Microgrids and Distributed Generation
Accelerating the transition to renewable energy and a modern grid

Through technical, policy, and project development expertise

Learn more
Benefits of local renewables
Agenda

1. Drivers of Change - Why?
   1. Identify the operational and regulatory requirements that are influencing and driving healthcare operations

2. Impact of CA’s Renewable Initiative & Decarbonization
   1. Define the impact of California’s hugely successful renewable power initiative and the need to optimize its usage

3. Regulation
   1. Understand the regulatory drivers and the changes that will be required to allow these technologies to operate not only as normal power, but also to support operations in prolonged power outages

4. Systems and Options
   1. Outline system options and implementation strategies
John Griffiths PE LEED AP
Electrical Engineer,
Electrician
30 Years Experience

OSHPD HBSB Consulting Member

CONTECH-CA
CONTECH-CA provides value driven electrical engineering solutions for complex buildings types and systems; including healthcare, mission critical and distributed generation

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Charge Bliss Team

David Bliss, M.D. is the CEO of Charge Bliss, a surgeon-scientist as well as a Board Member and Chair of the Energy Committee for the Office of Statewide Health Planning and Development. He is a recognized expert on renewable energy microgrids including being an invited speaker and panelist at regional, national, and international conferences as well as consulting for engineering, architectural, and policy entities.

Jeffrey Harding is the Director of Construction for Charge Bliss. In addition to over 30 years in the construction industry, he has an AAS in Civil Engineering Technology as well as a BS in Construction Management both from Purdue University. Jeff was the on-site project manager for the first hospital microgrid in the state of California. Jeff's experience also includes natural gas-fired combined-cycle power generation plants ranging in size from 138MW to 1,054MW. This experience combined with an extensive background in commercial construction gives Jeff a very diverse set of skills and an ability to adapt to any type of construction project.

Jon Harding is the COO of Charge Bliss. Jon has 25 years of experience as a successful Project Manager and Estimator in commercial construction. Jon is experienced in managing multiple complex projects within time and budgetary constraints. His skills include organizing, developing, and managing project staff, budgeting, scheduling, jobsite administration, and field supervision. He has managed projects up to $20MM and estimated projects up to $50MM. Jon graduated from Indiana University with a BS in Business Management, International Business, and HR Management.
What is a Microgrid?
Why

Microgrids and Distributed Generation?
Driver of Change
The Golden State is officially a third renewable, and it’s not stopping there

California has passed its 33% renewable energy target two years before the 2020 deadline. The state’s next renewable milestone is at 44% by 2024, a 33% growth in just over five full years.

FEBRUARY 25, 2019  JOHN WEAVER

BUSINESS  MARKETS  POLICY  CALIFORNIA  UNITED STATES
Impact of Renewable Growth

Demand trend

Renewables trend

Clean Coalition
Goals and Targets

- **Energy Efficiency**
  - 40,000 GWh/year
  - 63,000 GWh/year
  - Zero Net Energy Commercial Buildings Goal
  - Double Energy Savings in Existing Buildings Goal

- **Renewable Energy**
  - 11% RPS Goal
  - 20% RPS Goal
  - 33% RPS Goal
  - 12 GW DG Goal
  - 8 GW Utility-Scale Goal
  - 50% RPS Goal

- **Greenhouse Gas Reductions**
  - Reduce GHG Emissions to 1990 Level (AB 32) – Represents 30% Reduction from Projected GHG Emissions
  - Reduce GHG Emissions 40% Below 1990 Levels (Exec. Order)
  - Reduce GHG Emissions 80% Below 1990 Levels (Exec. Order)
Climate Change

Do you have a plan to stay safe during power outages?

Learn more inside about how to prepare for extreme weather and possible outages.

Clean Coalition

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I-Occupancy Microgrid, Kaiser Richmond
Kaiser Richmond Utility Cost

![Graph showing utility cost trends from 2016 to 2019.](image)

Legend:
- Blue: 2016
- Orange: 2017
- Gray: 2018
- Yellow: 2019
Kaiser Permanente Microgrid Richmond Medical Center

**Solar and Inverter Power [kW]**
- Inverter: 1067 kWh
- Solar: 793.6 kg
- Solar Peak: 169 kW

**PCC Power [kW]**
- Energy Used: 7983 kWh
- Peak Demand: 622 kW
- Peak Reduction: 77 kW

**Battery State of Charge [%]**
- Maximum SoC: 80%
- Minimum SoC: 41%
NORMAL POWER

Diagram showing the flow of normal power through different branches:
- Normal source
- Alternate power source
- Non-essential loads
- Equipment branch
- Life safety branch
- Critical branch

Subsystems include:
- DC Power
- Microgrid Power
- Normal Power

Key components:
- PV
- Battery
- Inverter
- Non Auto Transfer Switch
GENERATOR POWER
San Benito Clinic, Microgrid
### Microgrid Details

<table>
<thead>
<tr>
<th>Grid Tied</th>
<th>PV Array</th>
<th>Battery System</th>
<th>PV Inverter</th>
<th>Storage Inverter</th>
<th>Hybrid Inverter</th>
<th>Generator</th>
<th>Energy Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>86.4 kW</td>
<td>548 kWh</td>
<td>(12) SMA SB</td>
<td>EPC PD250</td>
<td>None</td>
<td>150 kW Cummins</td>
<td>0.18 $/kWh</td>
</tr>
</tbody>
</table>

### Energy
- **Total Load Energy Consumed**: 34.98 MWh
- **Total Renewable Energy**: 21.85 MWh
- **Total CO2 Reductions**: 15.36 Tons
- **Total Dollars Saved**: $3,933.43

### Energy Source (Last 30 Days - MWh)
- **Renewable (MWh)**: 13.37

### Energy Source Per Day (kWh)

![Energy Source Per Day Chart](chart.png)
How to Apply to a Project?
How to Apply to a Project?

**New Build**

- **Opportunity**
  - Incorporate into early planning and infrastructure
  - Optimize system integration
  - Minimize legacy systems

- **Challenges**
  - Funding
  - Regulation
  - Design Skills, Education
How to Apply to a Project?

**Existing**

- **Opportunity**
  - Take incremental strategic approach
  - Optimize system integration
  - Minimize legacy systems

- **Challenges**
  - Funding and Existing PPA’s
  - Limiting Existing Infrastructure
  - Design Skills, Education
The total cost of energy-storage systems should fall 50 to 70 percent by 2025 as a result of design advances, economies of scale, and streamlined processes.

Where battery-storage-system costs will be affected, range

- **Soft costs:** Customer acquisition and development, interconnection, overhead, taxes, and duties

  Developers spend less time educating increasingly savvy customers, digitized tendering speeds up bids, and permitting and interconnection get faster with standardization.

  Decrease by 2025: 60 to 75 percent

- **Battery pack:** Battery-management system, cells, and modules

  Large-scale manufacturing, consolidation, and improvements in processes and technology drive costs down.

  Decrease by 2025: 50 to 70 percent

- **Balance-of-system hardware:** Climate control, containerization, controller and controls, and inverter

  Design improvements remove unnecessary costs and complexity. New low-cost competitors put pricing pressure on incumbents.

  Decrease by 2025: 55 to 70 percent

- **EPC:** Engineering, procurement, and construction

  EPC companies create economies of scale and reduce on-site labor by pursuing standardization in design and construction. Prefabricated, plug-and-play components also lessen manual effort.

  Decrease by 2025: 40 to 55 percent
Summary

1. Drivers of Change - Why?
2. What is a Microgrid
3. Example of a Microgrid
4. How to Apply to a Project
5. Cost

Questions?

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