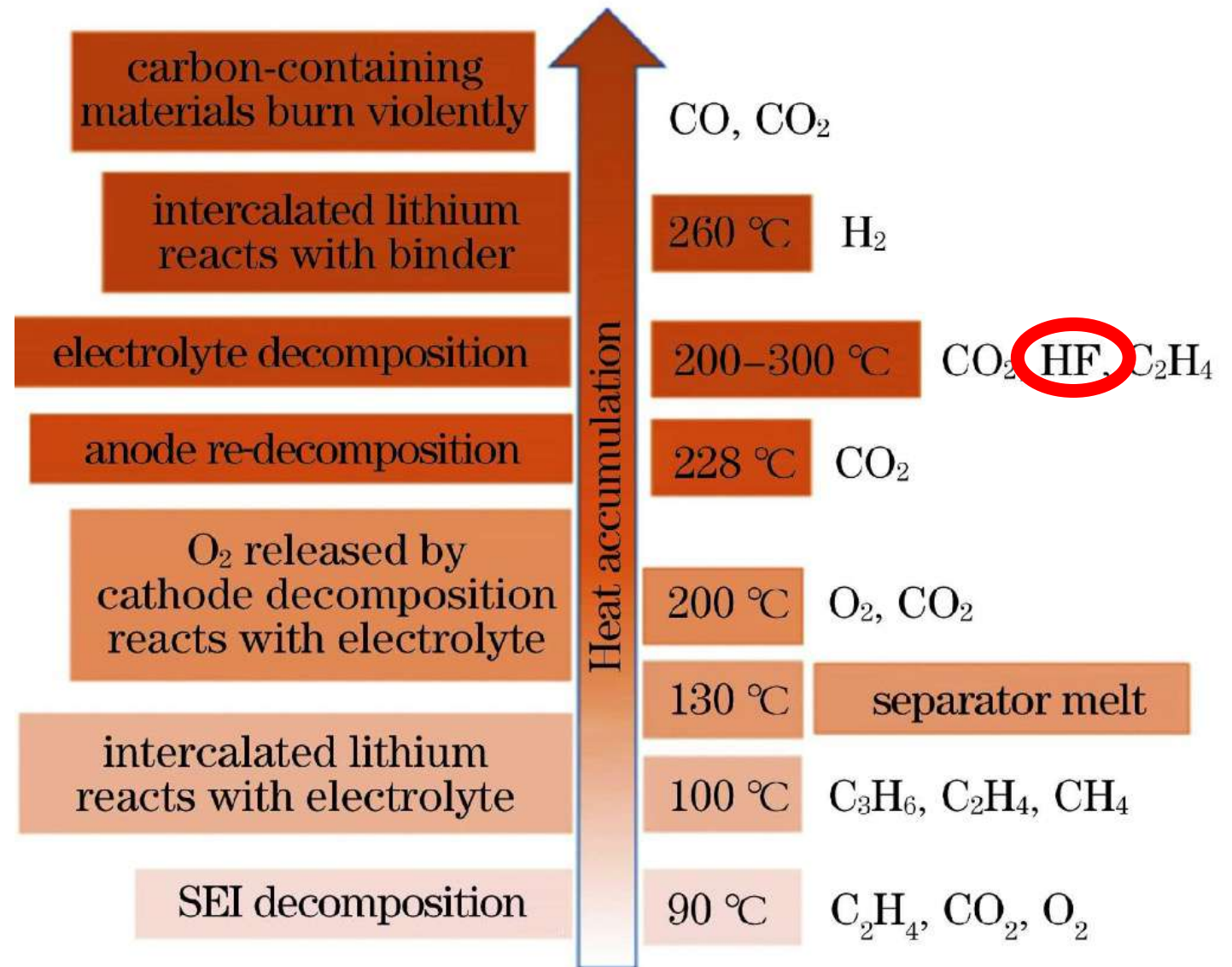
How Do We Assess Risk?

- OCA does not evaluate likelihood of an event
- OCA assumes a maximum credible event occurs, and combines it with conservative weather conditions
- The likelihood of both happening at once is very, very small



What Is Emitted?

- We reviewed past studies that evaluate primary emissions from battery fires
- Most chemicals emitted are flammable but not toxic
- *Batteries* **2023**, 9(8), 411; <https://doi.org/10.3390/batteries9080411>



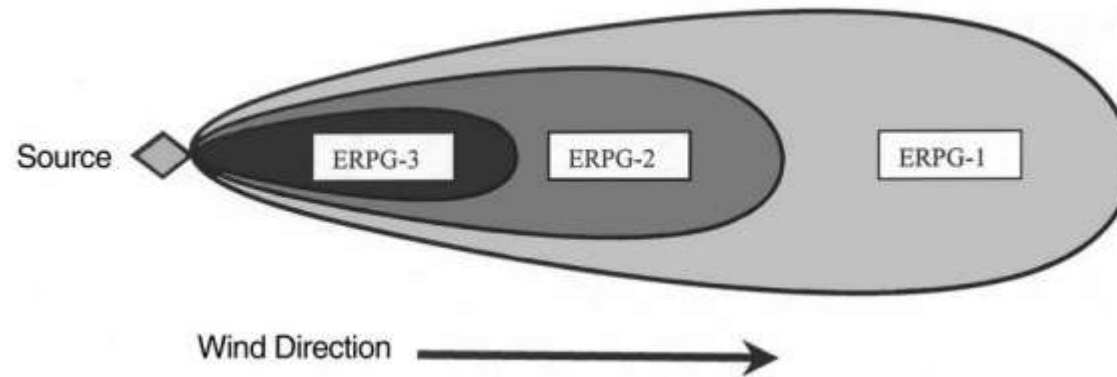
How Much Is Released?

- Emissions factors in the OCA represent the amount of a pollutant released per kilogram of battery burned
- Emissions factors can vary from battery to battery depending on factors like electrolyte chemistry, housing components, and wiring materials

- An “**emissions factor**” tells us how much of a pollutant is released for a certain unit of activity (e.g., gallon of diesel consumed)
- Emissions factors are often used in air quality studies
- Extensive literature on emissions from battery fires
 - Dozens of studies calculate emission rates
 - Emissions factors often based on number of modules or racks burned
 - Emissions factors normalized for purposes of OCA

OCA uses the highest credible emissions factors to evaluate impacts

How To Assess Impacts on People?

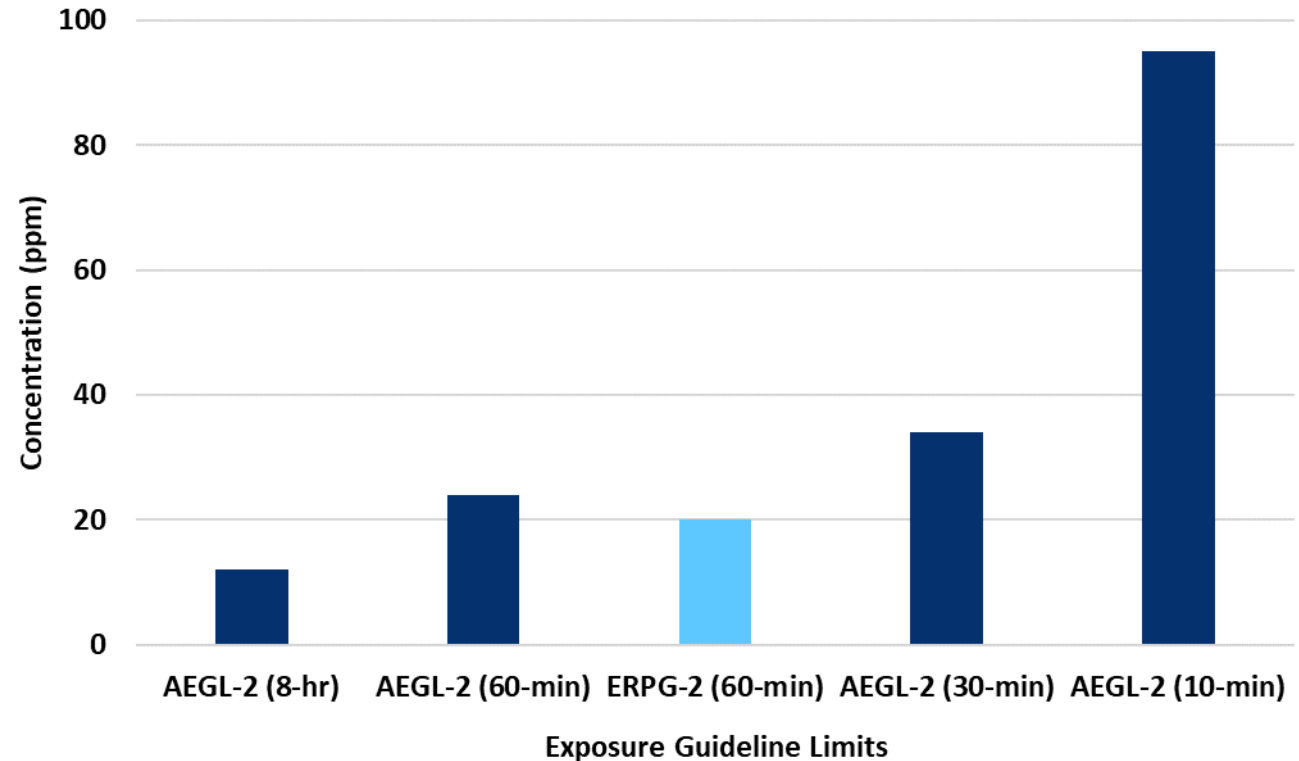


- Two sets of guidelines
 - Different exposure durations
 - Increasing levels of significance
- Both guidelines are used for releases where the onset is *sudden* and with a *relatively short duration*
- This OCA uses both sets of guidelines to evaluate impacts

- **Emergency Response Planning Guidelines (ERPGs)**
 - Developed by the **Emergency Response Planning Committee of the American Industrial Hygiene Association (AIHA)**
- **Acute Exposure Guideline Levels (AEGs)**
 - A collaborative effort between the **U.S. Army** and the **U.S. Environmental Protection Agency (EPA)**

Safety Thresholds: Exposure Guideline Limits (HF)

| | HF |
|---|---------------|
| | 60 min |
| AEGL-1 (ppm) | 1 |
| AEGL-2 (ppm) | 24 |
| AEGL-3 (ppm) | 44 |
| ERPG-1 (ppm) | 2 |
| ERPG-2 (ppm) | 20 |
| ERPG-3 (ppm) | 50 |
| | 30 min |
| AEGL-1 (ppm) | 1 |
| AEGL-2 (ppm) | 34 |
| AEGL-3 (ppm) | 62 |
| | 10 min |
| AEGL-1 (ppm) | 1 |
| AEGL-2 (ppm) | 95 |
| AEGL-3 (ppm) | 170 |
| | 8 hour |
| AEGL-1 (ppm) | 1.0 |
| AEGL-2 (ppm) | 12 |
| AEGL-3 (ppm) | 22 |
| NR – Not recommended due to insufficient data | |
| NA – Not appropriate | |

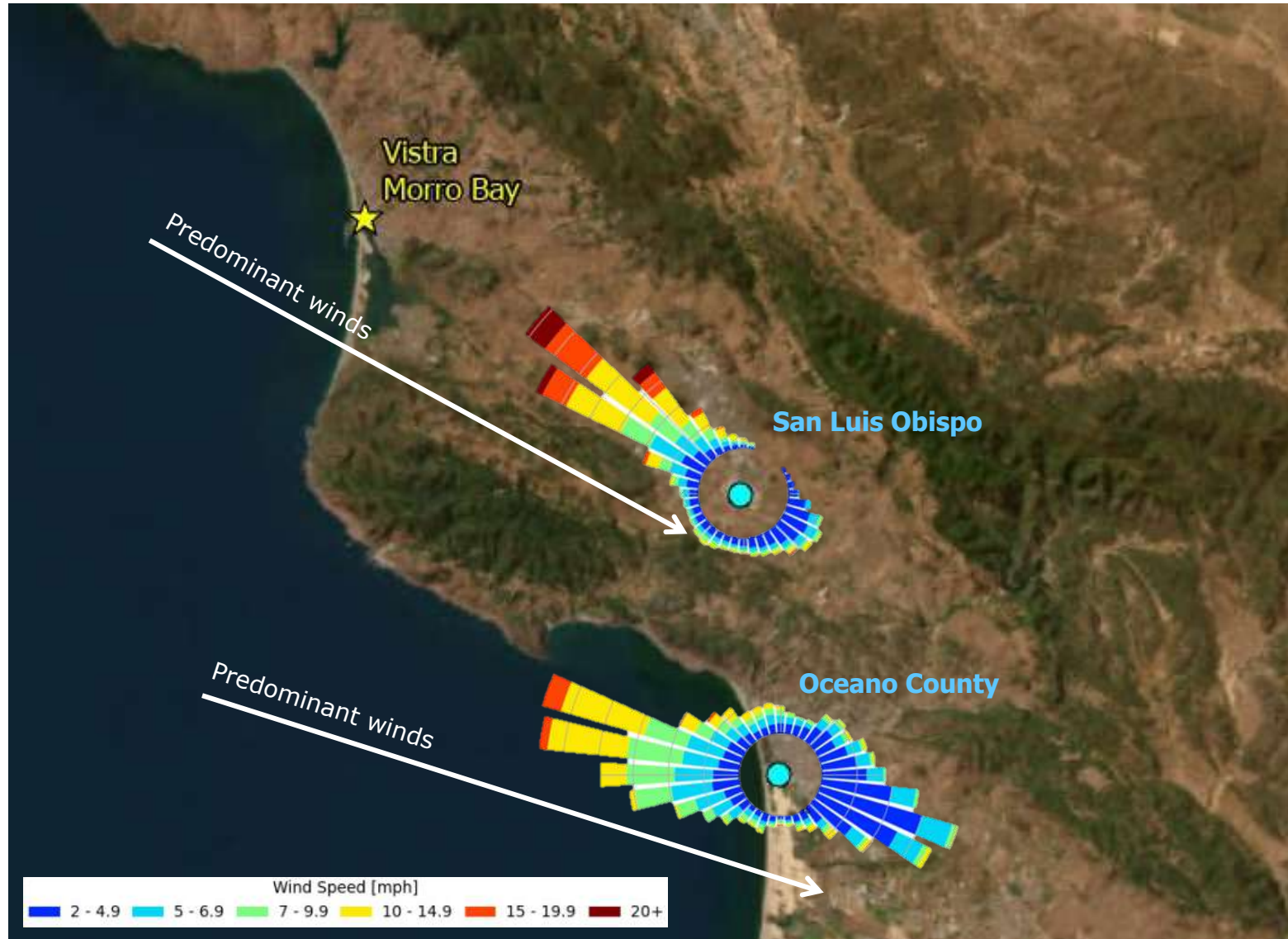




How To Estimate Downwind Concentrations?

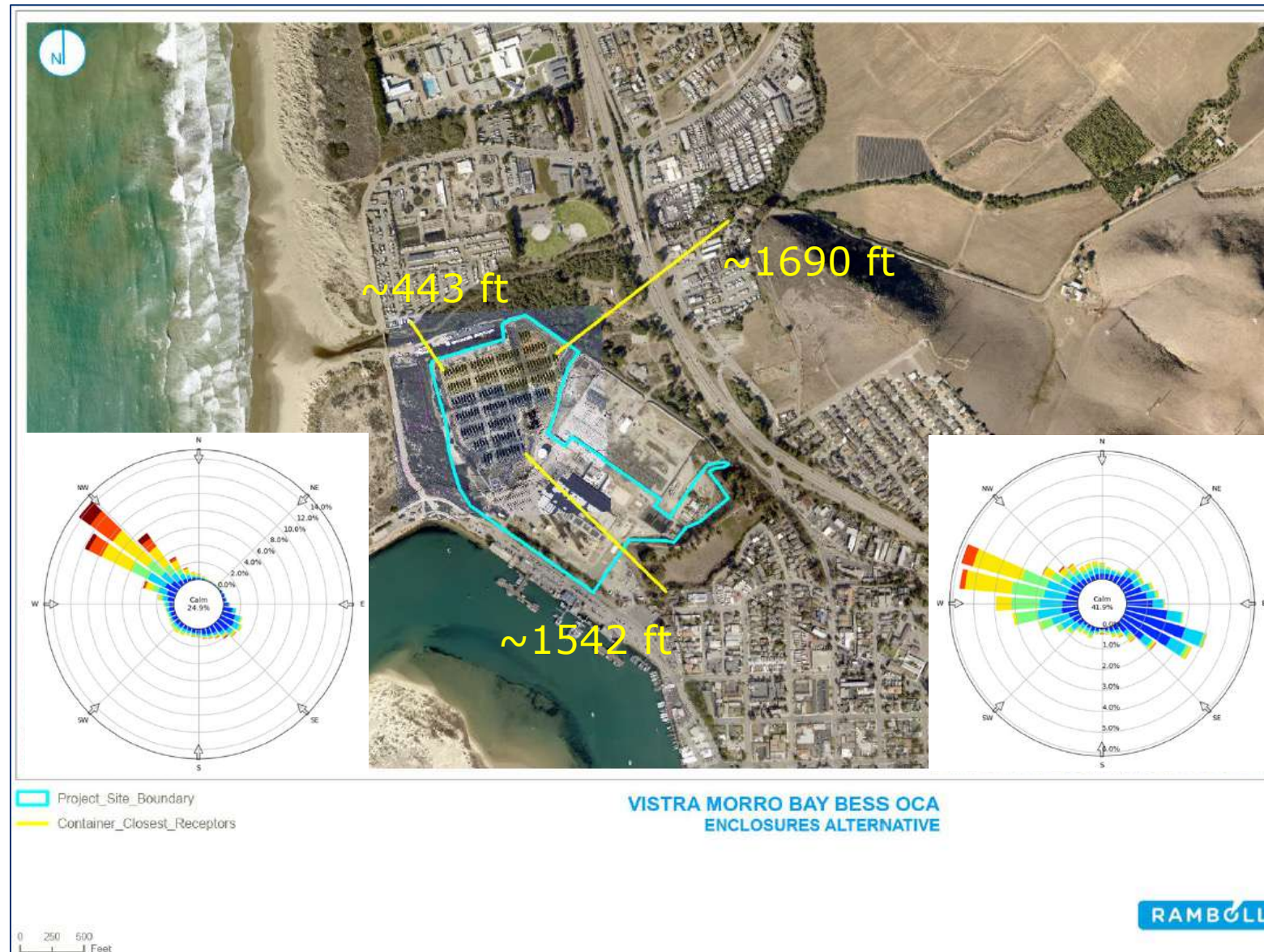
- Dispersion models simulate chemical and physical processes in the air
- Use information on emissions, duration of release, winds, and source configuration
- This study used AERSCREEN, a model designed to maximize concentrations

Meteorology Shows Consistent Offshore Winds

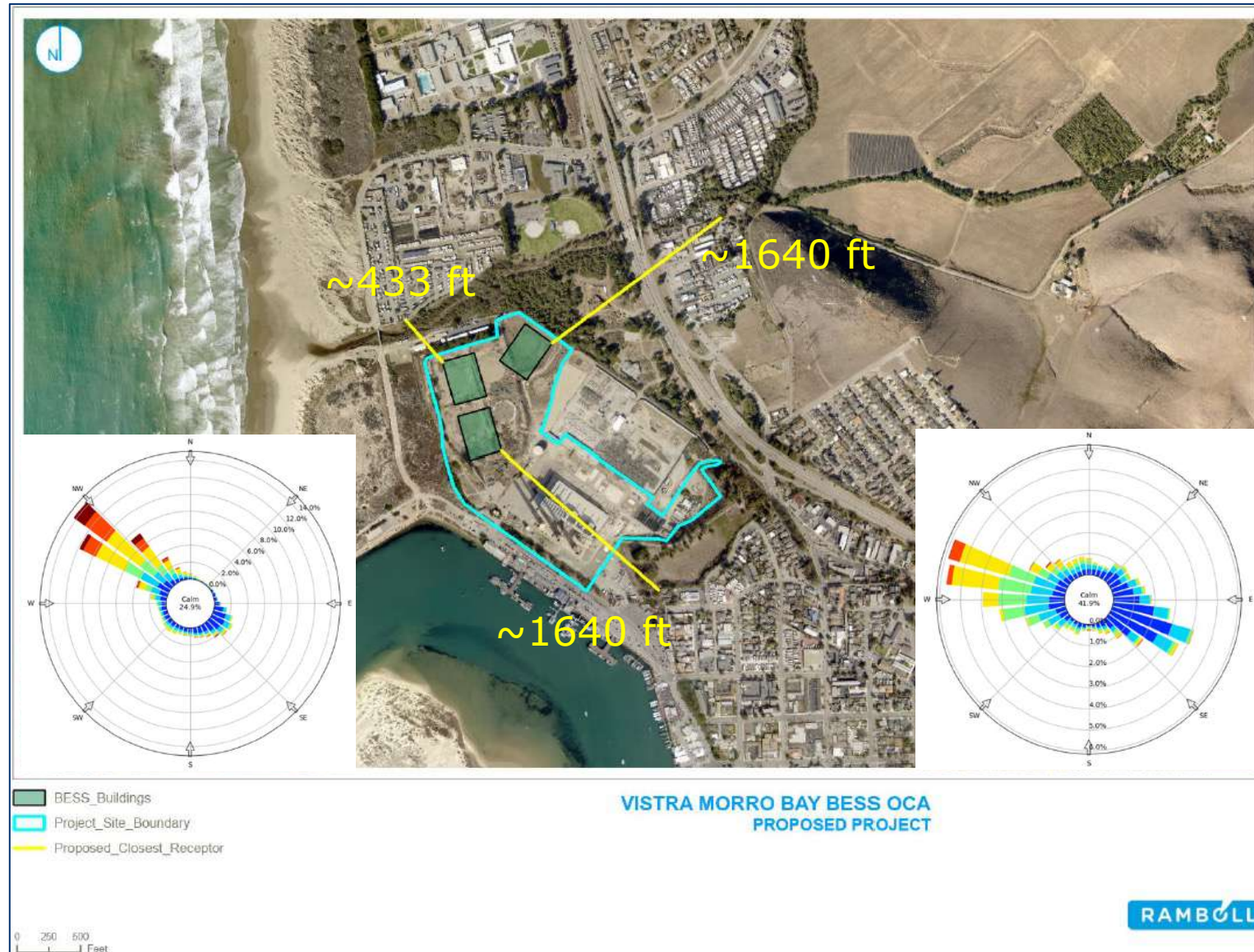


- Wind rose charts show wind speed and direction
- Two local meteorological stations:
 - San Luis Obispo
 - Oceano County
- Predominant winds blow from sea to land

Distances to Nearest Receptors – Enclosures Alternative



Distances to Nearest Receptors – Proposed Project



OCA Uses Multiple Conservative Assumptions



Slow wind speeds



Winds blowing towards residents



Evaluate impacts at nearest residence



Maximum emissions factors

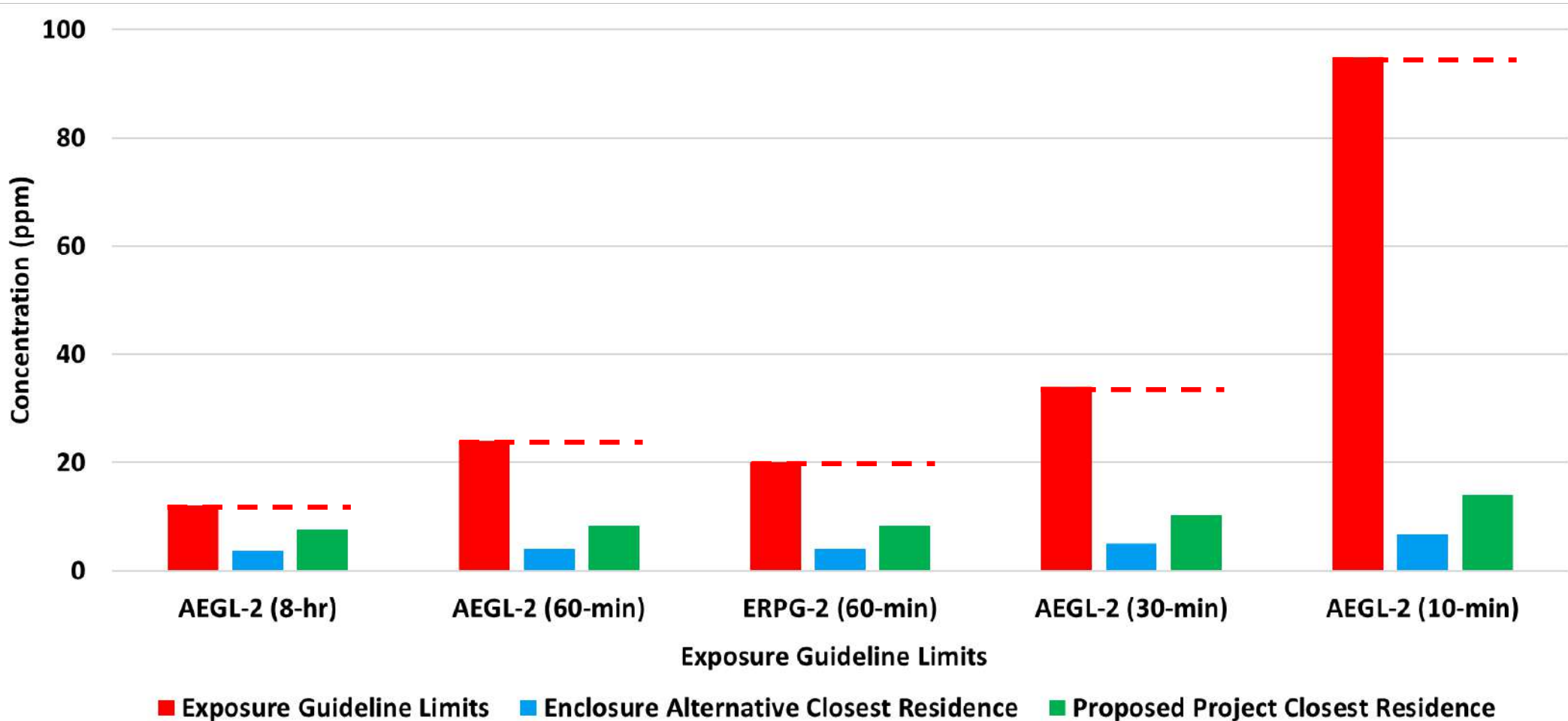


Maximum credible fire event



Health protective standards

The Results: All Scenarios Comfortably Within Safety Thresholds for HF



Enclosures Alternative – HF

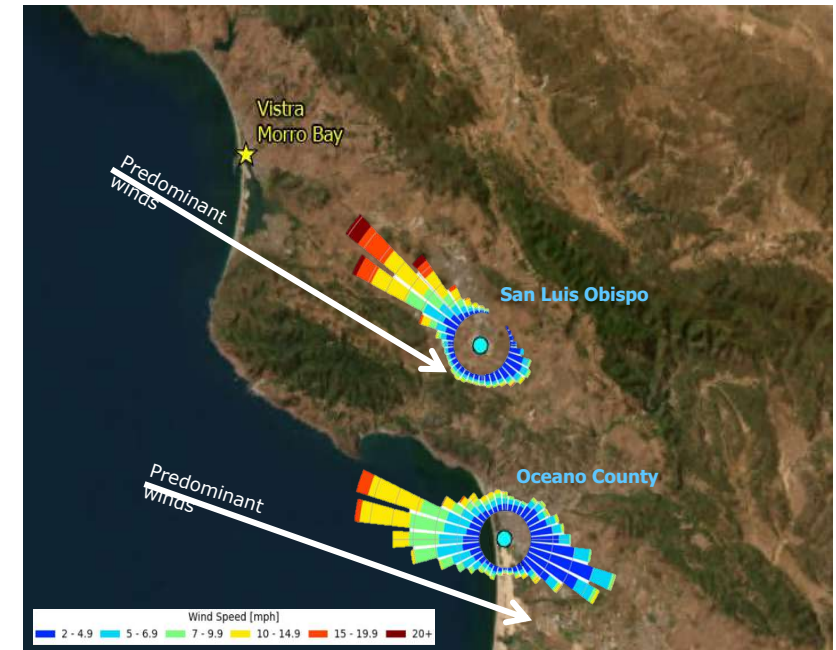
- HF exposure limits would not be exceeded in areas outside the circles
- Circles represent the areas associated with different exposure limits:
 - 8-hours (blue)
 - 60-minutes (purple & yellow)
 - 30-minutes (green)
 - 10-minutes (orange)



Interpreting the Data

- Extensive modeling to identify reasonable worst-case conditions
- Modeled scenarios **over-predict** impacts of real world events:
 - Modeled fire size is *unlikely*
 - 24-hour duration is *unlikely*
 - Receptors directly downwind for entire event is *unlikely*
 - Report uses EPA persistence factors to convert 1-hour concentrations to longer periods, which produces conservative upper bound concentrations
- Real world impacts would be **less severe** with:
 - *Smaller* fire
 - *Shorter* fire duration
 - *Typical* wind directions and speeds
 - *Typical* emergency response
 - *Wetter* weather conditions

| AEGL-2 Limits (ppm) | | | | |
|---------------------|------------------------|-------------------------|------------------------|----------------------|
| | Hydrogen Fluoride (HF) | Hydrogen Chloride (HCl) | Hydrogen Cyanide (HCN) | Carbon Monoxide (CO) |
| 10-minute | 95 | 100 | 17 | 420 |
| 30-minute | 34 | 43 | 10 | 150 |
| 60-minute | 24 | 22 | 7.1 | 83 |
| 8-hour | 12 | 11 | 2.5 | 27 |



Overall Risk vs. Potential Impacts?

Impact
How severe would the outcomes be if the risk occurred?

Probability
What is the probability the risk will happen?

| | Insignificant 1 | Minor 2 | Significant 3 | Major 4 | Severe 5 |
|-------------------------|----------------------------|--------------------|--------------------------|--------------------|---------------------|
| 5 Almost Certain | Medium 5 | High 10 | Very high 15 | Extreme 20 | Extreme 25 |
| 4 Likely | Medium 4 | Medium 8 | High 12 | Very high 16 | Extreme 20 |
| 3 Moderate | Low 3 | Medium 6 | Medium 9 | High 12 | Very high 15 |
| 2 Unlikely | Very low 2 | Low 4 | Medium 6 | Medium 8 | High 10 |
| 1 Rare | Very low 1 | Very low 2 | Low 3 | Medium 4 | Medium 5 |

Bright
ideas.
Sustainable
change.

RAMBOLL



Why Morro Bay?

David Yeager



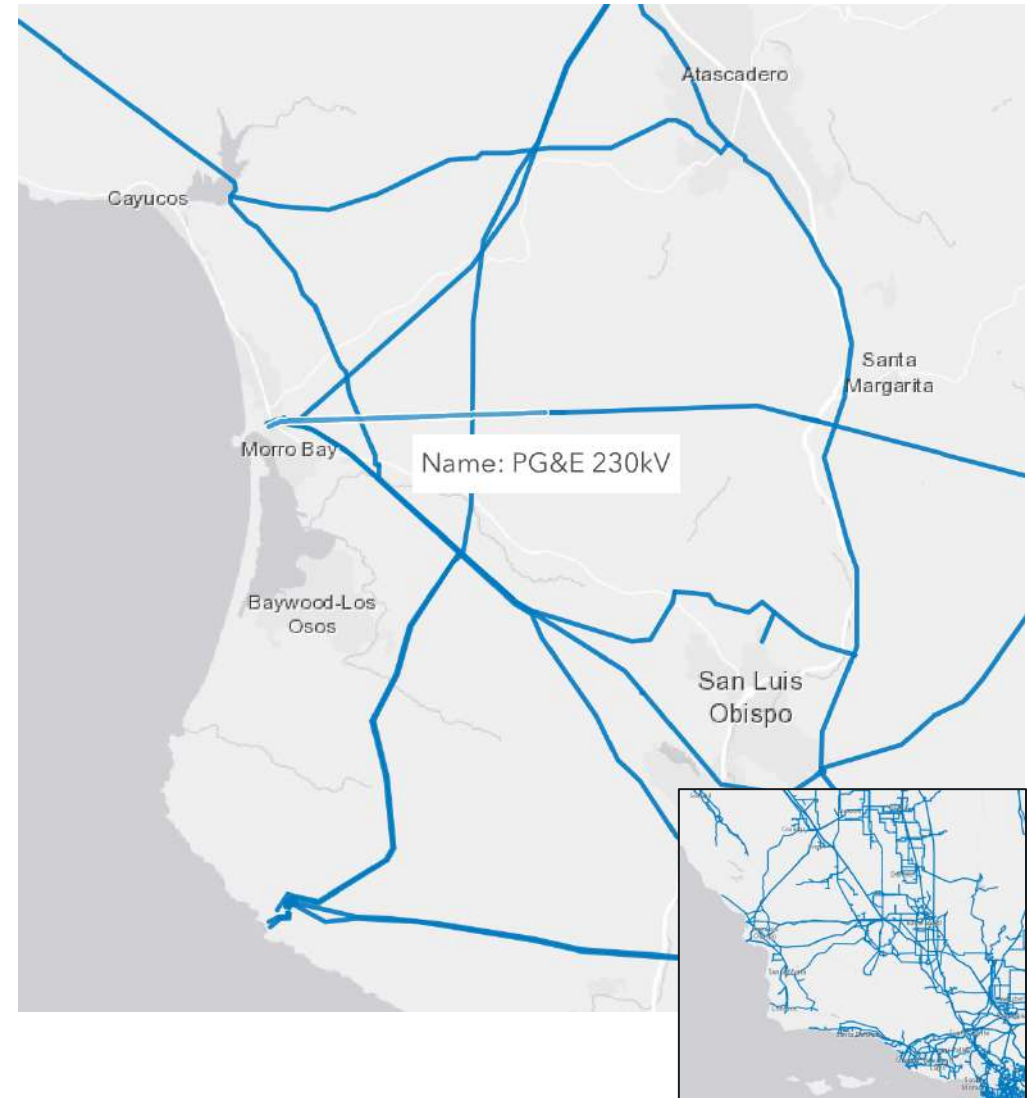
Why Morro Bay & Not Somewhere Else

» **It all comes down to transmission.**

» **Coastal Transmission Highway:** The Morro Bay and San Luis Obispo region are home to several high-capacity transmission lines, switchyards, and substations.

Generation and energy storage assets must be built and operated at **critical points along the grid.**

Physical losses are an unavoidable consequence of transporting electricity. When you transport electricity across a network of poles and wires, some of it is lost as heat. The amount of power lost depends on the **distance it has to travel from the generator to customers** – the more it travels the more power is lost.



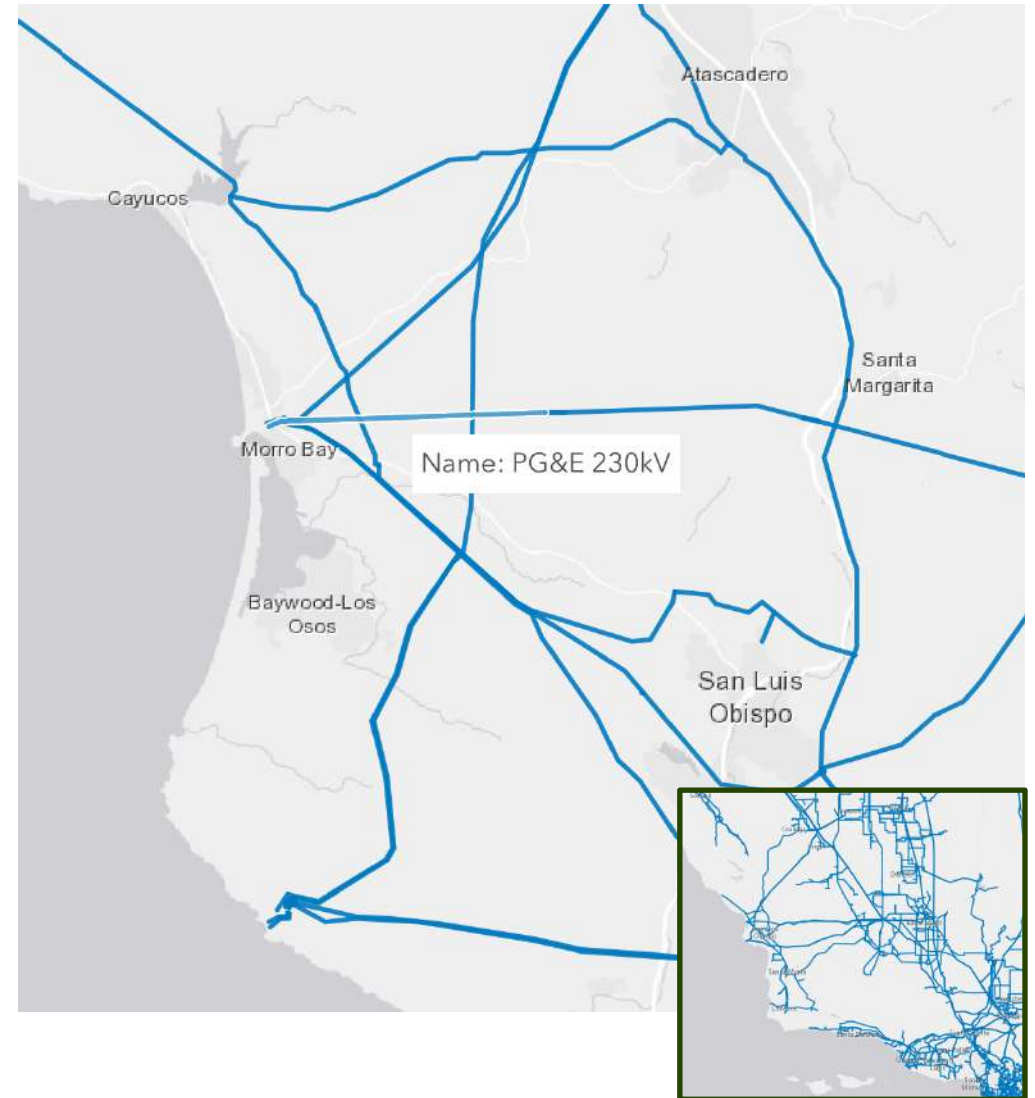
Why Morro Bay & Not Somewhere Else

» **It's Already Built:** The preexisting regional utility infrastructure that ratepayers paid over decades to develop and maintain makes the **Morro Bay plant site ideal to help solve the region's energy security challenges.**

» **It's Underutilized:** Siting energy storage where infrastructure exists **lowers costs for ratepayers** by avoiding expensive additional buildout of transmission lines.

New lines typically require the approval of multiple regional authorities that often disagree over whether the lines are needed and who should pay for them – a process that can take many years, often **decades, to complete.**

California, due to increased energy demand and its clean energy goals, does not have that kind of time.



Our goals for the site:

- 1. Put Ratepayers First** by Reusing a Portion of the Site & Existing Infrastructure to **Improve Grid Reliability & Stability**
- 2. Responsibly Demolish & Remediate** the Legacy Power Plant to Provide Opportunity for **Future Redevelopment**
- 3. Improve the Embarcadero & Harbor-Front** for Future Generations

Goal 1: Put Ratepayers First by Reusing a Portion of the Site & Existing Infrastructure to Improve Grid Reliability & Stability



» Put Ratepayers First:

Reuse of ~24 of the 107-acre site to build energy storage facility and connect to existing transmission and utility infrastructure.

Goal 2: Responsibly Demolish & Remediate the Legacy Power Plant to Provide Opportunities for Future Redevelopment



For illustration purposes only

Goal 3: Improve the Embarcadero & Harbor-Front For Future Generations **VISTRA**



For illustration purposes only



Unlocks \$9.9 Million in Property Tax Revenue For Local Governments in First Year of Operations



One-time Stimulus of Local Sales Tax Revenue From Construction Phase



Responsibly Reuses Existing Ratepayer-Funded Transmission to Help Power California

**~\$1.3
Million**

**Annual Estimated Year 1
Property Tax Payment
to City of Morro Bay for
Essential Local Services**

- » Exploring Alternatives
- » Commercially Available Products Evolving
- » No Decisions on Battery Technology, Chemistry, or Provider Have Been Made





Building Option

» **Aesthetically Different To Honor Views of Morro Bay**



Container Option

» **Existing Berm Taller ~15 Feet Taller Than Containers**

Summary of Impacts and Mitigation Measures

The City of Morro Bay has completed the Draft Environmental Impact Report (EIR) for the proposed Morro Bay Battery Energy Storage System Project.

The Draft EIR found several environmental impacts to be less than significant with mitigation incorporated, or less than significant impacts without the need for mitigation.

The Draft EIR found the following environmental factor to be significant and unavoidable: historical resources (*demolition of buildings and structures*).

Source: Notice of Availability For A Draft Environmental Impact Report - <https://www.morrobayca.gov/DocumentCenter/View/19079/NOA-Morro-Bay-BESS--Draft-EIR>





Morro Bay Energy Storage Opportunity

Community Question & Answer

