Planning for County-Wide Renewable Energy Development in San Luis Obispo (A CEC PIER -Funded RESCO Grant)

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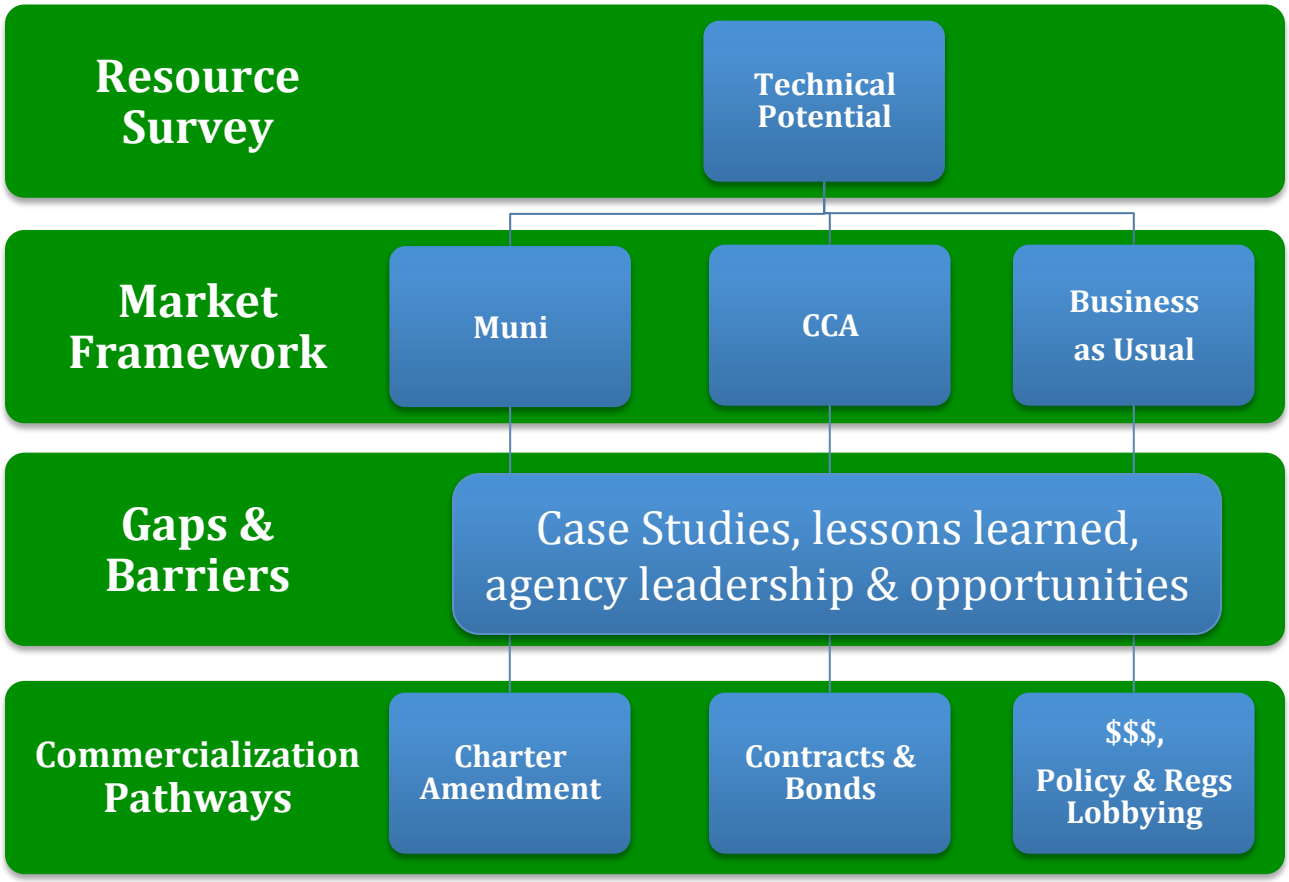
Local Power Inc.

29 February 2012

SLO RESCO Overview



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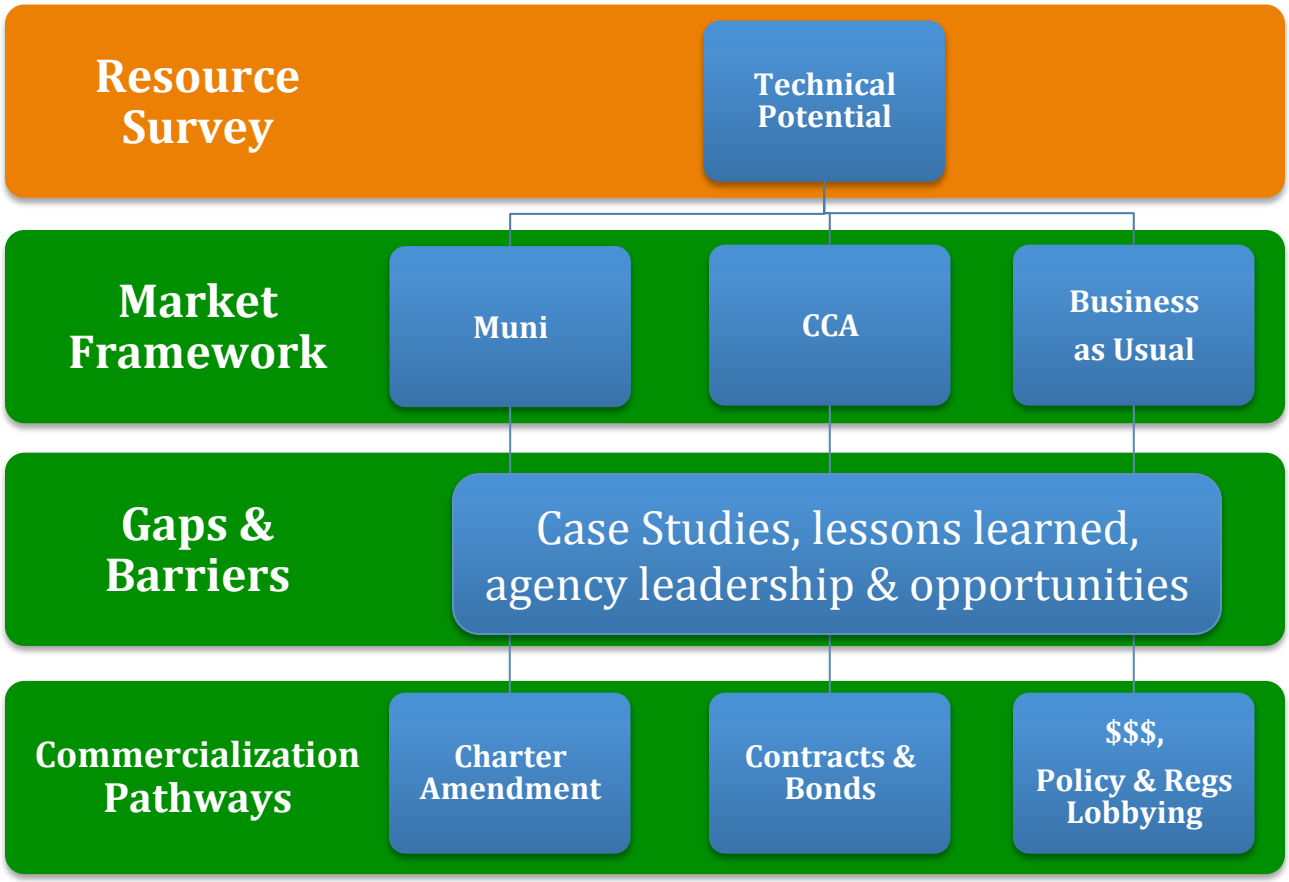

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Resource Potential Tool

Resource Identification Tool: Commercial & Low Power Wind

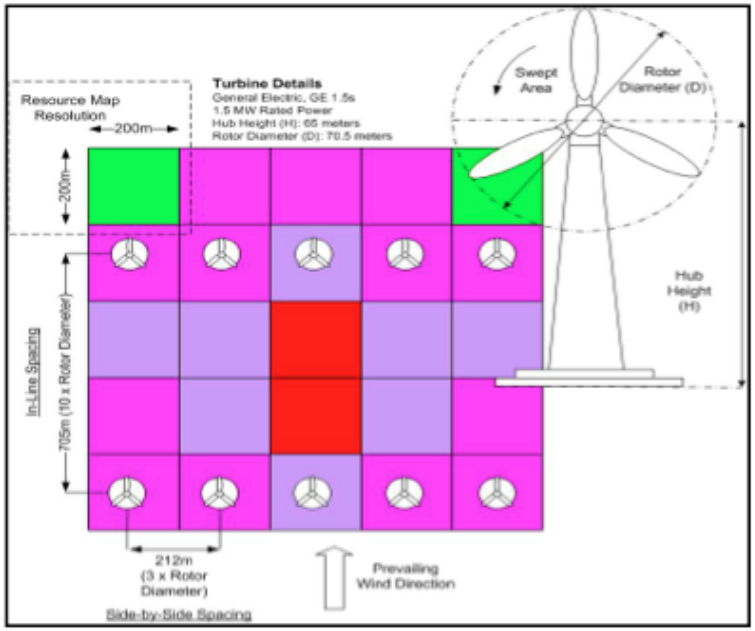
START			
Resource Map	Name	CEC Wind 70m Resource Map 2006	
	Resolution	200	Meters
	Elevation	70	Meters

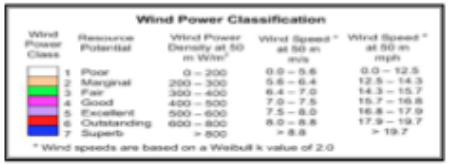
		Wind Class	# of Blocks	Square Kilometers
Resource Area by Wind Class	LOW	3 Fair	1488	59.52
	COMMERCIAL	4 Good	429	17.16
		5 Excellent	102	4.08
		6 Outstanding	10	0.40
		7 Superb	0	0.00
		Total Commercial (Class 4 thru 7)	541	21.64

	Constraint	Commercial Wind Percent Area Constrained	Low Wind Percent Area Constrained
Developmental Constraints	Environmental	60%	60%
	Visual	30%	30%
	Transmission Access	30%	30%
	Road Access	30%	30%
	Availability Factor	13.7%	13.7%

	Select Turbine Size		
Technology	1.5 MW		
	Rated Power Capacity	1.5	MW
	Rotor Diameter	71	Meters
	Nominal Wind Speed	11.5	Meters per Second

	Packing Factor		
Spacing	In-line	10	x Rotor Diameter (D)
	Side-by-side	3	x Rotor Diameter (D)
	Spacing Distance		
	In-line (Wind Shadow)	705	Meters
	Side-by-side	212	Meters
	Required Area per Turbine	0.15	Square Kilometers





Wind Power Classification

Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m²	Wind Speed * at 50 m m/s	Wind Speed * at 50 m mph
1	Poor	0 – 200	0.0 – 5.6	0.0 – 12.5
2	Marginal	200 – 300	5.6 – 6.4	12.5 – 14.3
3	Fair	300 – 400	6.4 – 7.0	14.3 – 15.7
4	Good	400 – 500	7.0 – 7.5	15.7 – 16.8
5	Excellent	500 – 600	7.5 – 8.0	16.8 – 17.9
6	Outstanding	600 – 800	8.0 – 8.8	17.9 – 19.7
7	Superb	> 800	> 8.8	> 19.7

* Wind speeds are based on a Weibull k value of 2.0

		Wind Class	Available Area (km^2)	Capacity Factor	# Turbines	Power (MW)	Energy (MWh)	
Resource Potential	LOW	3 Fair	8.17	15%	55	82	107,000	LOW
	COMMERCIAL	4 Good	2.35	22%	16	24	45,645	COMMERCIAL
		5 Excellent	0.56	29%	4	6	14,306	
		6 Outstanding	0.05	33%	0	1	1,596	
		7 Superb	0.00	38%	0	0	0	
		Total Commercial (Class 4 thru 7 only)			20	30	61,000	

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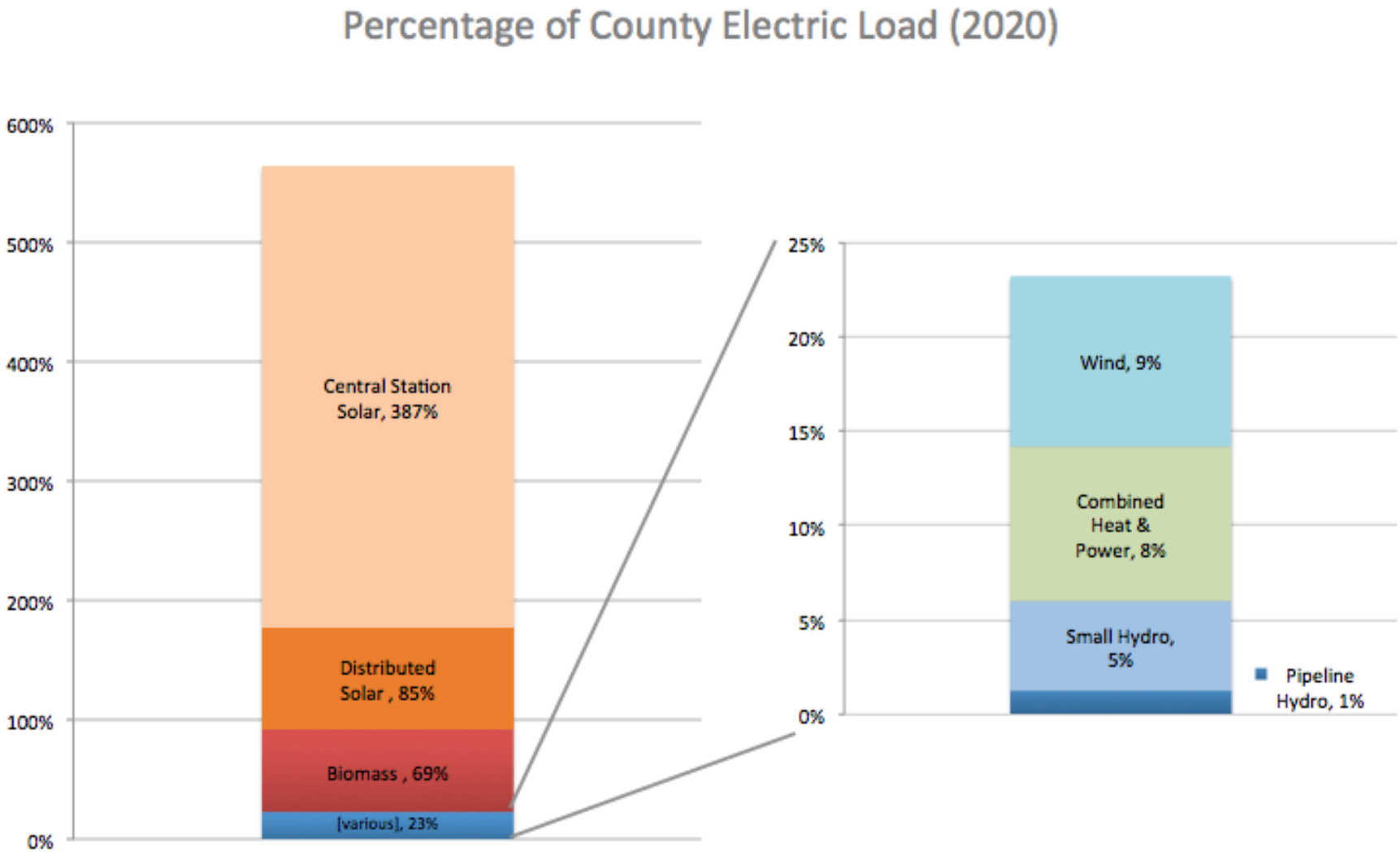
Resource Potential: Electric



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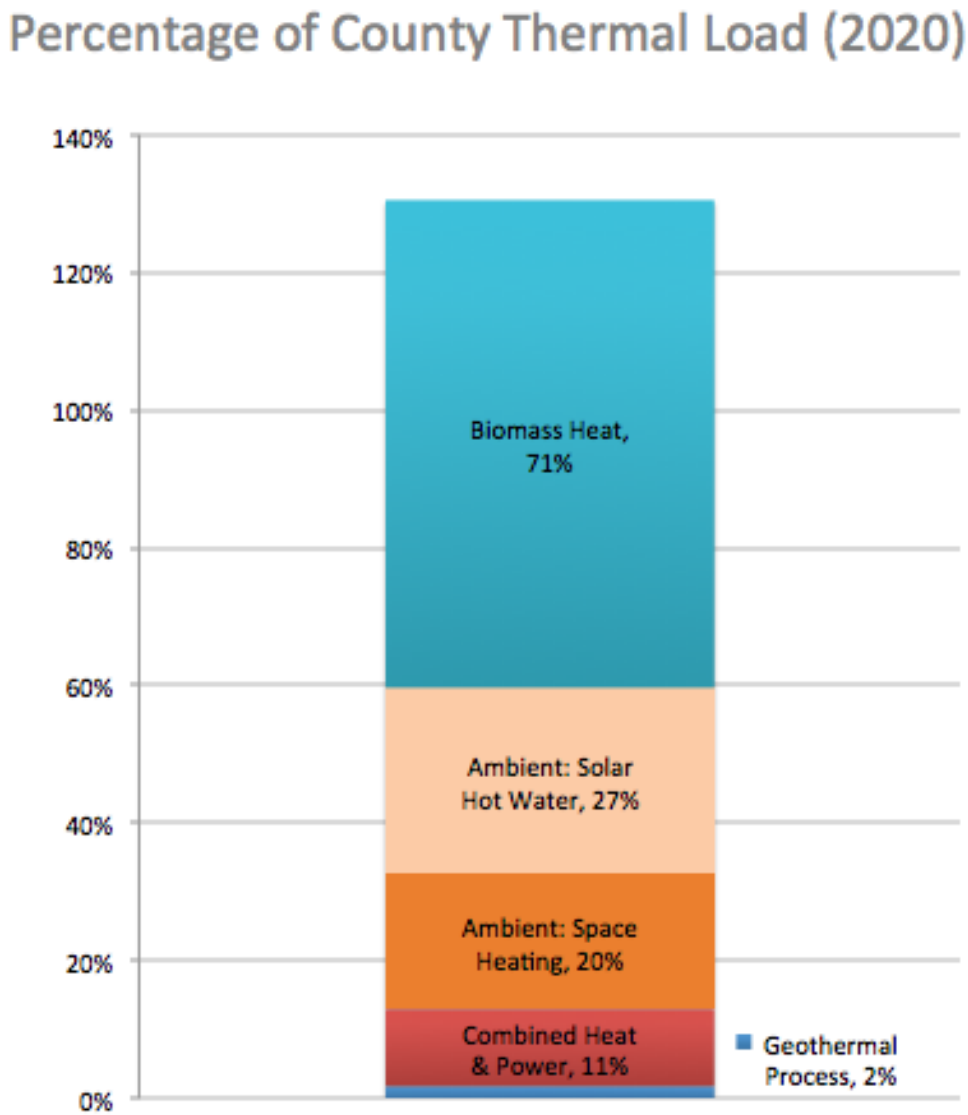
Resource Potential: Thermal



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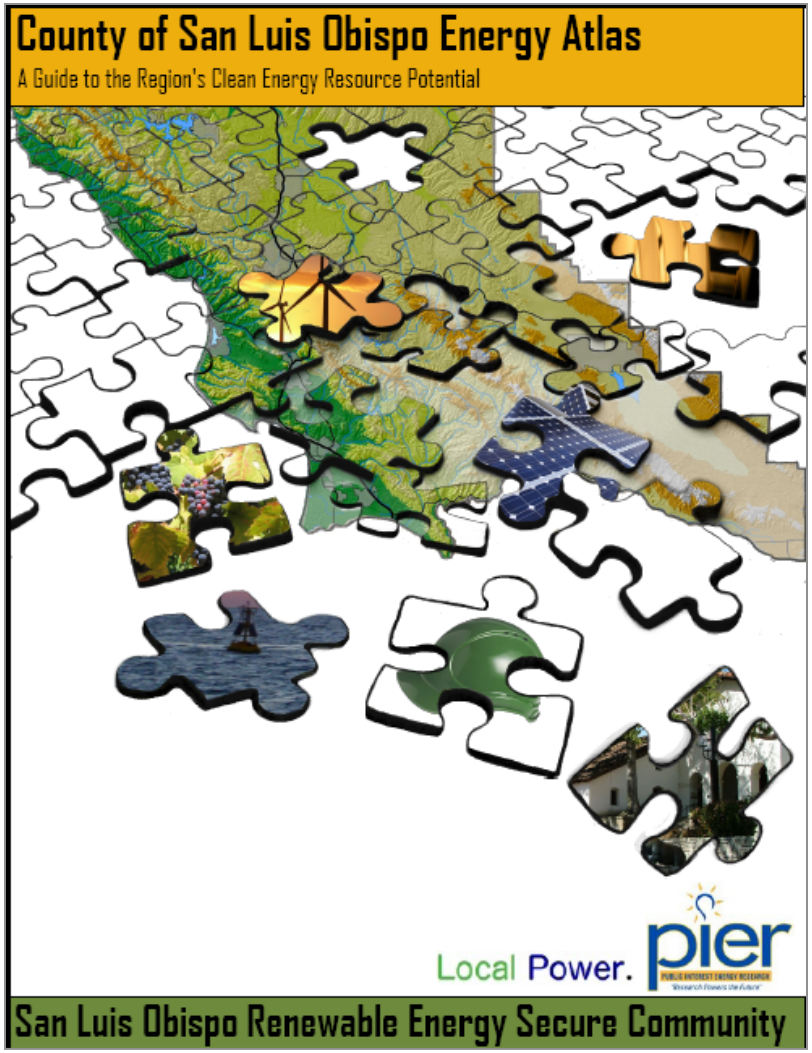
Outreach & Education:

The Energy Atlas

- Collaborative Process
  - Guidance from 16 members of Professional Advisory Committee
- Primarily a resource survey
- Designed for a wide audience
- Directs readers to larger study (acts as a 'hook')
- Distributed through:
  - Print on demand
  - Electronic copies
  - Social media, word of mouth
  - iPad viewer under consideration



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SLO Energy Atlas

Wind-[Commercial]

Power Potential	30 MW
Capacity Factor	28%
Annual Generation	73,584 MWh

Resource Defined:

Commercial scale wind power uses large wind turbines mounted on high towers, generally capable of producing 1.5 megawatts or more from each turbine. These turbines are the most efficient and cost effective way to use wind power, but have significant visual profiles. Large scale commercial wind farms have dozens to hundreds of turbines, but most good wind sites—such as in SLO County— are only large enough for a small number of turbines.

Conventional thinking of wind power in the US is most often characterized as large sprawling wind farms. In San Luis Obispo County, commercial wind developments would more likely appear as individual or small clusters of wind turbines in the vicinity of suburban or rural communities or near the ridgelines of the mountain ranges. Commercial wind projects of this sort are considered to be distributed renewable energy. Compared to smaller wind turbines, these projects require additional consideration of zoning, environmental impacts, finance, and other factors.

The map to the right shows specific areas with sufficient wind resource potential for wind development. The wind zones organize the resource based on their general location and character. Based upon analysis of California Energy Commission wind data for areas with Class 3 wind and above, San Luis Obispo County has a resource potential of approximately 150MW, assuming the use of standard 1.5MW turbines. After considering developmental constraints, it is likely that the actual developable commercial land-based wind resource potential of less than 30MW.

There are certain issues that create varying levels of restriction on the possible development of the county's wind resource. The major considerations include environmentally protected lands, road access to the site, access to the grid, and visibility. A majority of the wind resource present in the south east portion of the county is within the federally protected lands of the Los Padres National Forest and Wilderness areas. These areas have wind resource and potential grid access, but are in environmentally sensitive areas that are often not accessible by road.

There are several promising areas with wind resource and the right combination of developmental factors. The wind zone near Diablo Canyon has existing roads, easy access to the grid, and low visibility. Wind zones along the ridgeline of the Santa Lucia range, especially near Hearst Castle and West Cuesta Ridge have potential road and grid access. Additionally, there are several promising areas near Cal Poly and to the southeast of the City of San Luis Obispo that may be ideal for wind power.

PRELIMINARY DRAFT

Renewable Energy

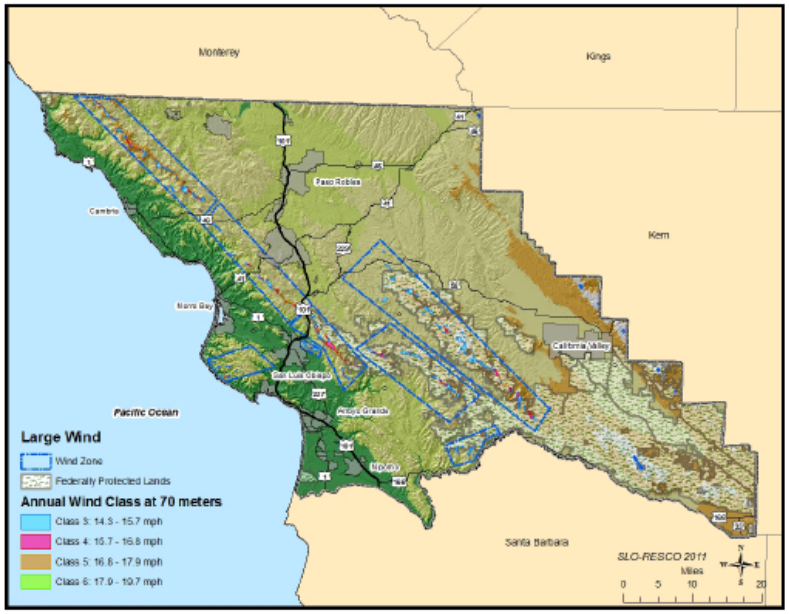

Figure X: Large Wind Resource Potential Map

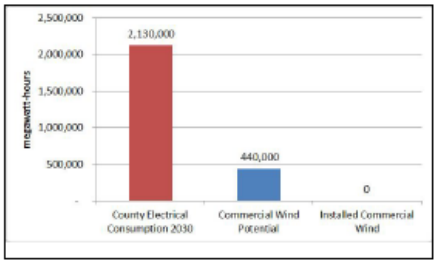

Figure X: Annual Commercial Wind Generation Potential

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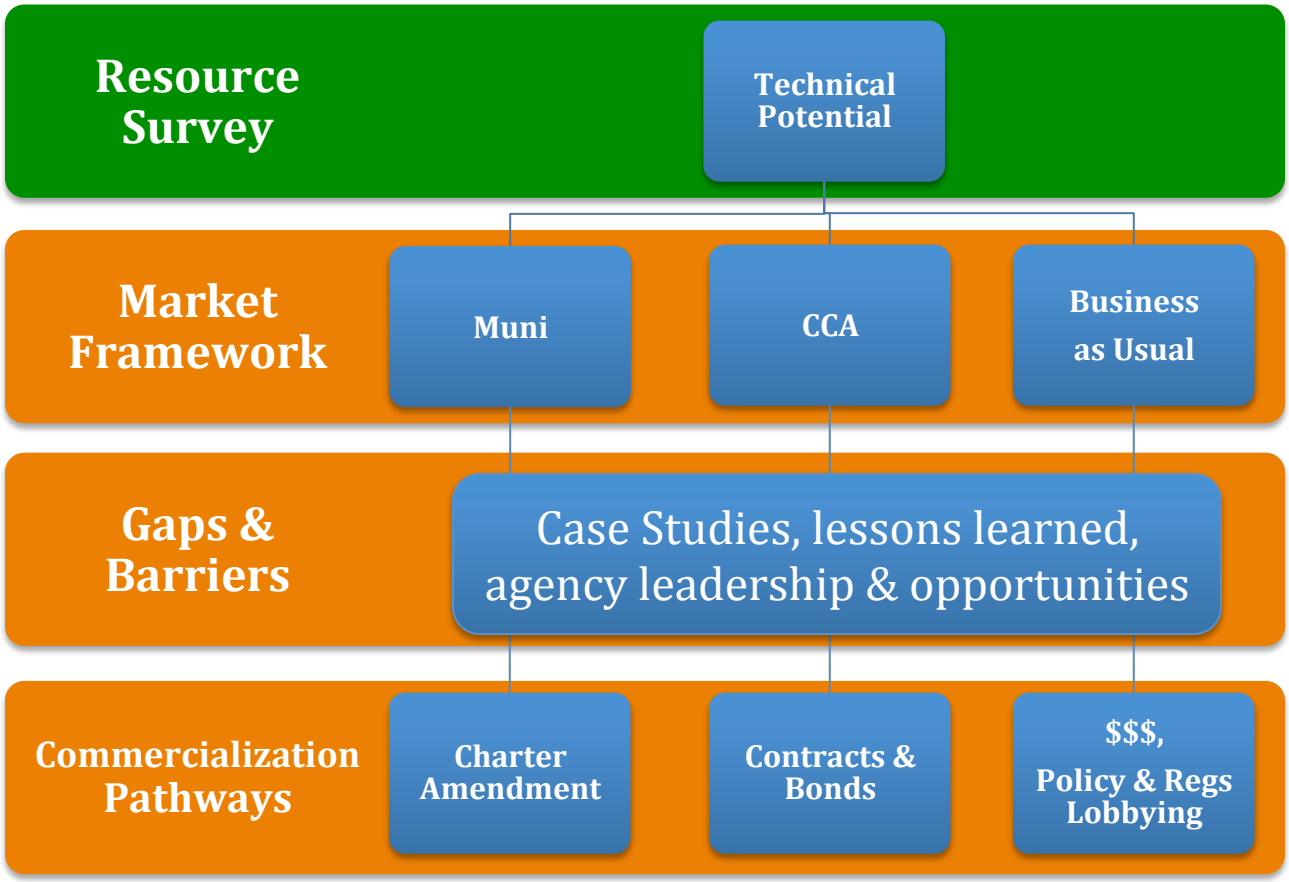

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SLO's Energy Future

- Development pathways unique for different policy scenarios (Muni, CCA, BAU)
- Gaps & Barriers factored into analyses
  - Case Studies
  - Site-specific interviews
    - Agencies
    - Public sector deployment opportunities
    - Private sector market analysis

RESCO Informs County Planning

- Outreach and Education is strong:
  - RESCO staff advised County on EnergyWise Plan (formerly Climate Action Plan)
  - County staff waiting for RESCO report to inform planning process:

"The Department has determined that CCA and other measures such as small and large scale renewable power will rely on the as yet unpublished RESCO report. That report should be available in 2012."

James Caruso
San Luis Obispo County
Department of Planning and Building
Senior Planner

Site-Specific Investigations

- Case Studies & Lessons Learned:

Categories of Lessons-Learned:	Policy	Finance	Technology	Markets	Environment
Geothermal Heat Pump, City of SLO	x	x	x	x	
CHP Microturbines, City of SLO WWTP	x	x	x	x	
Solar PPAs, Cal Poly and Atascadero Unified School District	x	x		x	
Green Corridor, Arroyo Grande	x	x		x	
Clean Energy Workforce Training Program, Cuesta College	x			x	
Solar Parking Lot, Los Osos		x			x

Site-Specific Investigations

- Ongoing Research:
  - Los Osos community service district: WWTP plasma gasification
  - SLO Public Works Dept.: Nacimiento pipeline (four potential pipeline hydro generator sites)
  - Chicago Grade Landfill: have looked at plasma gasification plant in the past
  - Cold Canyon Landfill: Integrated Waste Management Authority is looking at a digester for food waste
  - Central Coast Water Authority JPA - responsible for the state water project that goes through the county - identified a site for pipeline hydro generator
  - A network of water conveyance systems - there are a series of studies on potential storage for reservoirs (including a small reservoir on the National Guard base that is connected to pipelines but under used)
  - CSD's 7 waste water treatment plants: note SLO City WWTP is working with PG&E on retrofits for generation
  - County Operations Center (emergency response, jails): large and expanding loads for DSM opportunities.

Recommendations for Further Funding

"Proposals which receive the consent and support of an electricity investor-owned utility (IOU) will receive a scoring preference"

-PIER Staff Workshop, 10 Jan 2012

- New solicitation should also provide:
  - Opportunities to municipalities or CCAs
  - Preference to existing RESCO projects that are ready to jump into the next phase

Thank You

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