



Port of San Diego

Resiliency in Terminal Operations at Tenth Avenue Marine Terminal

Renée Yarmy, Program Manager, Energy & Sustainability

The Port Act and Tidelands Trust Doctrine



Details responsibility on behalf of the people of the State of California



Manage San Diego Bay and the Waterfront 'Tidelands'



Promote commerce, navigation, recreation and fisheries



Port of San Diego Jurisdiction

34

miles of waterfront

2,403

acres of land

3,535

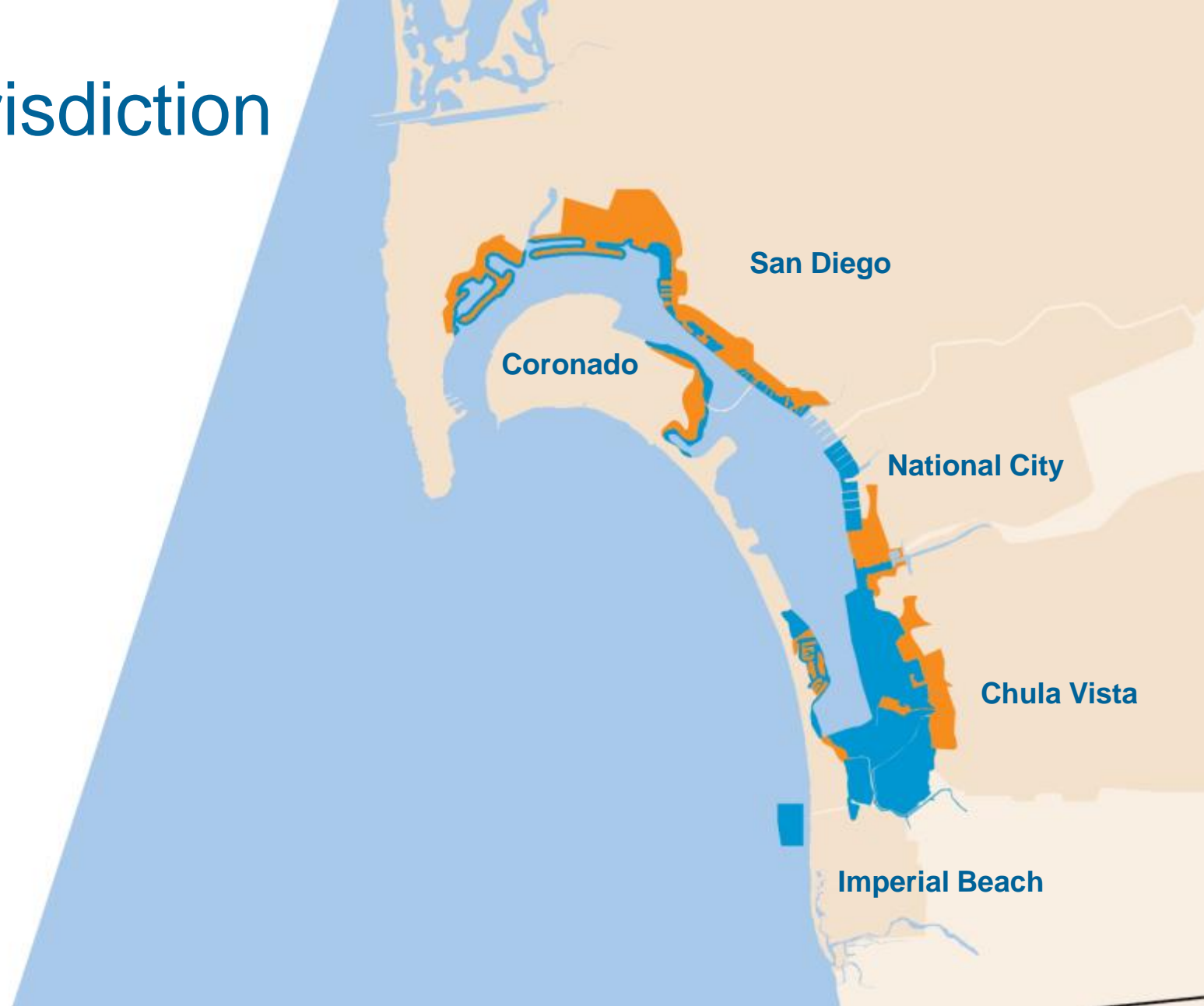
acres of water



Port Tidelands



Submerged Tidelands



Port of San Diego – Services & Amenities



5

public piers

9

museums & attractions

17

hotels

22

parks

70

artworks

73

restaurants

80+

sponsored events

Port of San Diego – Maritime Operations



4th

largest of the 11
California ports

2

cargo
terminals

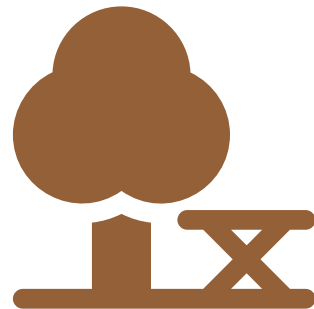
2

cruise
terminals

1 of 17

U.S. strategic
ports

Economic Engine



\$8.3
BILLION

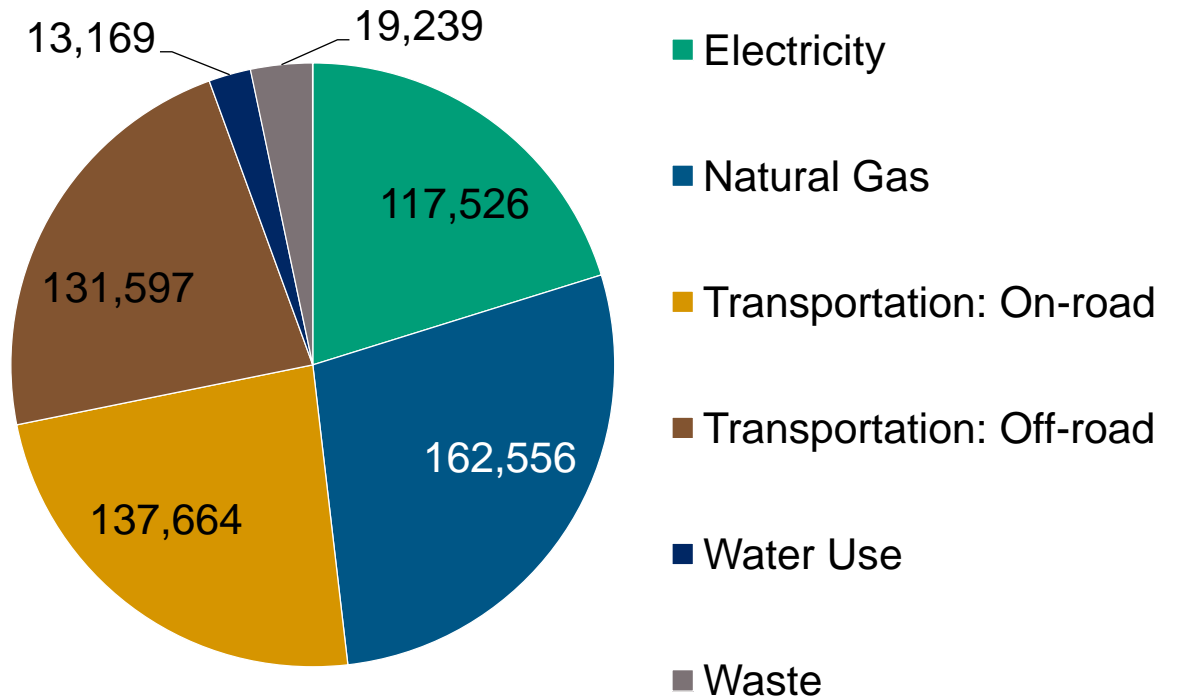
9% increase
from 2013 to 2015

Climate Action Plan

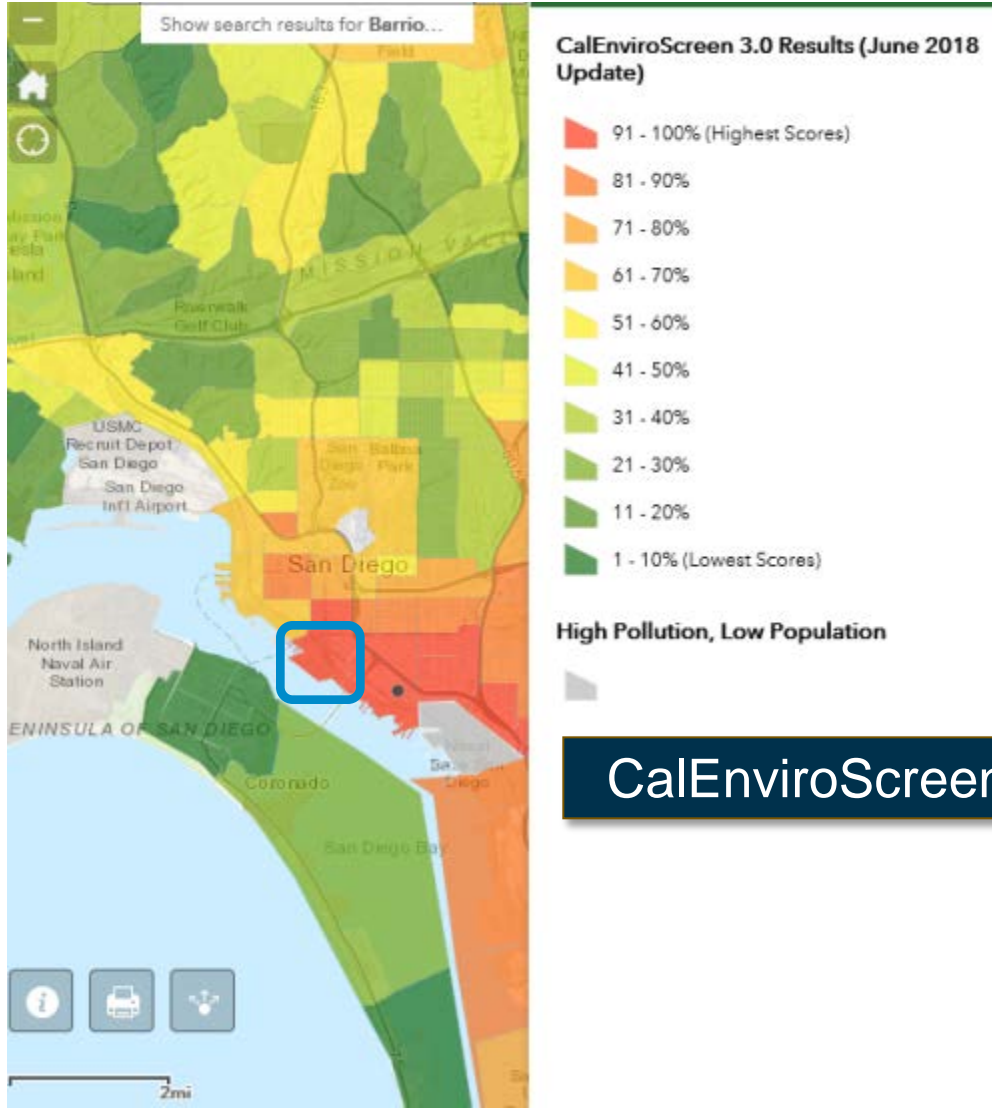


10% Reduction by 2020
25% Reduction by 2035

CAP 2006 Baseline Emission Sources
(581,750 metric tons CO₂e)



Tenth Avenue Marine Terminal – An Innovation Hub



Tenth Avenue Marine Terminal—An Innovation Hub



- Adjacent to the disadvantaged community of Barrio Logan.
- Projects at TAMT aimed at:
 - Reducing criteria air pollutants;
 - Reducing greenhouse gas emissions;
 - Public benefit; and
 - Improving terminal efficiency.

Tenth Avenue Marine Terminal—An Innovation Hub



- Approved a Redevelopment Plan in 2016
- \$10M Transportation Investment Generating Economic Recovery (TIGER) grant
- Quadruple cargo throughput
- Requires emissions reductions
- Enhancements of Shorepower system
- Electric Cargo Handling Equipment



Demonstrate Business Case for Advanced Microgrids in Support of California's Energy and GHG Policies



Electric Program Investment Charge Program

- 17 microgrid projects at 23 sites.
- Total: \$75.6 million CEC funds and \$71.4 million match funds.
- Projects are located in the CA Investor Owned Utility territories.

Grant Funding Opportunity-17-302		
Project Title	Grant Recipient	EPIC Funding (Match)
Port of Long Beach Microgrid	Port of Long Beach	\$5M (\$2.12M)
Camp Parks Microgrid	Lawrence Berkeley National Laboratory	\$5M (\$11.41M)
Miramar Marine Air Station Microgrid	University of California, San Diego	\$5M (\$6M)
Port of San Diego Microgrid	San Diego Unified Port District	\$4.98M (\$4.63M)
Port Hueneme Server Farm Building Microgrid	Electric Power Research Institute	\$4.99M (\$3.5M)
Chemehuevi Indian Reservation Microgrid	Handbook Holdings, LLC	\$4.99M (\$8.4M)
Virtual Wide Area Urban Microgrids	Gridscape	\$4.99M (\$3.28M)
Rialto Microgrid	Rialto Bioenergy Facility	\$5M (\$6.66M)
Redwood Coast Airport Microgrid	Humboldt State University	\$5M (\$6.32M)
Santa Rosa Junior College Microgrid	Sonoma County Junior College District	\$4.99M (\$8.69M)
	Total Award	EPIC - \$49.97M Match - \$61.02M

Project Overview – Goals of Microgrid Grant

- **Electrification**

Improve air quality and reduce greenhouse gas emissions. Supports Final EIR for TAMT and Climate Action Plan.

- **Resiliency**

Demonstration of a reliable, resilient and safe system to increase the terminal’s readiness and capabilities as a Department of Defense Strategic Port.

- **Technological Advancement**

Provide technological advancement and breakthroughs to achieve the state’s statutory energy goals.

- **Replicability**

Develop a model for port terminals and goods movement facilities.



Tenth Avenue Marine Terminal

Microgrid Project Overview

- **Project Partners**

- Burns & McDonnell (BMcD) – System Design
- Electric Power Research Institute (EPRI) – Testing and Evaluation
- UC San Diego (UCSD) – Project Evaluation and Knowledge Transfer

- **Application Ask**

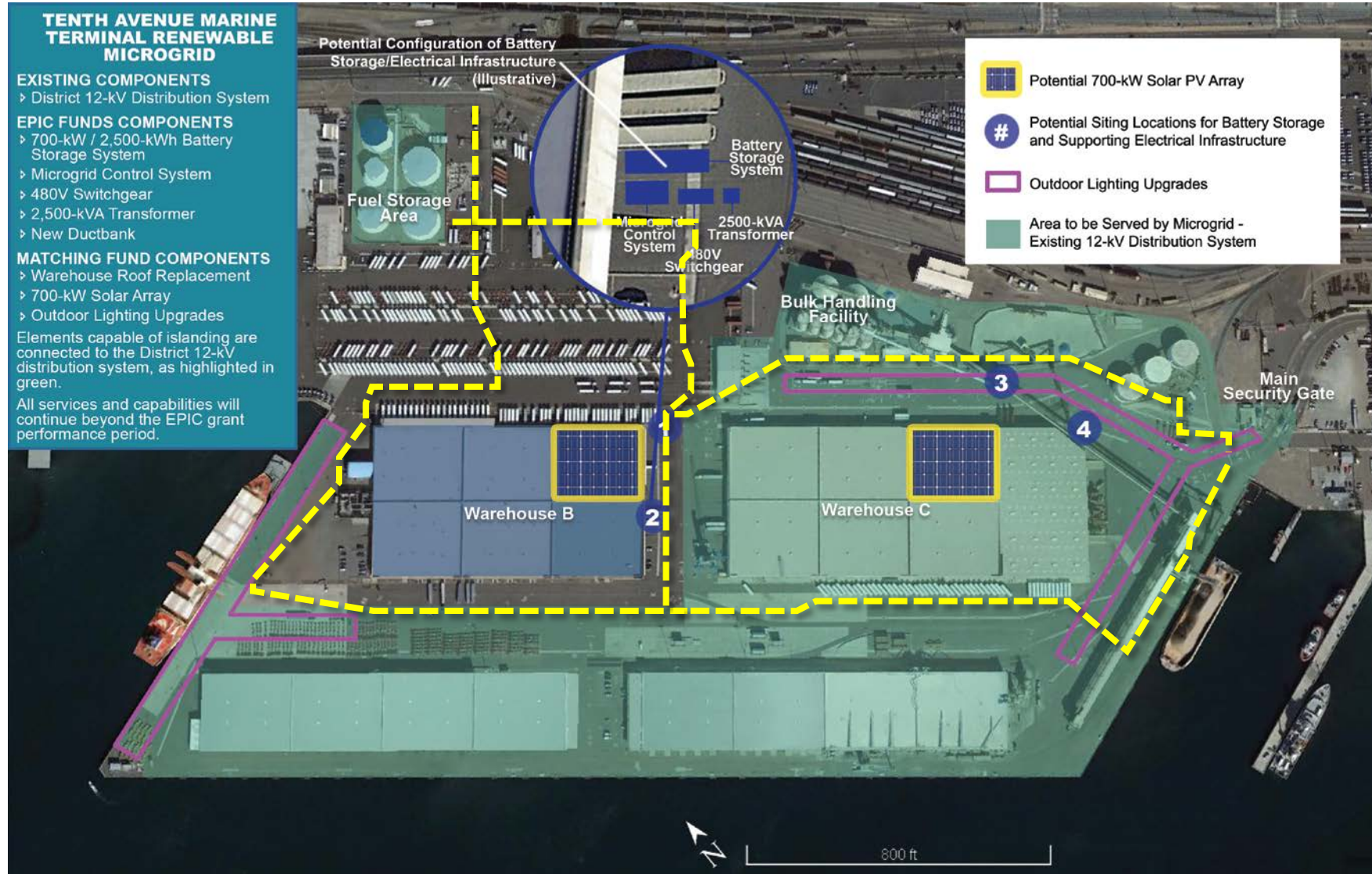
- CEC Funding: \$4,985,272
- District Match: \$4,427,973
- UCSD Match: \$201,963

Estimated Project Budget \$9.6 M

- **Overview**

- Solar PV power, battery storage, and microgrid controller
- Energy Efficient Lighting Retrofits
- Decrease electricity costs 60%

Microgrid Preliminary Site Plan

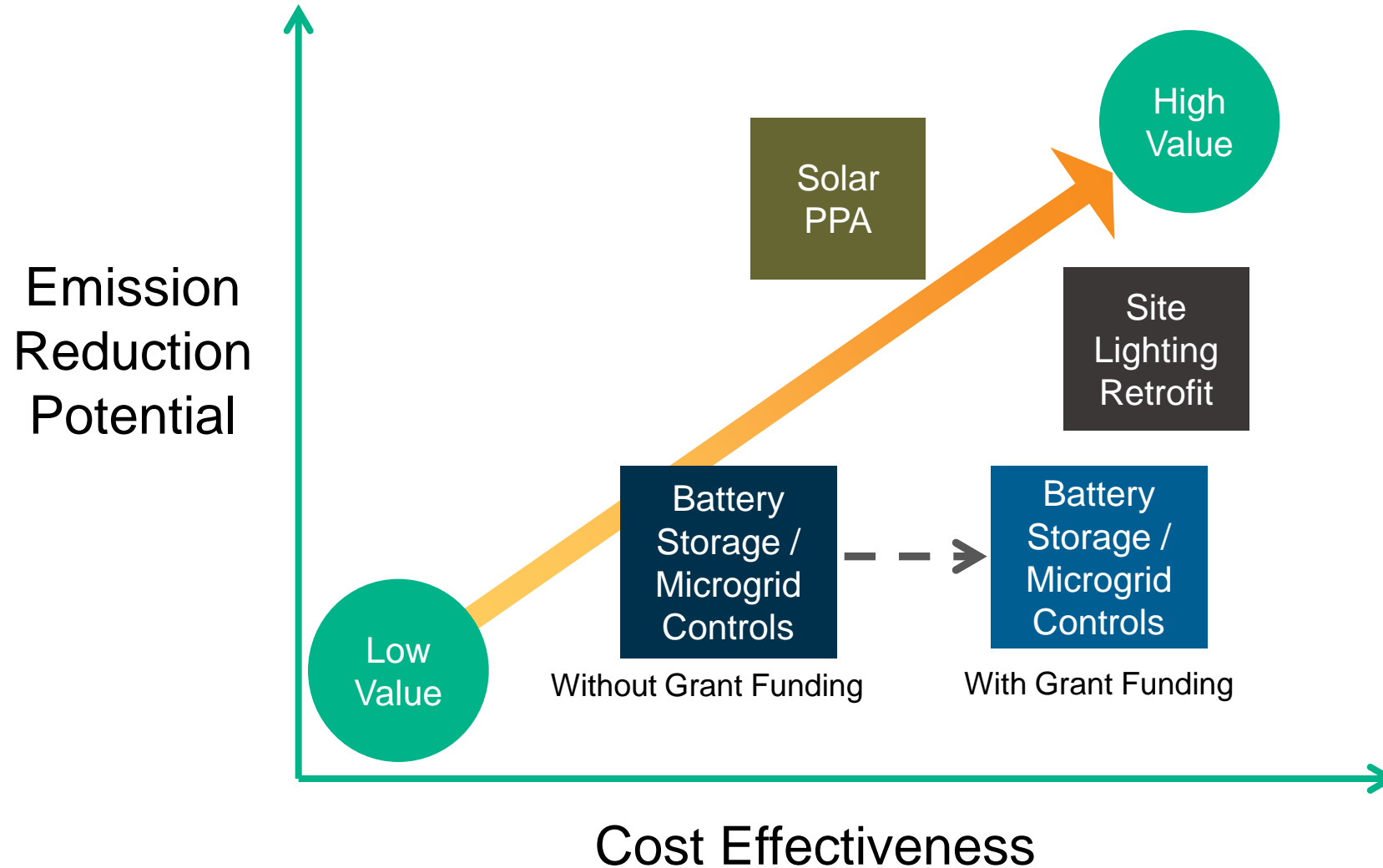


858,000 kWh Reduction
 Solar 700 kW
 Battery Storage
 700 kW / 2,500 kWh

280,000 kWh Reduction
 Energy Efficient Site
 Lighting Retrofits

Estimated Reduction
360 MTCO₂e

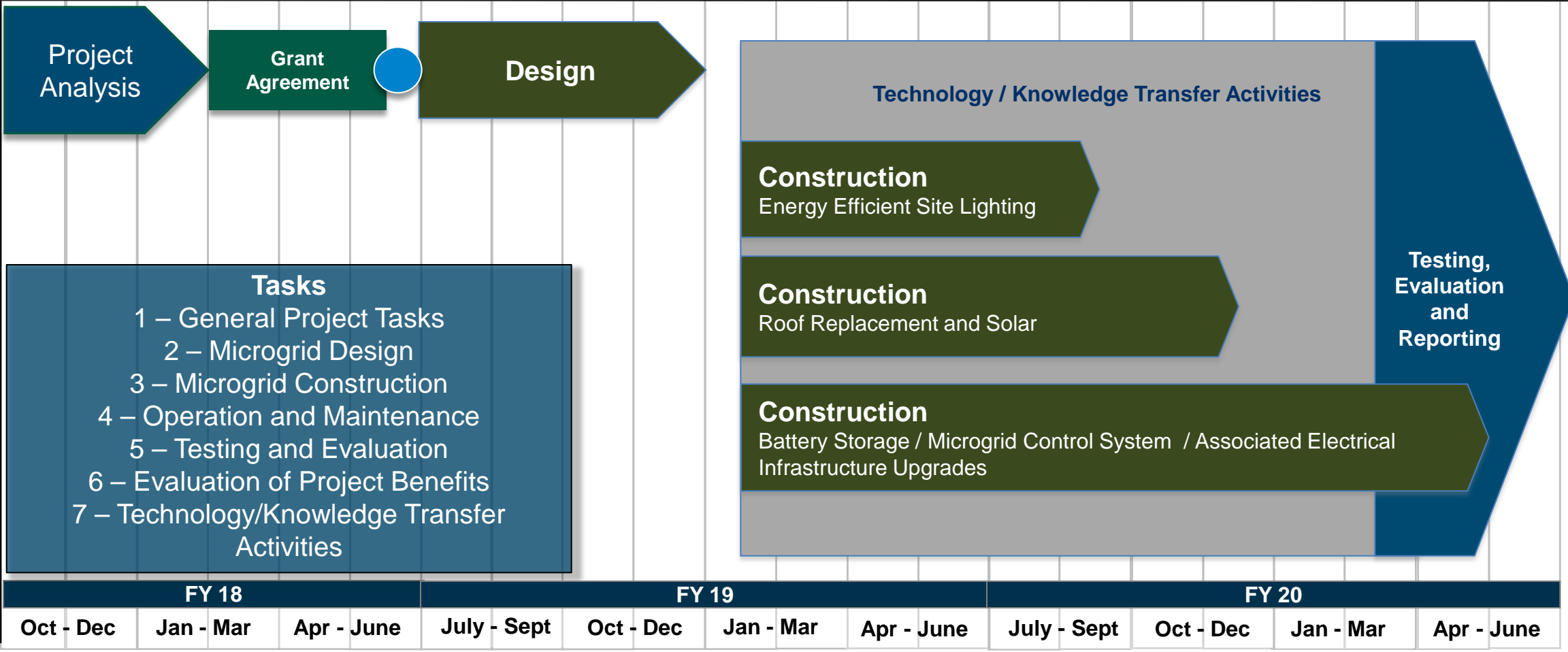
Overview of Value Proposition



Microgrid Anticipated Project Schedule



Microgrid Project



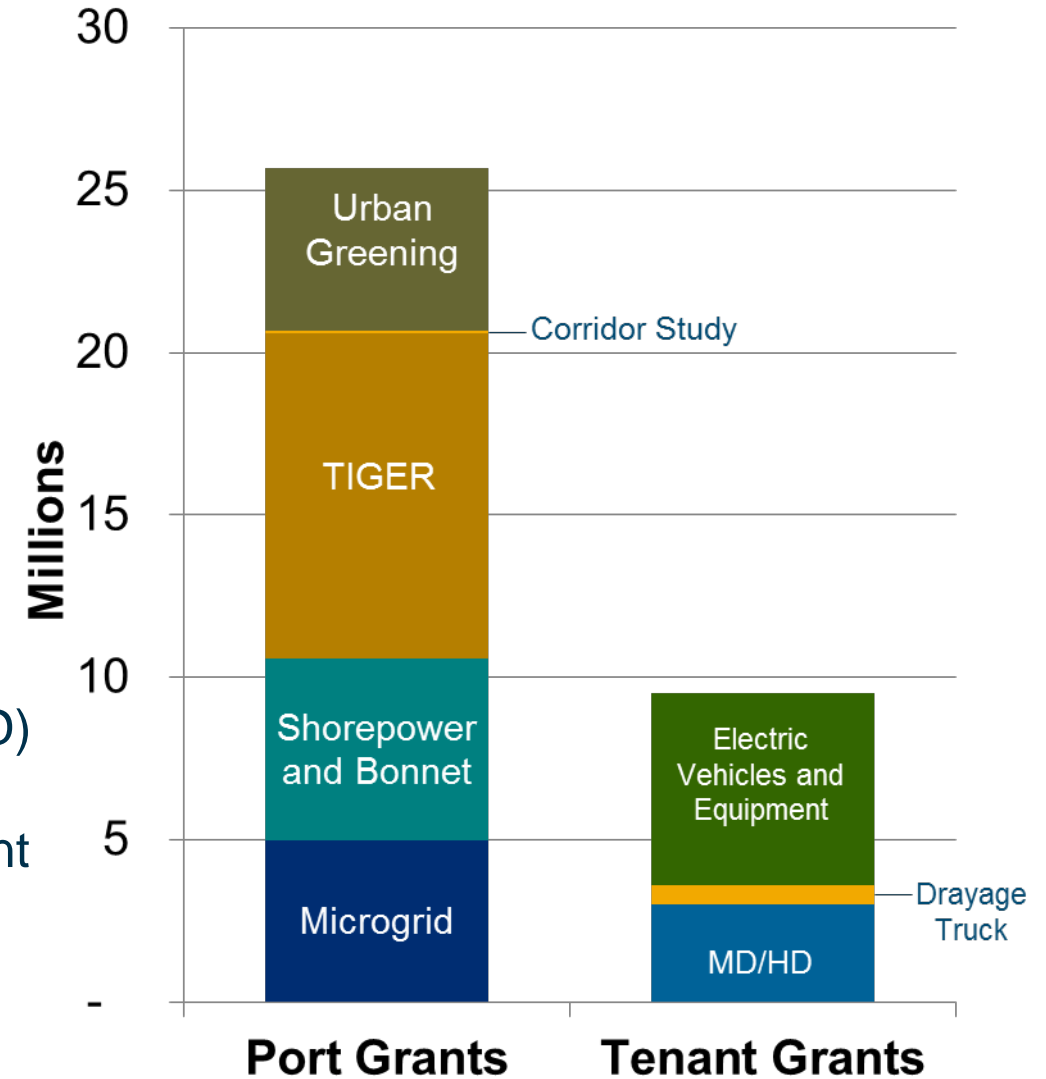
Grant Funding – Beyond the Microgrid

Port Grants Underway:

- **Transportation Investment Generating Economic Recovery (TIGER):** Tenth Avenue Marine Terminal Modernization – Phase 1 Underway
- **Federal Highway Funds:** Harbor Drive Multi-Modal Corridor Study
- **Natural Resources Agency:** Urban Greening Grant
- **California Transportation Commission SB1 Grant:** Shorepower Extension and Bonnet System

Tenant Grants Underway:

- **CEC (PON 14-605):** Medium- and Heavy-Duty (MD/HD) Advanced Vehicle Technology Demonstration
- **California Air Resources Board:** Drayage Truck Grant
- **CEC (GFO 15-604):** Freight Transportation Projects at California Seaports



Tenth Avenue Marine Terminal—An Innovation Hub



Image source: advancedemissionscontrol.com

California Transportation Commission SB1 Grant

- \$5.6M Grant Funding
- Extension of shorepower system
- Purchase of advanced marine emissions control system
- Barge-based Bonnet system
- Reduce criteria pollutants and GHG

Tenth Avenue Marine Terminal—An Innovation Hub



San Diego Port Tenants Association Zero Emissions Freight Demonstration Project

- \$5.9M Grant Funding
- 10 all-electric vehicles coming to the Port of San Diego
- Electric Drayage Trucks
- Electric Yard Tractors
- Electric Forklifts
- Reduce ~900 MT GHG emissions over lifetime of project

Thank you!
Questions / Discussion





PORT of
SAN DIEGO

Solar PV – Cost Analysis

Power Purchase Agreement



Power Purchase Agreement (PPA)
District or Tenant and Developer



Renewable energy system installed by Developer



District pays a pre-determined energy price for energy generation



Developer owns, manages and maintains system

20 Year Agreement

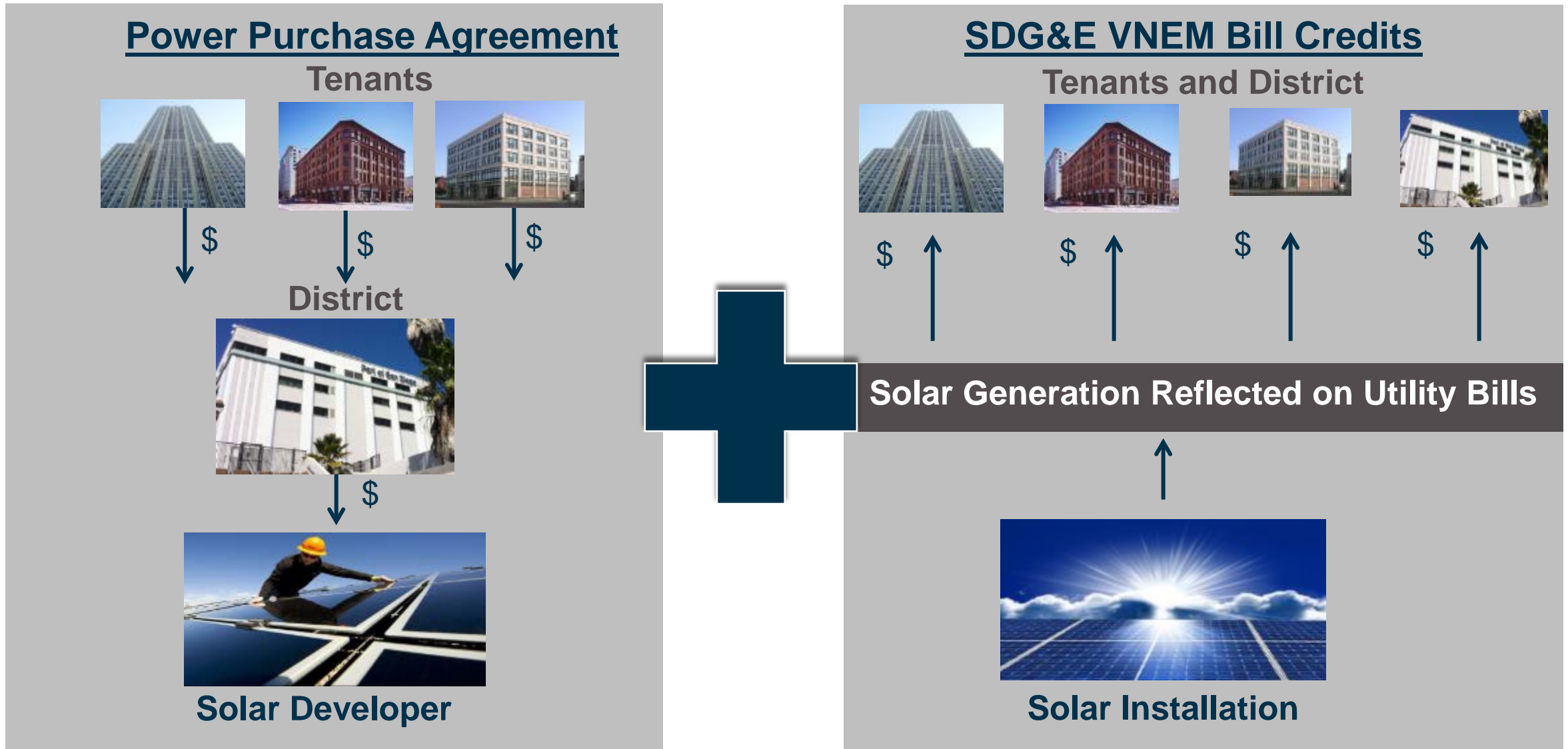
Federal Investment Tax Credit

- Thirty percent (30%) of the cost as a **tax credit**
- Future of the Federal ITC is unknown

Additional Financial Considerations

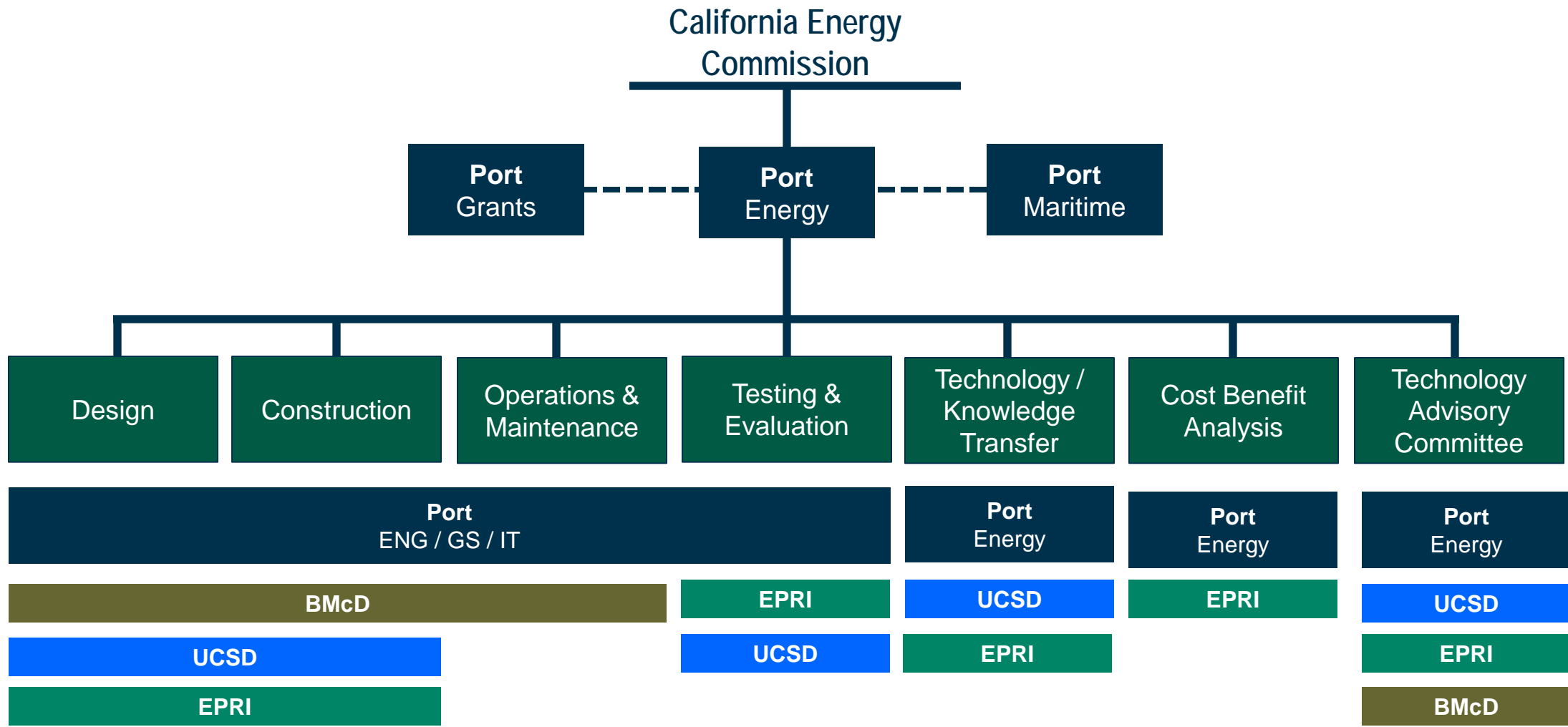
- Self Financed with Equity (Cash)
- Self Financed with Debt
- Property Assessed Clean Energy (PACE) financed

Solar Financing and VNEM Metering Rate Structure



Illustrative Graphic

Roles & Responsibilities – Technical Leads

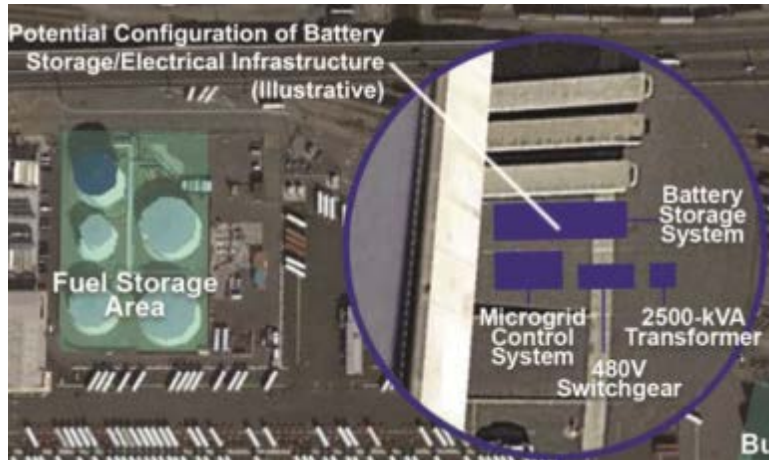


Acronyms: ENG = Engineering; GS = General Services; IT = Information Technology;
 BMcD = Burns & McDonnell; UCSD = University of California, San Diego; EPRI = Electric Power Research Institute

Microgrid Technical Tasks and Estimated Budget

Tasks	CEC Funds	Port Match	UCSD Match	Total by Task
1. General Project Tasks	\$0	\$250,000		\$250,000
2. Design	\$550,614	\$100,000	\$100,000	\$750,614
3. Microgrid Construction	\$3,954,661	\$2,976,981		\$6,931,642
4. Operations and Maintenance	\$0	\$597,189		\$597,189
5. Testing and Evaluation	\$350,000	\$353,803	\$101,963	\$805,766
6. Evaluation of Project Benefits	\$79,997	\$100,000		\$179,997
7. Technology/Knowledge Transfer	\$50,000	\$50,000		\$100,000
Total by Funding Partner	\$4,985,272	\$4,427,973	\$201,963	\$9,615,208

California Energy Commission Funds



Tasks	CEC Funds	Components
1. General Project Tasks	\$0	
2. Design	\$550,614	Partners' labor
3. Microgrid Construction	\$3,954,661	Lithium Ion Battery – Energy Storage System, Centralized Microgrid Controller, Electrical Infrastructure Equipment and Contractor
4. Operations and Maintenance	\$0	
5. Testing and Evaluation	\$350,000	Partners' labor
6. Evaluation of Project Benefits	\$79,997	Partners' labor
7. Technology/Knowledge Transfer	\$50,000	Partners' labor
Grant Funding Total	\$4,985,272	

Port of San Diego Match



Tasks	Port Match	Total by Task
1. General Project Tasks	\$250,000	Port Staff Labor
2. Design	\$100,000	Port Staff Labor
3. Microgrid Construction	\$2,976,981	Warehouse Roof Replacement
4. Operations and Maintenance	\$597,189	High-mast lighting / Energy Efficiency Retrofit
5. Testing and Evaluation	\$353,803	Solar PPA and Port Staff Labor
6. Evaluation of Project Benefits	\$100,000	Port Staff Labor
7. Technology/Knowledge Transfer	\$50,000	Port Staff Labor
Port Match	\$4,427,973	

Microgrid Technology / Knowledge Transfer

PRINT	OUTREACH	ENGAGE	EXTEND	REPORT
<p>Prepare Fact Sheets Initial and Final</p>	<p>Prepare a Technology / Knowledge Transfer Plan</p>	<p>Participate in CEC Conference and Workshops</p>	<p>Participate in EPIC Symposium</p>	<p>Prepare a Technology / Knowledge Transfer Report</p>
<ul style="list-style-type: none"> Develop a dedicated webpage to share progress Prepare Printed Materials 	<ul style="list-style-type: none"> Strategically target audiences that will benefit from lessons learned Establish performance and outreach metrics 	<p>Representative Engagements</p> <p>National: AAPA Energy and Environment Symposium PV Specialists Conference IEEE Power and Energy General Meeting</p> <p>State: UC Irvine Microgrid Conference ACI West Conference on Microgrids California Association of Port Authorities Local Government Sustainable Energy Coalition (LGSEC)</p> <p>Regional: CleanTech San Diego Energy Working Group (SANDAG) Local Government Partnership (SDG&E)</p>	<p>Report-out on metrics and achievements, as appropriate: survey, interview, questionnaires, engage outreach participants</p>	

Tenth Avenue Marine Terminal—An Innovation Hub



Fleet



Freight



Folks

Electric Vehicle Charging Infrastructure



CALIFORNIA
ENERGY
COMMISSION

FY 18-19
\$134.5M



SDG&E
\$155M Approved
\$150M waiting for approval



First Cycle
\$120M

Tenth Avenue Marine Terminal Modernization Plan

Long-Term Market-Driven Redevelopment

- Will create more laydown space
- Will create distinct cargo nodes
- First phase will remove two cargo sheds
- \$10 Million Transportation Investment Generating Economic Recovery (TIGER) grant

