



RETI Phase 2 Update Workgroup

Preliminary Draft Final Results Review

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March 11, 2010

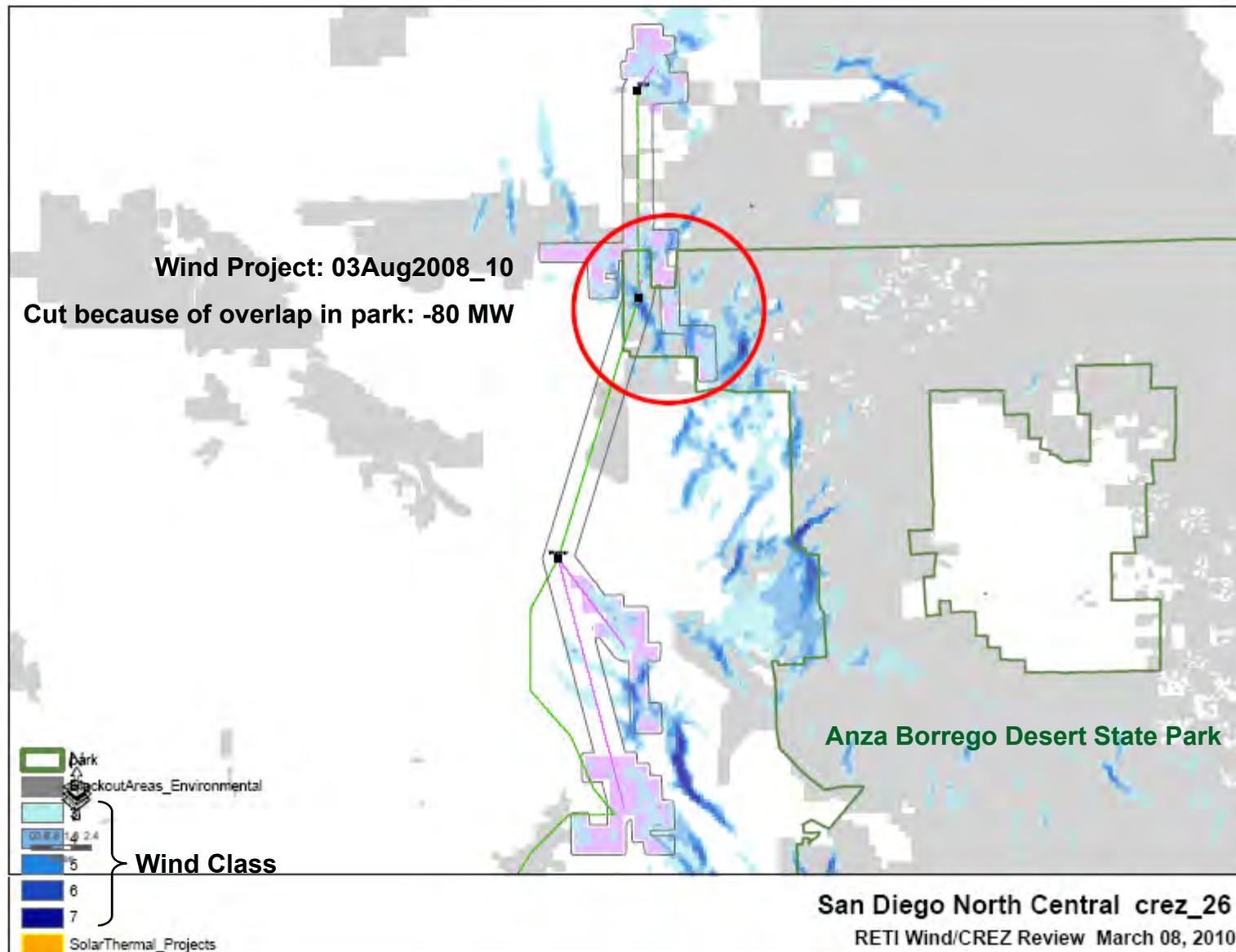
Agenda

- Additional Minor Changes
- Review of Reference Case Results
- Sensitivity and Uncertainty Analysis
- Report and associated data

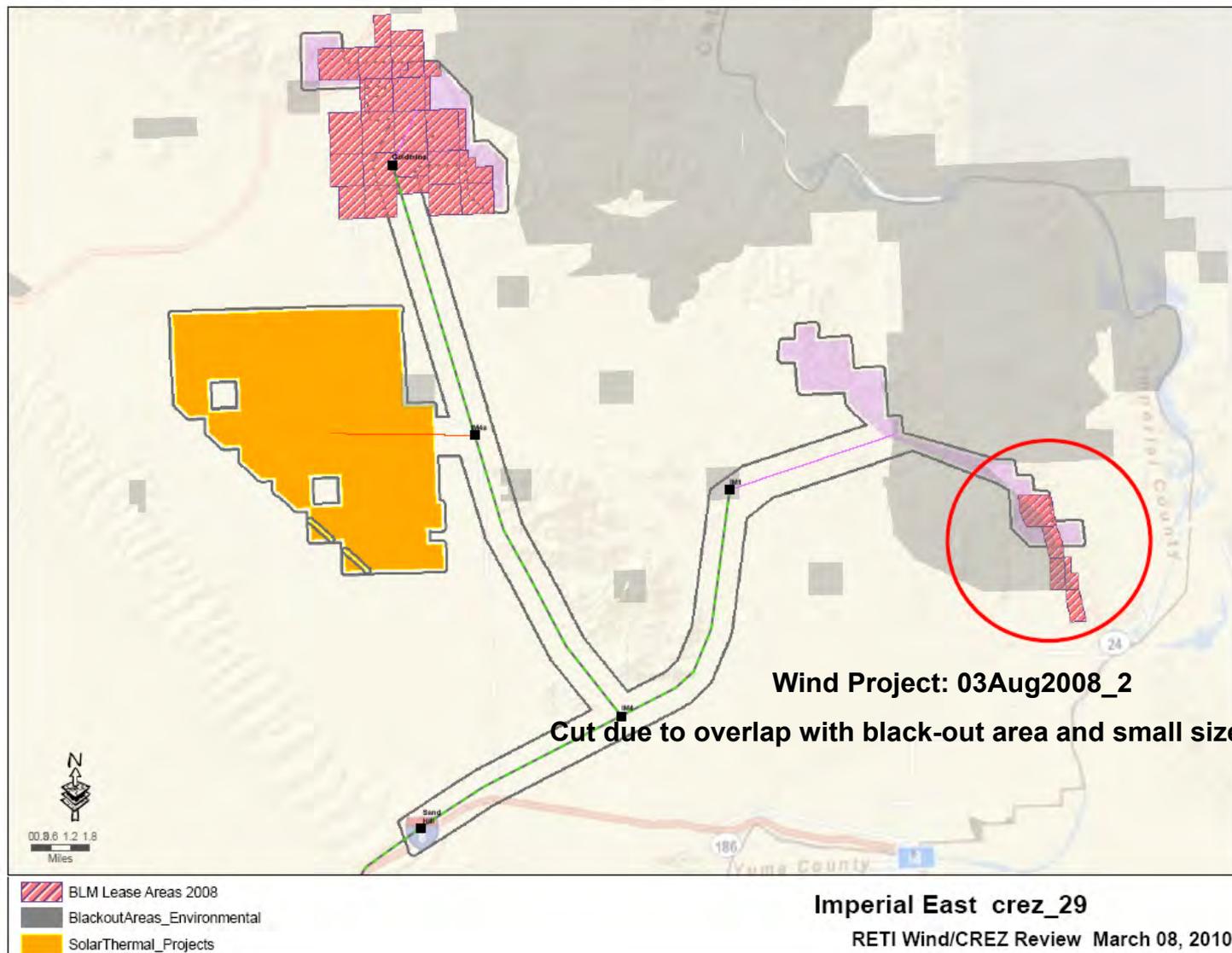


Minor Updates

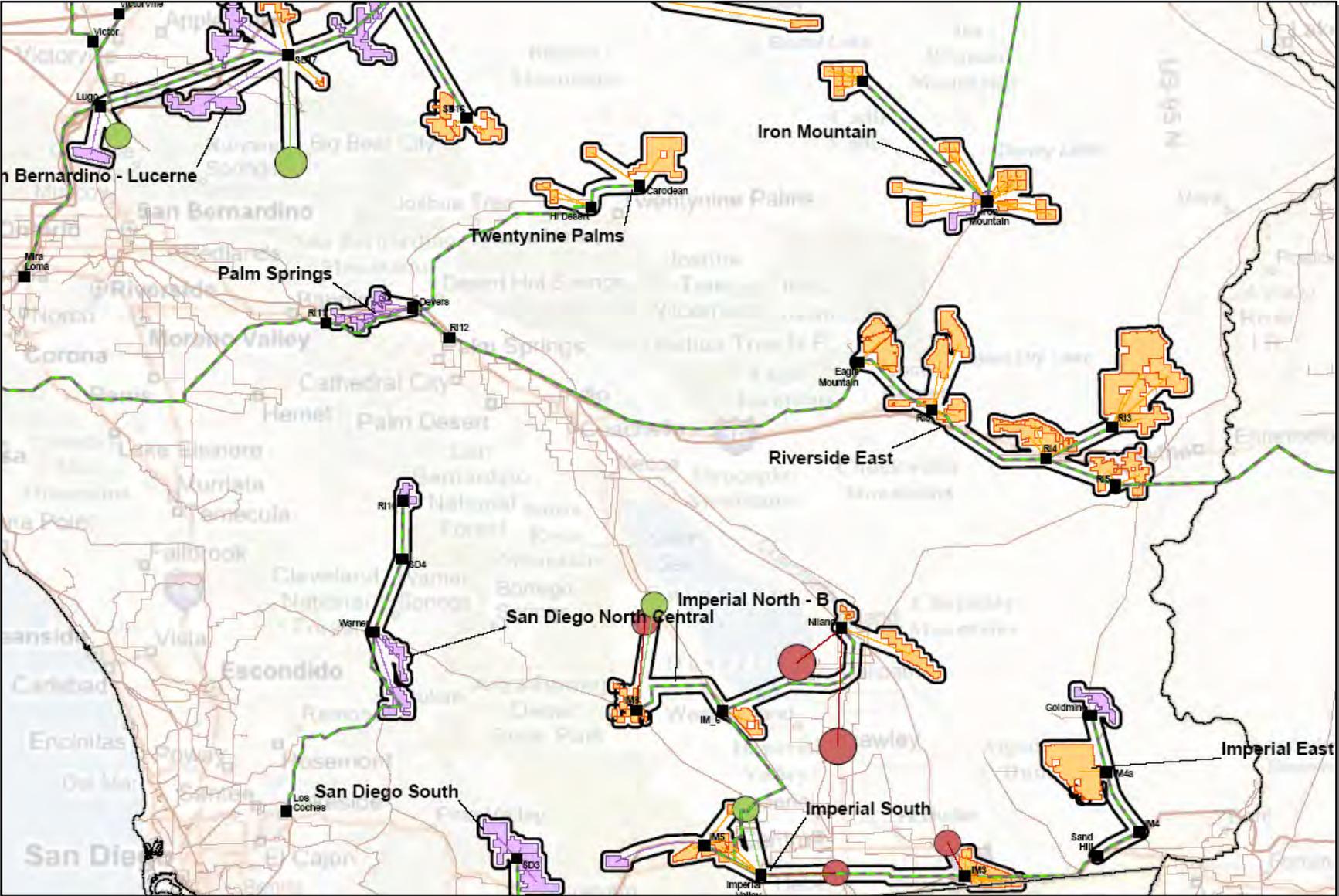
San Diego North Central



Imperial East



New CREZ Map



Capacity Changes Relative to Phase 2A (July 20, 2009)

	Capacity (MW)				Capacity Total	Notes
	Biomass	Geothermal	Solar	Wind		
Barstow	-	-	-	-	-	No changes
Carrizo North	-	-	-	-	-	No changes
Carrizo South	-	-	(877)	-	(877)	Revised solar to 1B values, which were correct.
Cuyama	-	-	(400)	-	(400)	Revised solar to 1B values, which were correct.
Fairmont	-	-	(200)	(668)	(868)	Cut wind projects due to CREZ refinement. Solar project due th CA DPA
Imperial East	-	-	-	(49)	(49)	Dropped one wind project due to overlap with black-out area
Imperial North-A	-	-	-	-	-	No changes
Imperial North-B	-	-	-	-	-	No changes
Imperial South	-	-	-	-	-	No changes
Inyokern	-	-	-	-	-	No changes
Iron Mountain	-	-	(50)	-	(50)	Small discrepancy due to Trilobite capacity assumption (moved in Phase 2A)
Kramer	-	-	-	-	-	No changes
Lassen North	-	-	-	-	-	No changes
Lassen South	-	-	-	-	-	No changes
Mountain Pass	-	-	-	(700)	(700)	Cut wind projects due the CA DPA
Needles	-	-	(200)	(261)	(461)	Cut wind projects due the CA DPA; eliminated CREZ as below 250 MW.
Owens Valley	-	-	3,600	-	3,600	Added 3600 MW of solar
Palm Springs	-	-	-	(437)	(437)	Cut wind projects due to CREZ refinement.
Pisgah-A	-	-	(350)	-	(350)	Cut half of Trilobite project due the CA DPA
Riverside East	-	-	-	-	-	No changes
Round Mountain-A	-	-	-	-	-	No changes
Round Mountain-B	(55)	-	-	(0)	(55)	Biomass project dropped since resource already in use in Shasta County
San Bernardino - Baker	-	-	(320)	-	(320)	Cut solar projects due to CA DPA
San Bernardino - Lucern	-	-	(800)	-	(800)	Cut solar projects due to CA DPA
San Diego North Central	-	-	-	(80)	(80)	Dropped one wind project due to overlap with black-out area
San Diego South	-	-	-	-	-	No changes
Santa Barbara	-	-	-	-	-	No changes
Solano	-	-	-	-	-	No changes
Tehachapi	-	-	-	(412)	(412)	Cut wind projects due to CREZ refinement.
Twentynine Palms	-	-	-	-	-	No changes
Victorville	-	-	-	-	-	No changes
Westlands	-	-	5,000	-	5,000	Added 5000 MW of solar
Total	(55)	-	5,403	(2,608)	3,202	

Final Proposed California CREZ Capacity – Solar Thermal

CREZ_NAME	Sum of Capacity, MW				Total Sum of Capacity, MW
	Biomass	Geothermal	Solar Thermal	Wind	
Barstow			1,400	936	2,336
Carrizo North			1,600		1,600
Carrizo South			3,000		3,000
Cuyama			400		400
Fairmont	138		1,800	712	2,650
Imperial East			1,500	74	1,574
Imperial North-A		1,370			1,370
Imperial North-B	30		1,800		1,830
Imperial South	36	64	3,570	45	3,715
Inyokern			2,145	287	2,432
Iron Mountain			4,800	62	4,862
Kramer		24	6,185	203	6,412
Lassen North				1,467	1,467
Lassen South				410	410
Mountain Pass			780	178	958
Owens Valley			5,000		5,000
Palm Springs				333	333
Pisgah			2,200		2,200
Riverside East			10,550		10,550
Round Mountain-A		384			384
Round Mountain-B				132	132
San Bernardino - Baker			3,350		3,350
San Bernardino - Lucerne	91		1,540	599	2,230
San Diego North Central				200	200
San Diego South				678	678
Santa Barbara				433	433
Solano				894	894
Tehachapi	37		7,195	3,193	10,425
Twentynine Palms			1,805		1,805
Victorville			1,200	436	1,636
Westlands			5,000		5,000
Grand Total	332	1,842	66,820	11,273	80,267

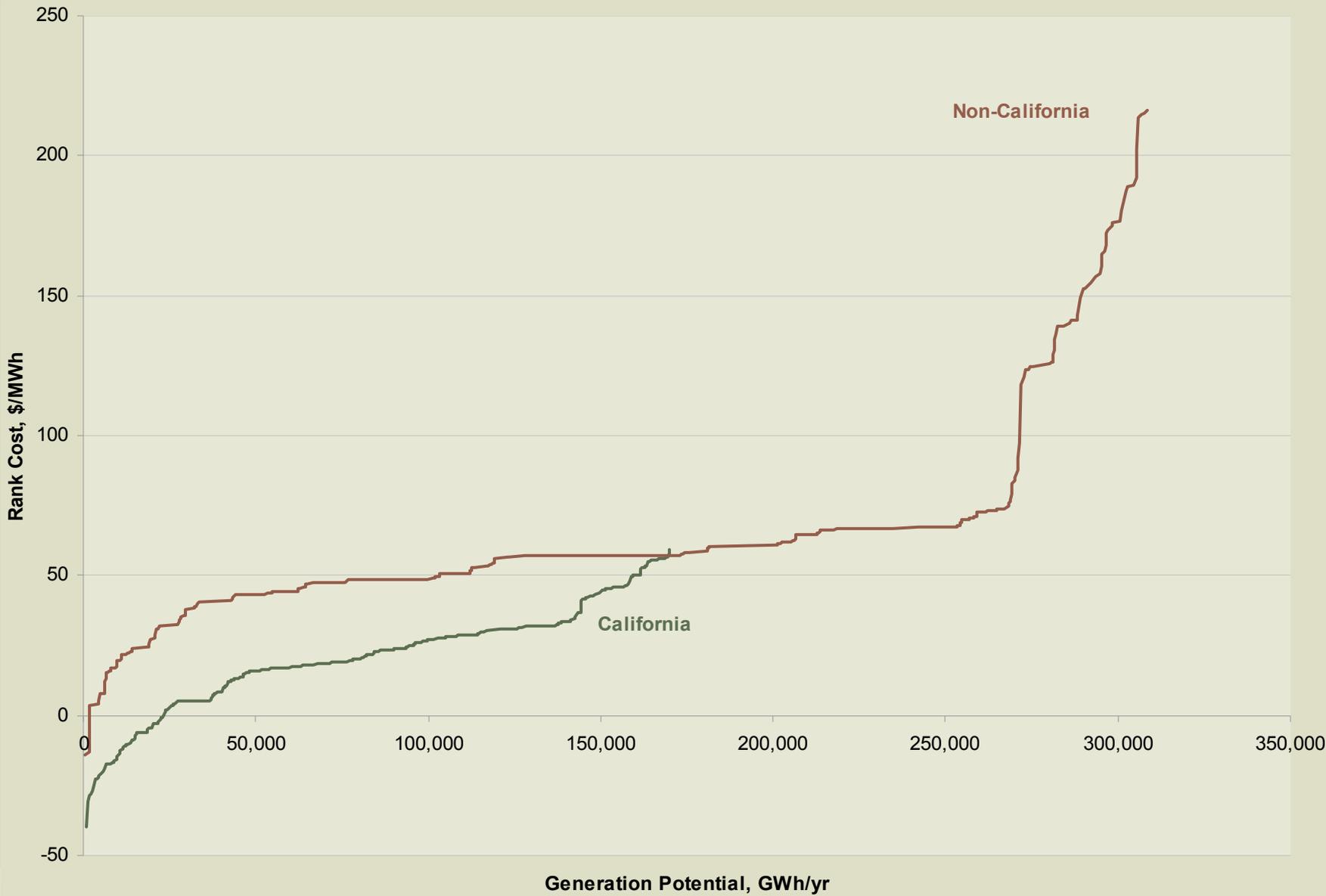
Final Proposed California CREZ Capacity – Solar PV

CREZ_NAME	Sum of Capacity, MW				Total Sum of Capacity, MW
	Biomass	Geothermal	Solar PV-TF	Wind	
Barstow			1,050	936	1,986
Carrizo North			1,200		1,200
Carrizo South			2,250		2,250
Cuyama			300		300
Fairmont	138		1,350	712	2,200
Imperial East			1,125	74	1,199
Imperial North-A		1,370			1,370
Imperial North-B	30		1,350		1,380
Imperial South	36	64	2,678	45	2,823
Inyokern			1,609	287	1,896
Iron Mountain			3,600	62	3,662
Kramer		24	4,639	203	4,866
Lassen North				1,467	1,467
Lassen South				410	410
Mountain Pass			585	178	763
Owens Valley			3,750		3,750
Palm Springs				333	333
Pisgah			1,650		1,650
Riverside East			7,913		7,913
Round Mountain-A		384			384
Round Mountain-B				132	132
San Bernardino - Baker			2,513		2,513
San Bernardino - Lucerne	91		1,155	599	1,845
San Diego North Central				200	200
San Diego South				678	678
Santa Barbara				433	433
Solano				894	894
Tehachapi	37		5,396	3,193	8,626
Twentynine Palms			1,354		1,354
Victorville			900	436	1,336
Westlands			3,750		3,750
Grand Total	332	1,842	50,115	11,273	63,562



Reference Case Results

In-state versus Out-of-state



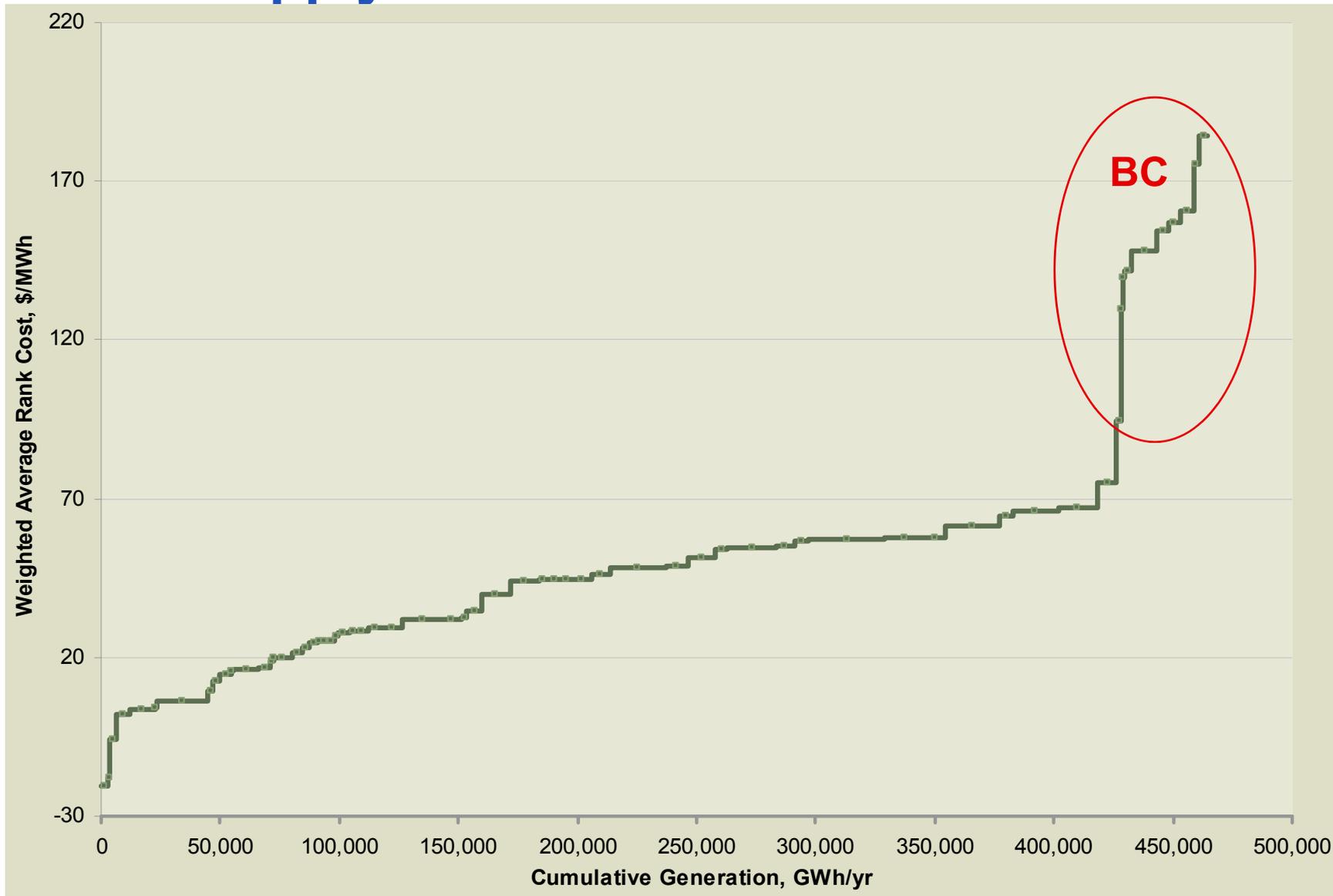
Ranked California CREZs (by Rank Cost, \$/MWh)

CREZ	2A Update	
Solano	-21	
Palm Springs	-18	
Round Mountain-A	-6	
Fairmont	2	
Imperial North-A	4	
Santa Barbara	4	
Tehachapi	6	
San Diego South	9	
Victorville	13	
Barstow	15	
San Diego North Central	16	< was 14
Kramer	16	
San Bernardino - Lucerne	17	
Lassen South	19	
Round Mountain-B	20	
Inyokern	22	
Twentynine Palms	23	
Pisgah	25	
Cuyama	25	
Lassen North	25	
Mountain Pass	27	
Carrizo South	28	
Carrizo North	28	
San Bernardino - Baker	28	
Riverside East	32	
Westlands	32	
Imperial East	32	< was 32
Imperial North-B	44	
Imperial South	45	
Owens Valley	46	
Iron Mountain	55	

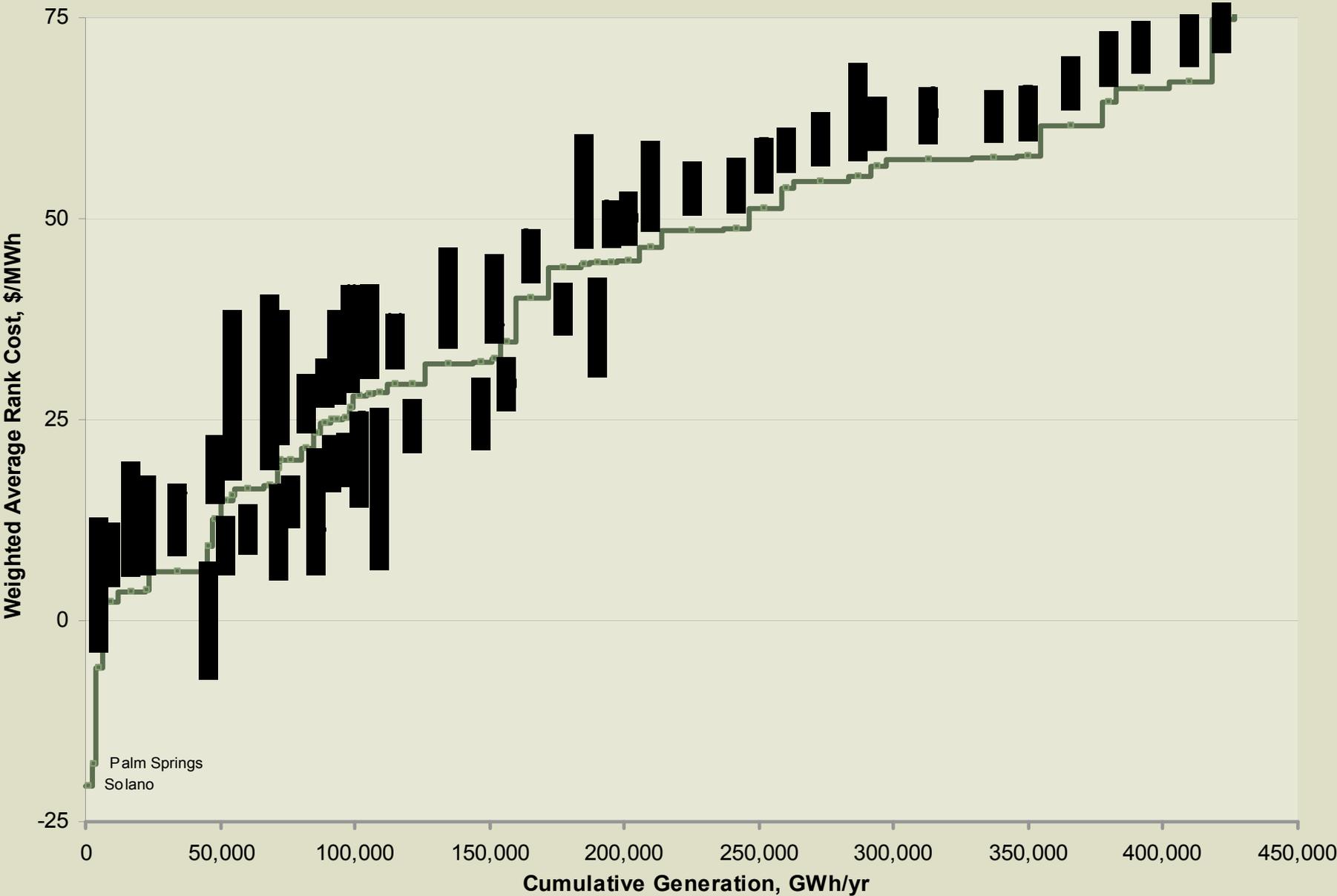
Ranked Out-of-State CREZs (by Rank Cost, \$/MWh)

CREZ	RC \$/MWh
UT_WE	20
OR_SO	25
OR_WE	29
NV_NO	29
OR_NE	35
NV_SW	40
AZ_NE	44
ID_SW	45
WY_EC	45
AZ_WE	48
AZ_NW	49
WA_SO	51
ID_EA	54
NV_WE	55
WY_SO	57
NM_EA	57
BJ_NO	57
WY_NO	58
WY_EA	62
NM_SE	65
NV_EA	66
AZ_SO	67
BJ_SO	75
BC_WC	94
BC_EA	130
BC_SE	139
BC_WE	142
BC_NE	148
BC_SW	154
BC_SO	157
BC_NO	161
BC_CT	175
BC_NW	184

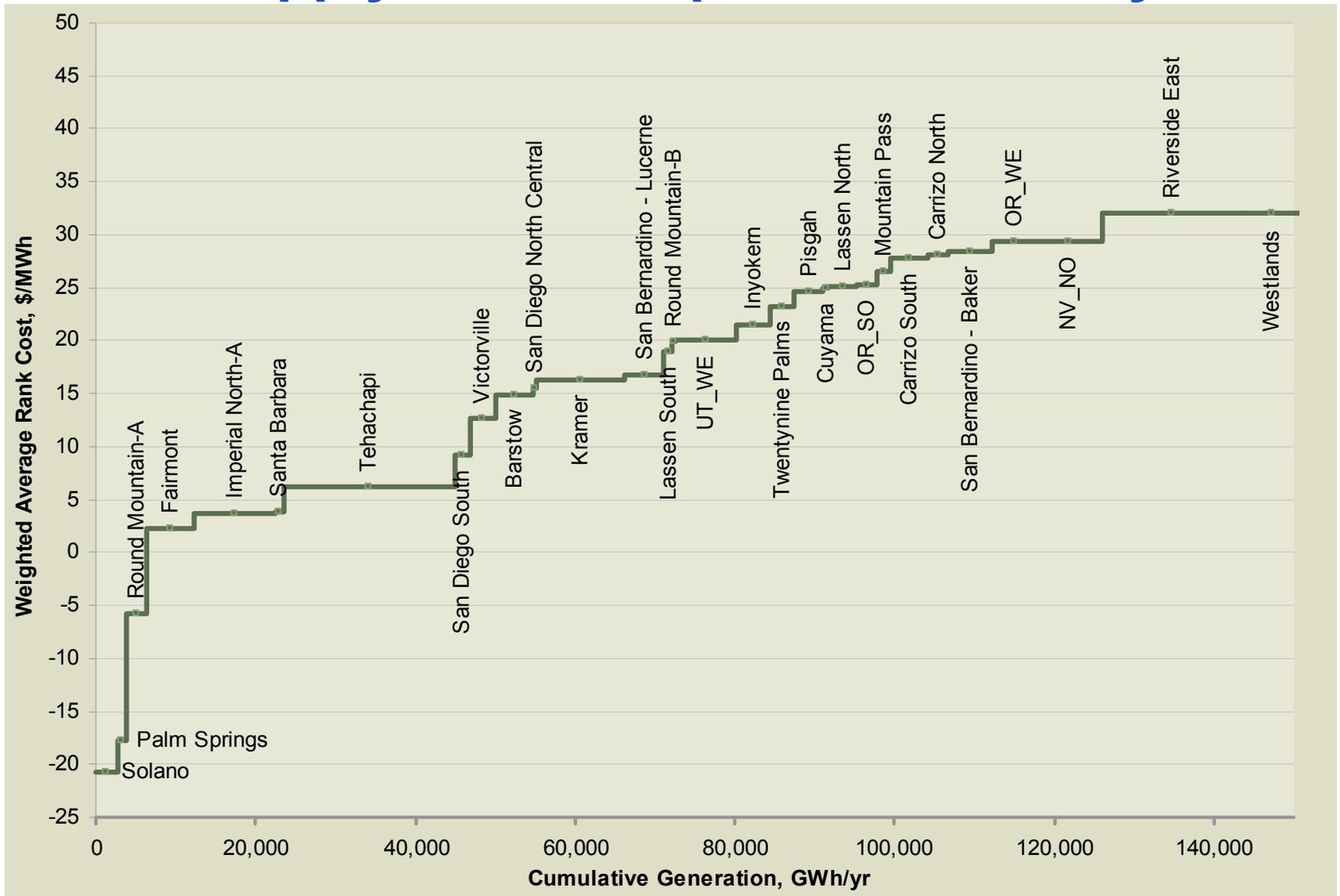
Overall Supply Curve



Overall Supply Curve, less BC



Overall Supply Curve, Top 150,000 GWh/yr



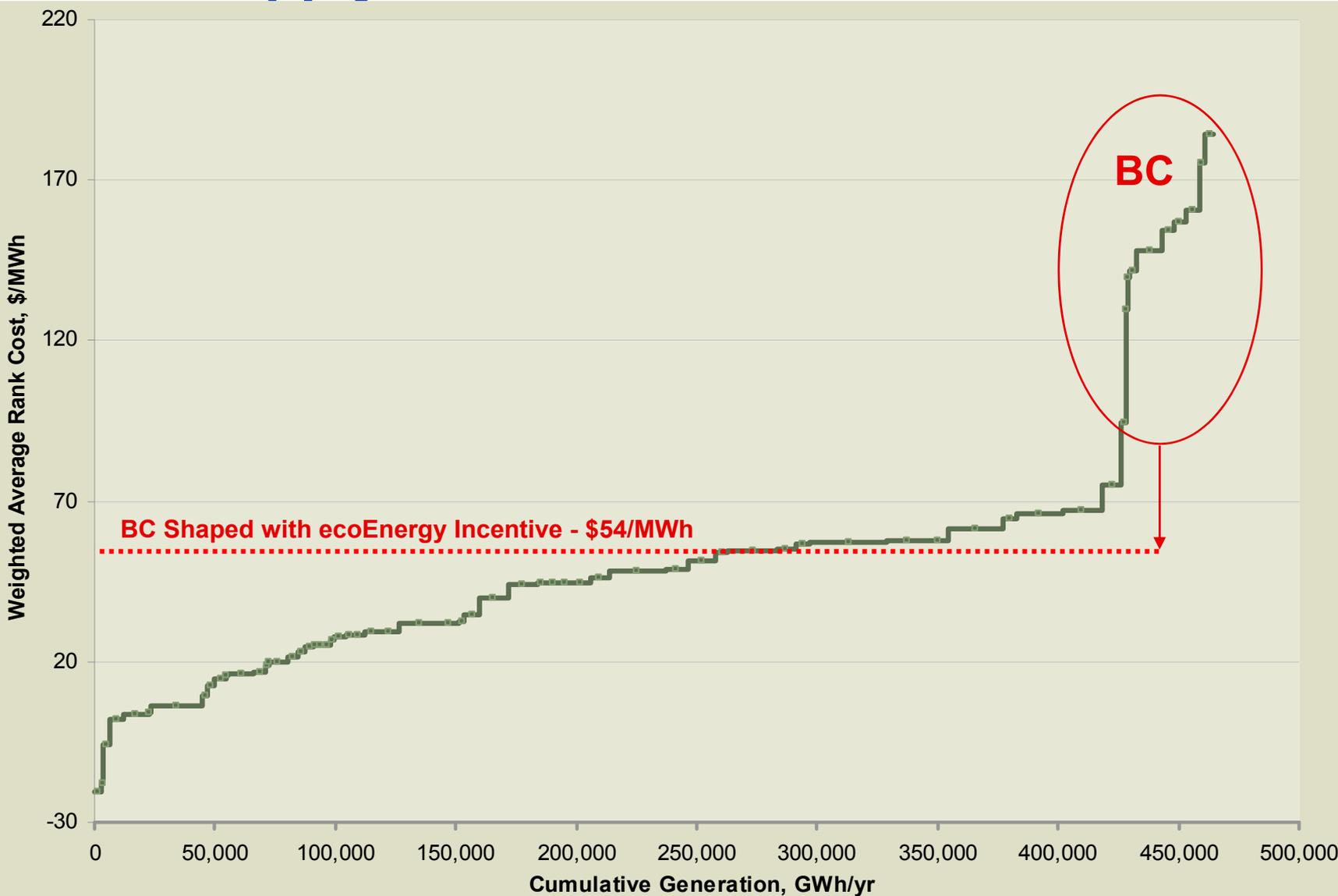
Special Considerations for Out-of-State Projects

- Out-of-State projects and transmission based on default assumptions
- Opportunities for specific projects to deliver at lower cost:
 - Utilize existing transmission
 - Better financing
 - Shaping and firming resources
 - More cost effective transmission (e.g., HVDC)

British Columbia

- BC Hydro has provided data on a shaped product
 - \$108/MWh USD; \$111/MWh CDN
 - 1500 MW for 7x24 from April 1 to Sep 30
 - 850 MW for 7x24 from Oct 1 to Mar 31
 - About 78% annual transmission utilization factor
 - Annual energy ~10,300 GWh
 - Additional shaped products are available (so to cover the possibility of doing 3000 MW or more)
- ecoENERGY incentive – Potential reduction of ~\$10/MWh

Overall Supply Curve



Sensitivity and Uncertainty Analysis

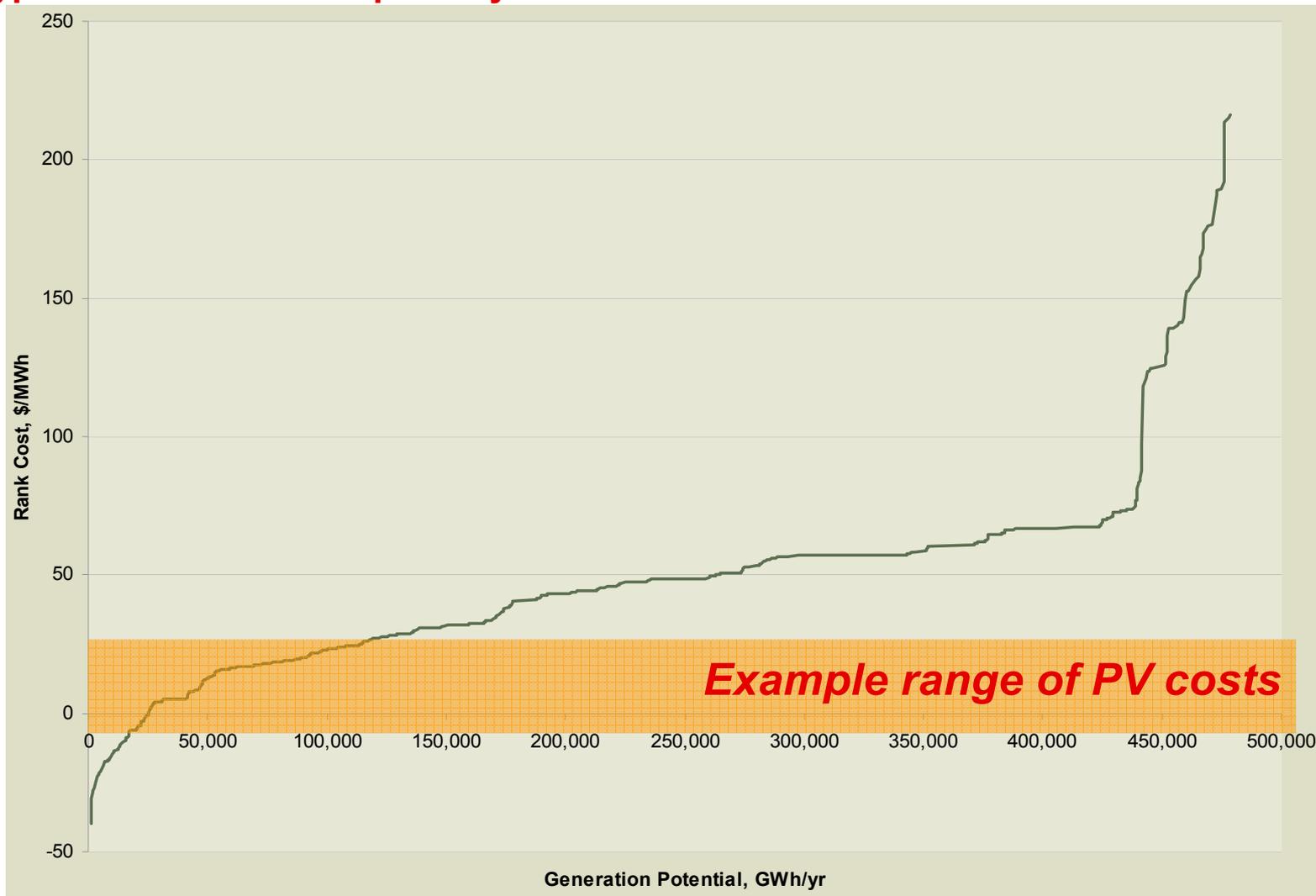
- Uncertainty Analysis - Same approach as RETI Phase 1
- Sensitivity: Advanced Solar Technologies
- Sensitivity: Distributed Solar PV
- Sensitivity: No OOS transmission costs
- Sensitivity: No tax credits

Sensitivity Study Will Identify Best Case Distributed Solar

- 20 MW
- Economies-of-scale
- Minimal interconnection cost
- No transmission cost
- No transmission losses
- Energy and capacity value

Example of Distributed Solar PV Sensitivity

Hypothetical – for example only



Report

- 1.0 Executive Summary
- 2.0 Introduction
- 3.0 Economic Model Updates
- 4.0 Technology Assumption Adjustments
- 5.0 CREZ Updates
- 6.0 Out-of-state Additions and Improvements
- 7.0 Results

Associated Data Files

- Project Characteristics Spreadsheet
- CREZ Map
- CREZ Shapefiles
- CREZ Google Earth Files



Thank You!

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