

Charting the Path to 100% Renewable

SPUR – April 15, 2013



Photo: Luminalt



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Guiding Climate & Energy Policies in San Francisco

- Climate Change Goals Ordinance (2008)

- Set aggressive citywide GHG reduction targets
- Encouraged pursuit of GHG-free electricity by 2030

- SF Climate Action Plan

- Inventories emissions from waste, transport & energy
- Outlines strategies to meet local, state & Kyoto targets

- SF Electricity Resource Plan

- **Achieve GHG-free electricity supply by 2030**
- Maximize Energy Efficiency
- Develop Renewable Power
- Assure Reliable Power
- Support Affordable Electric Bills
- Support Environmental Justice
- Improve Air Quality and Prevent Other Environmental Impacts
- Promote Opportunities for Economic Development
- Increase Local Control Over Energy Resources

SF GHG Targets

20% reduction by 2012

25% reduction by 2017

40% reduction by 2025

80% reduction by 2050

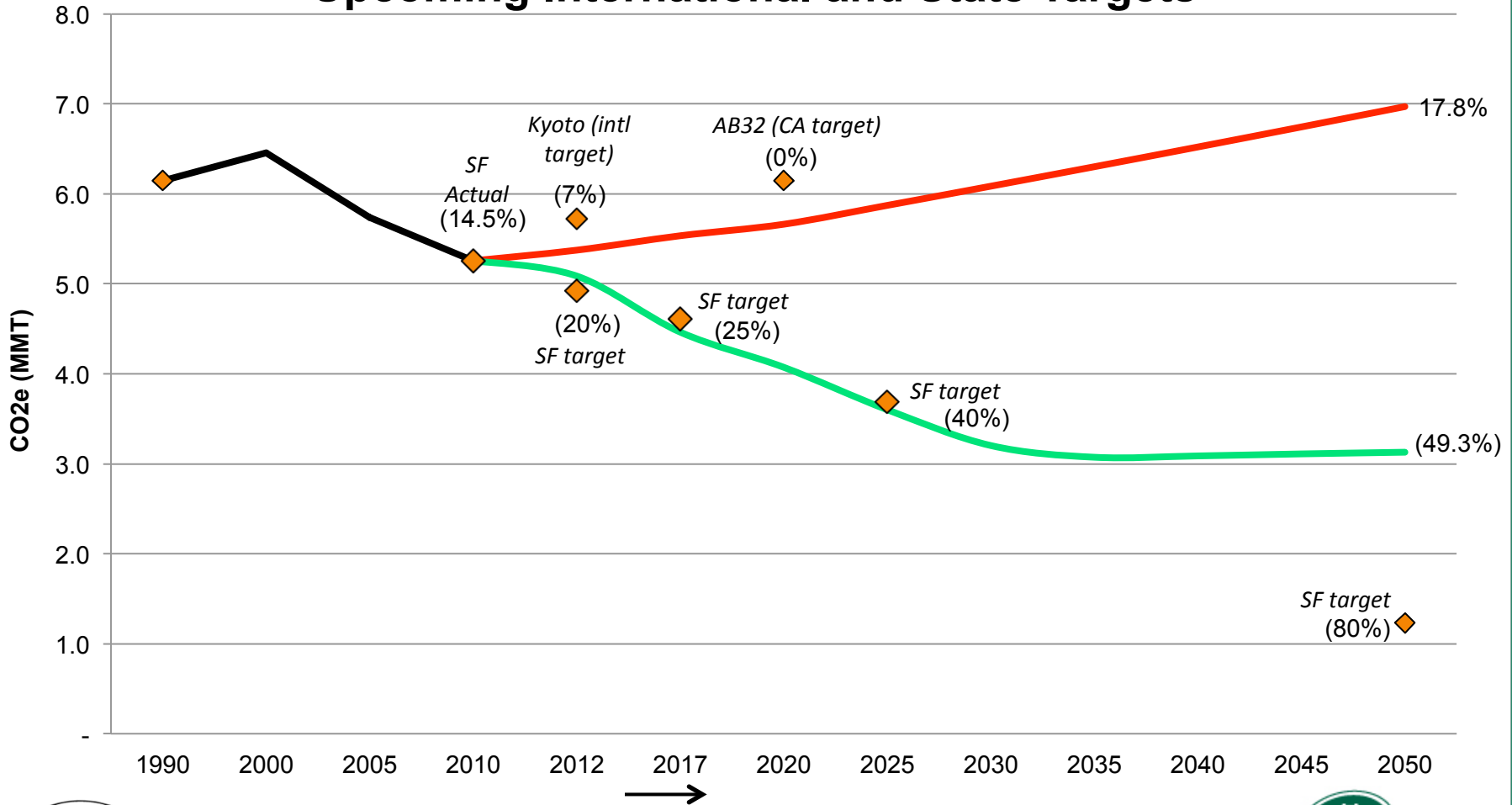
vs 1990 levels



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SF Citywide CO₂ Emissions Are On Track to Beat Upcoming International and State Targets

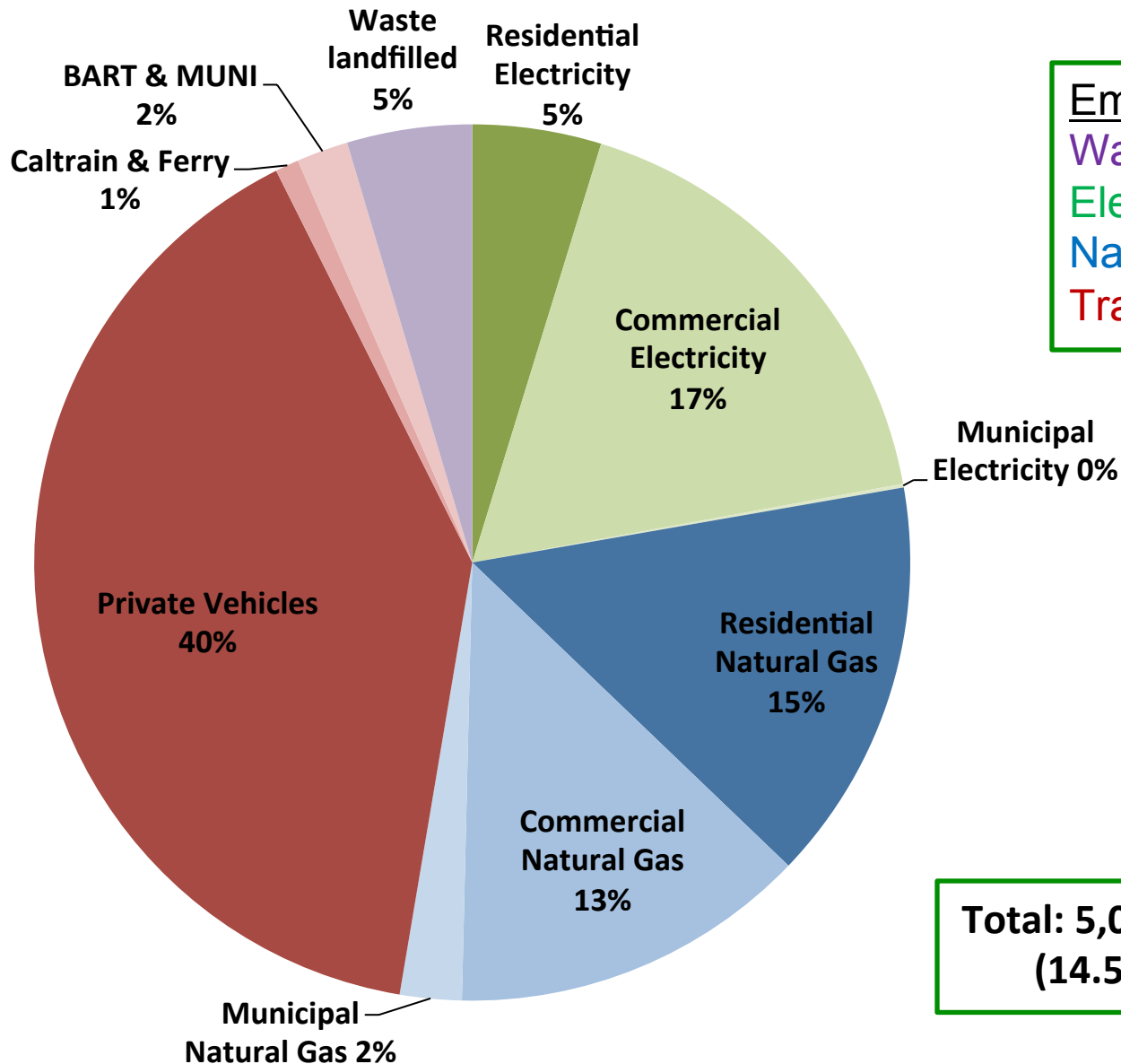


◆ SF (actual)
 — SF (no action)
 — SF (new measures)



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San Francisco's GHG Profile (2011)



Emissions Sources:

Waste	5%
Electricity	23%
Natural Gas	32%
Transport	45%

Total: 5,058,389 tonnes CO₂
(14.5% below 1990)

San Francisco's Electricity Supply (2011)

SF Electricity Providers

Direct

Access: 8%

SFPUC: 15%

PG&E: 76%

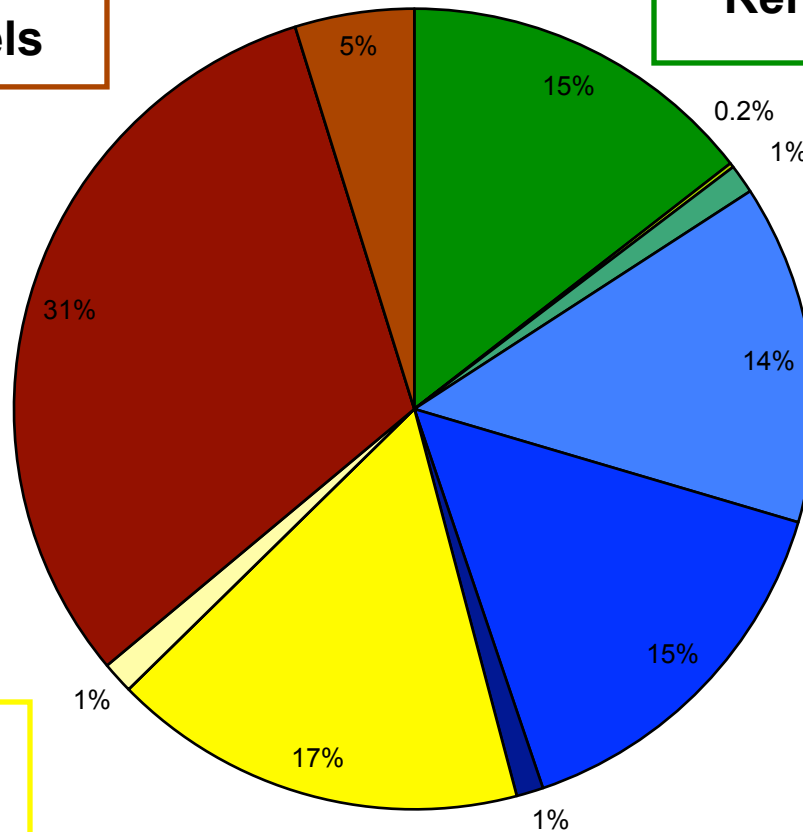
- PG&E RPS
- SFPUC RPS
- DA RPS
- PG&E Large Hydro
- SFPUC Large Hydro
- DA Large Hydro
- PG&E Nuclear
- DA Nuclear
- PG&E Fossil
- DA Fossil

**36%
Fossil
Fuels**

**16% RPS-Eligible
Renewables**

**30% Large
Hydro**

**18%
Nuclear**

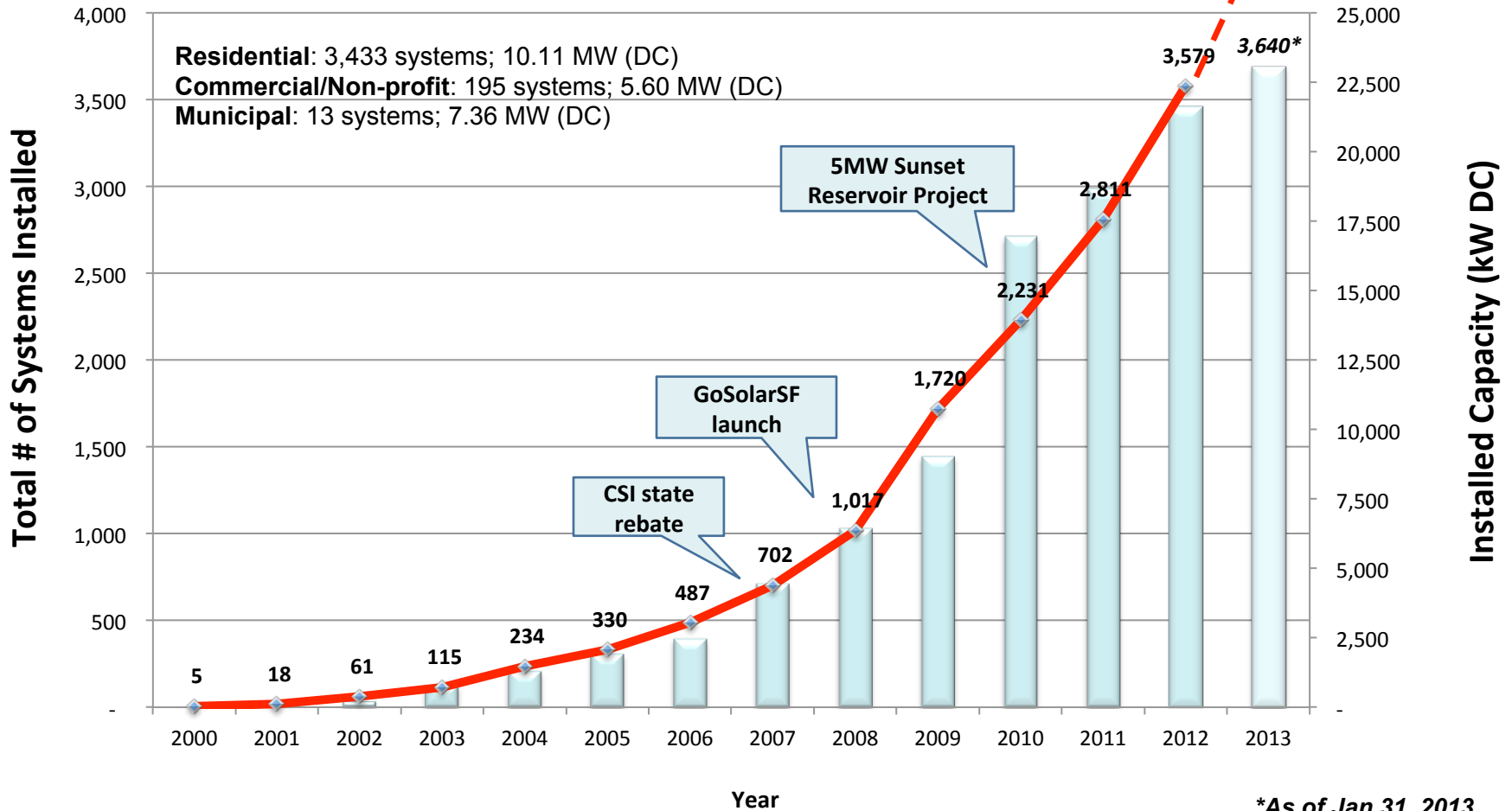


**SAN FRANCISCO
RENEWABLE ENERGY
EFFORTS TO DATE...**

San Francisco Solar PV Installations

(2000-2012)

Capacity (kW DC)



Municipal Solar Installations

- 13 projects completed, totaling 7.4 MW
 - Sunset Reservoir: 5 MW
 - Moscone Convention Center: 675 kW
 - San Francisco International Airport: 500 kW
- Under development: City Hall (100 kW) and Davies Symphony Hall (200 kW)



Moscone Center – 675 kW (2004)



Sunset Reservoir – 5MW (2010)

Solar Market Development

- Awareness building / market development
- Technical assistance
- Streamlined permitting
- Solar for multi-tenant buildings and renters
 - VNM; Community Solar
- Targeted outreach & aggregation programs
 - Large commercial roofs
 - Schools
 - BC3 & CCSF Employees
- Finance facilitation



GoSolarSF City Rebate Program

- Local incentive for PV installs (residential, commercial, and non-profit)
 - Began in 2008
 - \$2 to 5 million annual funding
 - Additional incentives for Environmental Justice neighborhoods, low-income applicants, and local installers
 - Installers must participate in the City's Workforce Development Program to be eligible



Results to date:

- 6.2 MW solar power installed or in progress (2,138 systems)
- \$16.9 m in incentives paid out,
 - \$11 million to low-income households & non-profits
- >100 green jobs through workforce development program

SF Solar Map

Shows users:

- All PV and SWH installs in city, with case studies
- Estimated rooftop PV potential (KW and KWh)
- Estimated electric bill savings
- Estimated CO2 reduction
- Rebates & tax credit info
- Cost estimator / financial analysis
- Link to local solar installers

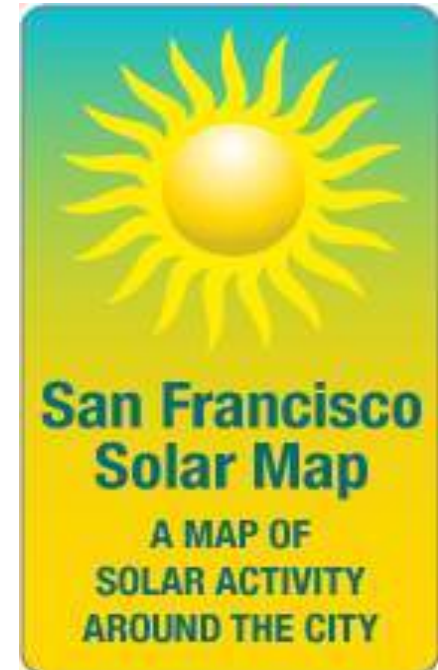
➤ **Developed 2006-2007**

➤ **First US City to Create Solar Map**

➤ **Won 2008 IREC Innovation Award**

➤ **Other city solar maps modeled on SF's**

- Berkeley, Los Angeles, San Diego, Sacramento, Portland



sf.solarmap.org

San Francisco Energy Map

A map of clean energy activity around the city

Reset Map Back

Map | Satellite | Hybrid

Welcome Solar Wind

Markers

Solar Installations

- Municipal
- Commercial
- Non-profits
- Environmental Justice Program
- Case Study
- Residential
- Schools/libraries
- Monitoring stations
- Solar Water Heating

Don't see your solar installation on the map?

What Can Solar Do For You?

Enter your address

(ex. 11 Grove Street or 11 Grove St)

get my info

Resources

Solar Estimators

- Solar PV Estimator
- Solar Water Heating Estimator

SF Environment Solar Resources

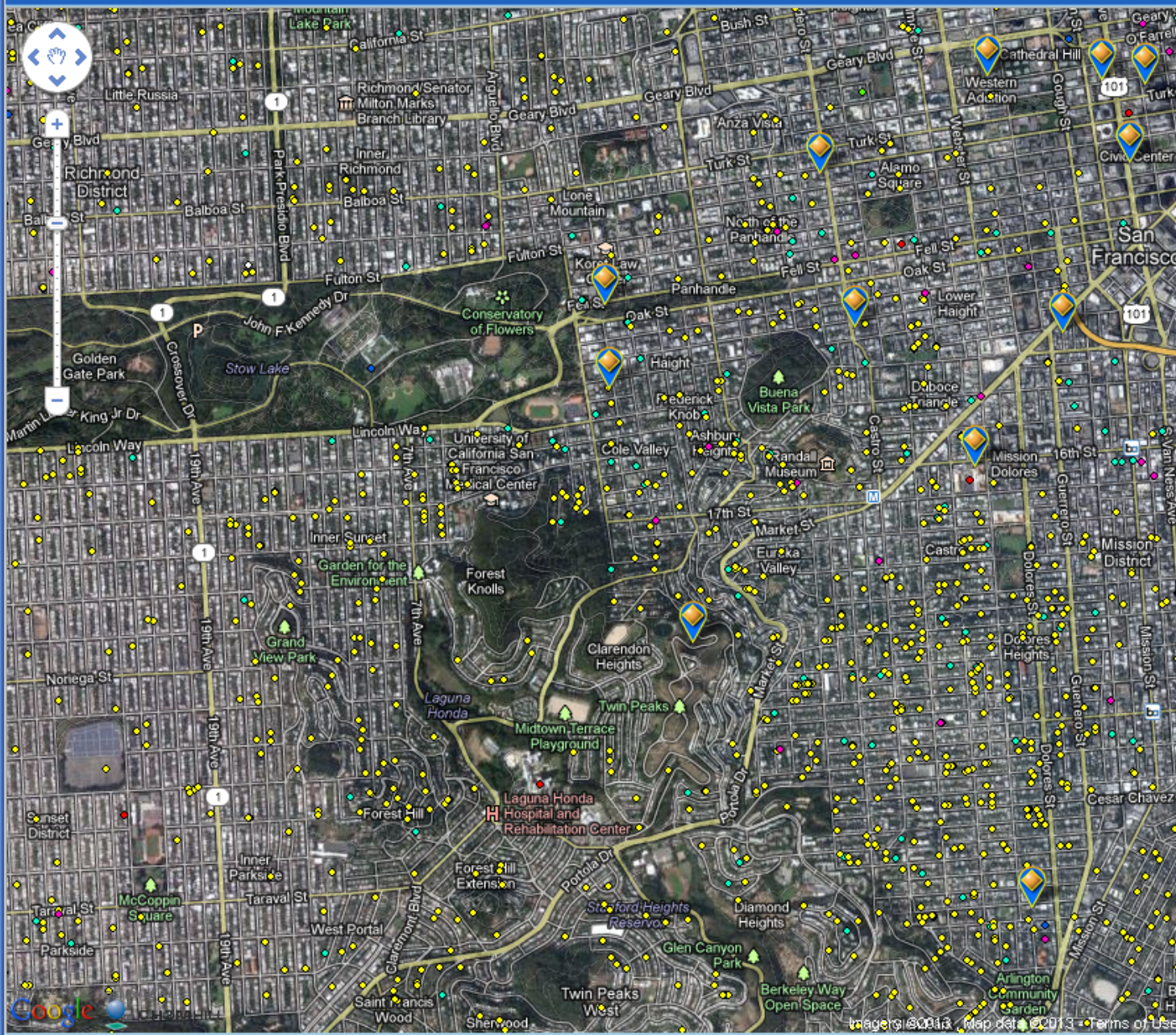
- Solar PV Consumer Guide
- Solar Rebates, Tax Credits & Other Incentives
- Find a solar PV installer
- Find a solar hot water installer
- SF Solar PV Permitting Process
- Solar PV for Multi-Tenant Buildings
- Residential Solar Water Heating Guide
- Commercial Solar Water Heating Guide
- Multifamily Solar Water Heating Guide

Additional Solar Resources

- Free Solar Classes
- Free Vote Solar Webinars

Energy Efficiency Resources

- Residential Energy Efficiency Upgrades
- Commercial & Multifamily Energy Efficiency Upgrades





Reset Map Back

Map | Satellite | Hybrid



11 Grove St**

My Solar Electric Potential

Roof Size:	4695 ft ² (Usable Roof: 3367 ft ²)
Estimated solar PV potential:	12 kW
Estimated electricity produced:	15514 kWh/yr ^a
Estimated electricity savings:	\$2898 per year ^a
Estimated carbon savings:	10096 lbs per year ^a

^a Assumes 4.6 average peak sun-hours per day

[Get Cost Estimates >>](#)

Solar Water Heating

This site may also be a good candidate for Solar Water Heating. Click here for our [Solar Water Heater calculator](#).

Links

[Find a solar installer](#)
More information about installing solar photovoltaic and solar water heating systems.

Disclaimer
Map locations are approximate
[Find out how we estimated your solar potential](#)

Welcome Legend

Markers

Solar Installations

 Municipal	 Residential
 Commercial	 Schools/libraries
 Non-profits	 Monitoring stations
 Environmental Justice Program	
 Case Study	 Solar Hot Water

Don't see your solar installation on map?

What Can Solar Do For You?

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(ex. 11 Grove Street or 11 Grove St)

[get my info](#)

SF Solar Resources

- Residential Solar Water Heating
- Commercial Solar Water Heating
- Multitenant Solar Water Heating
- Solar Rebates, Tax Credits & Incentives
- Solar PV Consumer Guide
- Clean Power Estimator
- Find a solar installer
- Solar for Multi-tenant Buildings
- SFE solar permitting process

SF Wind Map







Reset Map Back

Map | Satellite | Hybrid

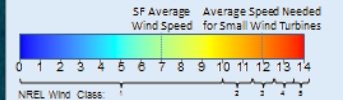
Welcome | Solar | Wind

Markers

Wind Installations

-  Municipal
-  Residential
-  Commercial
-  Anemometers
-  Wind Case Study
-  Wind Model Images
- Display Wind Resource Layer

Wind Resource (mph):



Zoom to your address

Enter your address

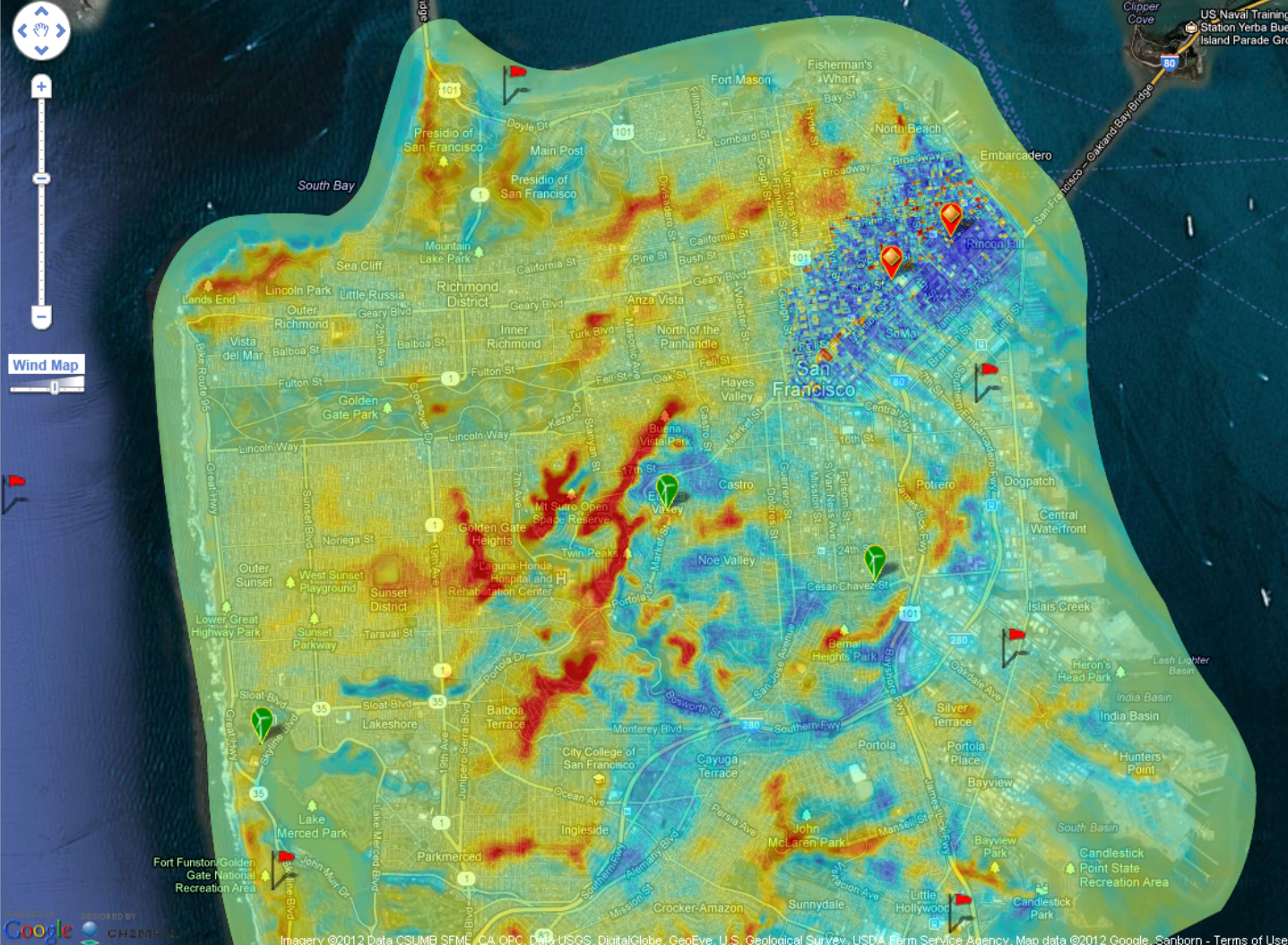
Go!

SF Wind Resources

- San Francisco Urban Wind Task Force Recommendations
- San Francisco Public Utilities Commission Wind Monitoring Stations
- Pacific Energy Center Tool Lending Library lends anemometers for free
- California's Emerging Renewables Program Rebates
- Small Wind Certification Council consumer guide
- Small Wind Certification Council turbine certification status
- US Department of Energy Small Wind FAQ
- American Wind Energy Association Small Wind FAQ
- 2010 American Wind Energy Association Small Wind Global Market Study
- Small Wind Considerations
- San Francisco Wind Map Overview

SF Wind News

- The temporary suspension of the Emerging Renewables Program is lifted beginning November 9, 2011
- SWCC Issues First Full Certification and Consumer Label
- SPUR: Expand small-scale wind generation
- Assessing the Value of Small Wind Turbines
- San Francisco to Boost Small Wind
- Urban Wind Turbine: A Rare Species Spotted



SF Wind Demonstration Projects

- National Park Service's Crissy Field Center
 - 5 VAWTs, Solar PV and EV Charging
 - Energy monitoring & public education
- America's Cup 2012-13
 - Demo opportunity for 500,000 visitors
 - Connect to wind power behind sailing



5 VAWTs totaling 6.8kW installed last month at NPS' Crissy Field Center



Randall Museum VAWT

- Randall Museum "Energy Garden"
 - Demonstration & public education opportunity
 - Currently hosts one VAWT and kinetic sculpture
 - Windy Corona Heights location
- SF Ports
 - Wind-powered off-grid lighting

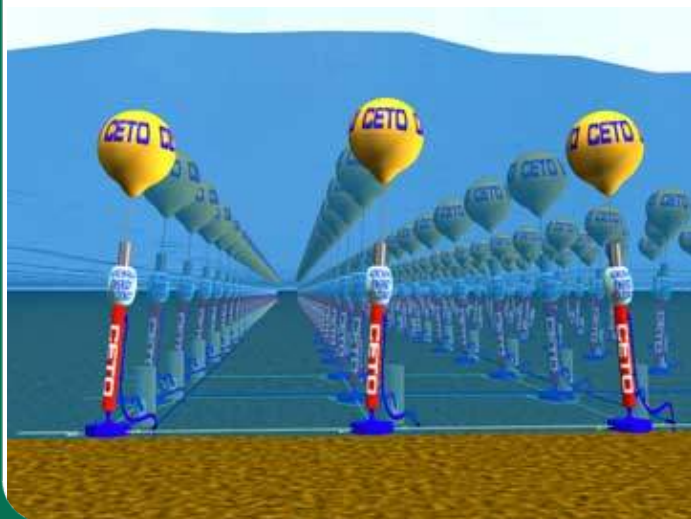


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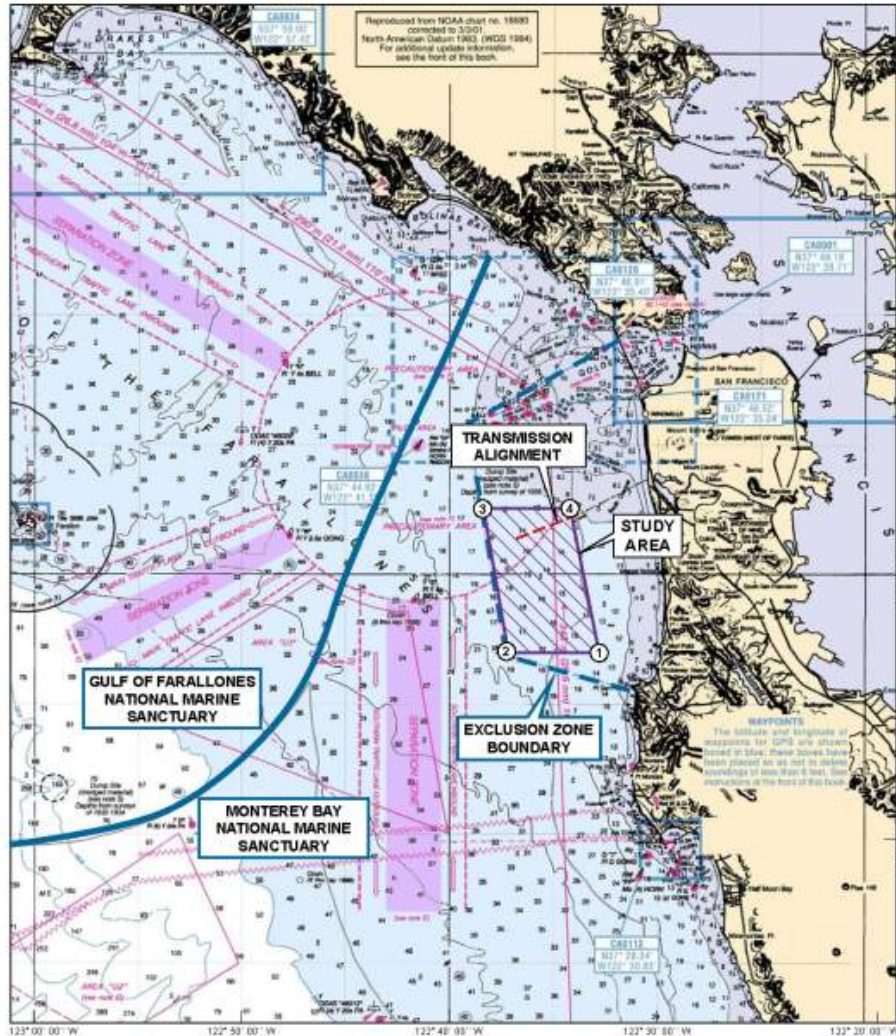
Wave Power



- Study area: Southwest Ocean Outfall
- Feasibility study completed fall 2009
- 30 MW wave farm could produce:
 - 100 gigawatt-hours (GWh) annually
 - cost in the range of 17 to 22 ¢/kWh
- Completed environmental studies
 - Gray whale & sediment transport



SF Oceanside Wave Energy Project Study Area



Source
NOAA, 2001, Chart Number 1210PG-02



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MOVING FORWARD...

Goal: 100% Renewable

-Meet all of San Francisco's electricity demand with renewable resources by 2020-



Renewable Energy Task Force

Comprised of local clean energy leaders, business and community stakeholders, representatives from environmental NGOs, labor, utilities, and relevant city departments



Dec 2010

Mayor Newsom announces 100% renewable goal

Jan 2011

Mayor Lee establishes Task Force

Feb 2011-May 2012

Monthly Task Force meetings

September 2012

Task Force report released

RE Task Force Scope

Task: Provide recommendations to help city achieve 100% renewable electricity supply within 10 years.

Barriers & Opportunities Addressed:

- Policy
- Regulatory
- Technical
- Financial
- Public Awareness



Outlined Recommendations Related to:

- Energy Efficiency
- Distributed / Local Generation
- Utility-Scale Generation

Strategies Identified to Meet 100% Renewable Goal

1

- Shrink the Pie: Increase Energy Efficiency

2

- Encourage Local Renewable Energy

3

- Break Down Barriers for Multi-Tenant Buildings & Occupants

4

- Expand Access to Local Renewable Energy

5

- Provide 100% Renewable Power Purchasing Options

6

- Encourage Private Sector Investment in Renewable Energy

Shrink the Pie

Reducing total electricity demand reduces the amount of renewable energy needed to meet 100% goal.

Actions

- Promote energy audits and retrofits through Energy Watch and Energy Upgrade CA
- Integrate green building & energy labeling into assessor-recorders database
- Tighten building code energy requirements (CalGreen)
- Strengthen retrofit on resale rules (RECO)



Encourage Local Renewable Energy

Local distributed electricity generation reduces transmission needs, improves local energy security, and keeps our energy dollars in the local economy.

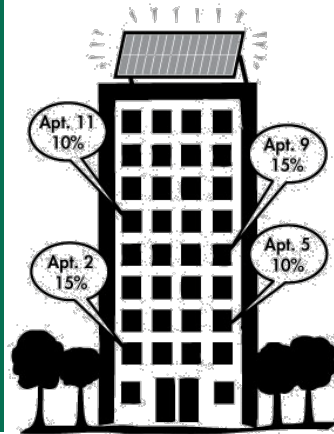
Actions

- Streamline solar permitting, move to e-permitting
- Provide stable funding for GoSolarSF incentive program
- Ensure net metering available
- Develop feed-in tariff for local renewables under CleanPowerSF
- Enable renewables on downtown distribution grid
- Address solar system shading



Break Down Barriers for Tenants & Expand Access to Local Renewables

With >60% households renting, it is critical to reduce disincentives for energy efficiency & renewable energy on multi-tenant properties.



Expanding access to off-site renewable energy helps democratize the renewable energy economy and increases local economic development.

Actions

- Expand understanding and use of Virtual Net Metering
- Support Community Renewable Energy legislation
- Enable energy efficiency and renewable energy pass-throughs under rent control rules
- Encourage green leases

Provide 100% Renewable Energy Purchasing Options

Renewable power purchasing options are necessary to supply power not generated locally & provide consumer choice.

i choose clean energy.



Actions

- Implement 100% renewable community choice aggregation program, CleanPowerSF
- Encourage robust utility green power purchasing programs
 - PG&E Green Option
- Expand deliveries of 100% renewable municipal power
 - Make SFPUC default power provider for city properties & tenants
 - Provide renewable SFPUC power for SF transit providers and new development areas

Encourage Private Sector Investment in Renewable Energy

Private sector investment is critical to ensuring that renewable energy projects are built to meet new demand.

Actions

- Expand & reduce cost of clean energy financing
 - Utilize low-interest bonds
 - Support crowd funding
 - Support project aggregation
 - Engage pension fund in clean energy investment
- Leverage CCA to spur renewable energy development
 - PPAs
 - Feed-in tariff
 - On-bill financing
- Provide cleantech demonstration opportunities



Thank you!

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SF's Proposed Climate Action Strategies

- 1 100% Renewable energy plan
- 2 Implementation of the existing commercial building benchmarking ordinance
- 3 Achieve zero waste sent to landfills by 2020
- 4 Develop and expand local electric vehicle market
- 5 Implement variable rate road pricing in downtown

1

- 6 Continue Energy Watch energy efficiency program for businesses and residences
- 7 Expand SFPark meter demand pricing program
- 8 Construct a protected cycletrack network
- 9 Energy efficiency designs for new developments
- 10 Convert taxi fleet to electric vehicles
- 11 Transit-oriented development in priority development areas
- 12 Improved public transit awareness through information integration

2

- 13 Transit passes for new developments
- 14 Convert street parking to a demand pricing program
- 15 Optimize transit system fleet, storage, maintenance
- 16 Continue parking cash out program
- 17 Increased distribution of employer transit passes
- 18 Renew RECO requirement for home sales
- 19 Require hotel visitor transit passes
- 20 New development car sharing and bicycle parking
- 21 Complete build out of SF's bicycle plan
- 22 Expand participation of SF's ridesharing 511 program
- 23 Expand region transit core capacity
- 24 Develop pedestrian amenities, complete green streets and slow zones
- 25 Convert service delivery vehicles to electric vehicles
- 26 Distribute transit passes to students and staff
- 27 Coordinate transit shuttles
- 28 Expand SFGO signal synchronization
- 29 Additional capacity for existing express transit corridors
- 30 Expand bicycle sharing, parking, and electric bicycle capacity
- 31 Neighborhood travel choice programs

3



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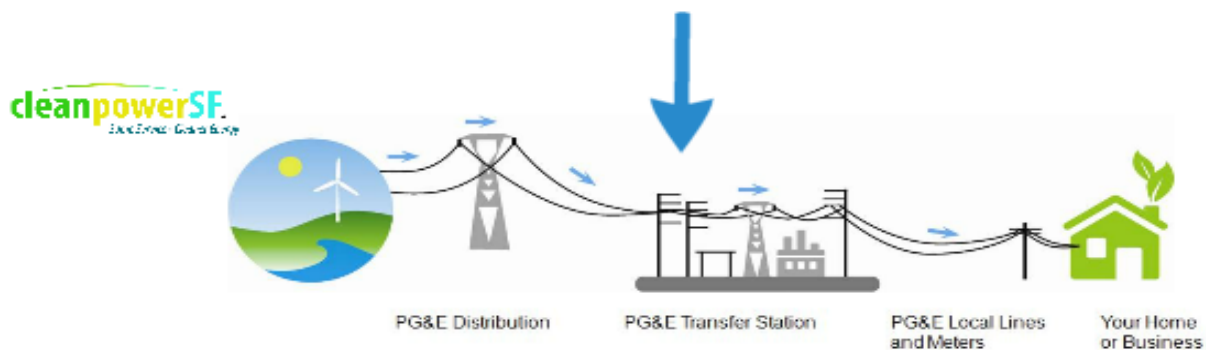
Community Choice Aggregation: CleanPowerSF

- AB 117 (2002) permits any city or county to aggregate the electric loads of residents, businesses and municipal facilities to facilitate the purchase and sale of electrical energy
- February 2004: CCSF Ordinance 086-04 established a San Francisco Community Choice Aggregation (CCA) program
- Goal: ensure "the provision of clean, reasonably priced and reliable electricity" under local control
- CCA is responsible for providing the energy commodity; may own electricity generation
- CCA does not own the transmission and delivery systems – PG&E maintains T&D for SF



CleanPowerSF will use PG&E's existing electricity lines

Currently



To provide all San Franciscans access to cleaner, more renewable energy automatically

San Francisco's Clean Energy Efforts & Accomplishments

- Closed Fossil Fuel Power Plants
 - Potrero and Hunter's Point
- Reducing Energy Demand
 - Green Building Ordinance: LEED Gold + required
 - Existing Commercial Buildings Energy Performance Ordinance
 - Residential Energy Conservation Ordinance
 - SF Energy Watch audits and incentives
- Developing Local Renewables
 - 10 MW Municipal Solar PV & Biogas
 - 16 MW Solar PV on private buildings
 - Streamlined solar permitting
 - GoSolar SF incentive program
- Providing 100% Renewable Power
 - Municipal power: 100% hydro, solar, biomass, RPS
 - CleanPowerSF: 100% renewable power for residents and businesses
- Addressing Financing
 - PACE financing: GreenFinanceSF
 - Green Tenant Toolkit
 - Aggregated purchasing & financing: Solar@Work, SF SunShares
- Education & Outreach
 - SF Energy Map (www.sfenergymap.org)
 - Solar Water Heating & PV public outreach
 - Free solar site assessments

