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RETI Phase 2 Update Workgroup

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October 15, 2009

RETI Phase 2 Update Workgroup Issues

- Economic Model Update
 - Model review
 - Incentives Assumptions
- Extended Analysis of WECC Resources
 - Introduction
 - Approach
- CREZ and Technology Updates
- Net Short Update

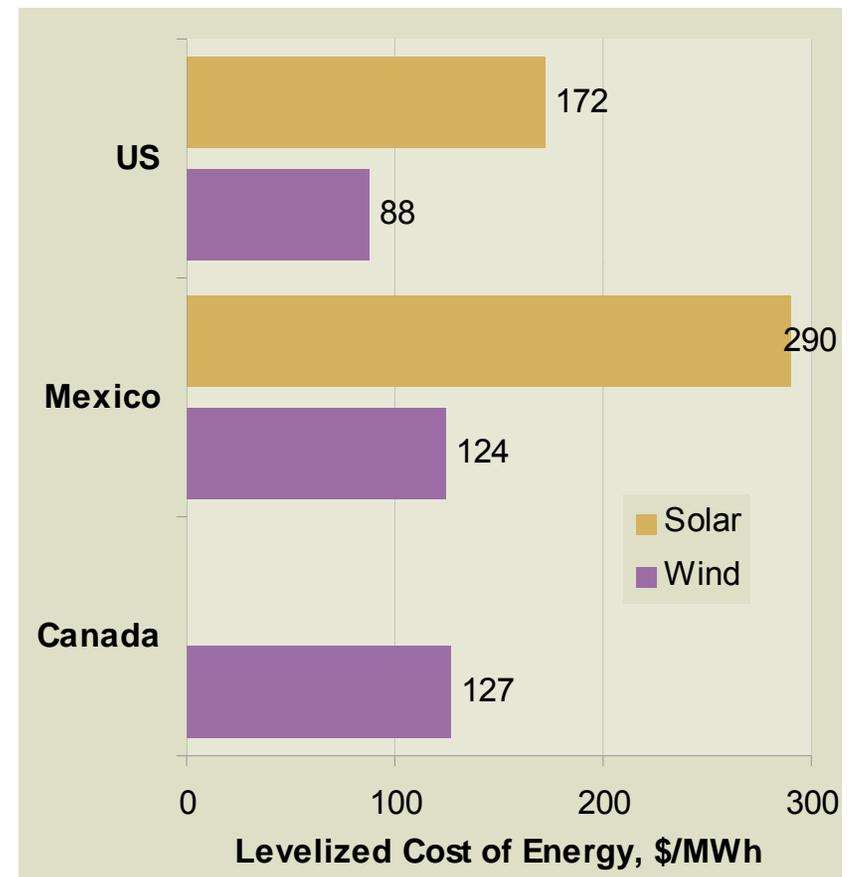


Next 2 Weeks



Impact of Different Incentive Assumptions in US, Mexico, and Canada

- Typical project characteristics
 - Wind: \$2400/kW, 33% capacity factor
 - Solar: \$5200/kW, 26% capacity factor
- Incentive assumptions (from 10/1)
 - **US:** ITC: 30%, MACRS: 100% 5-yr, tax rate: 40%
 - **Mexico:** ITC: 26.6%, MACRS: N/A, tax rate: 28%
 - **Canada:** ITC: 0%, MACRS: 100% 5-yr (approximates Canadian Capital Cost Allowance), tax rate: 40%



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Out-of-State Resources in RETI

Summary of Recommended Resource Assessments Use (RETI vs. WREZ) MW Estimates

Re-visit BC conversation in light of other potential OOS sources like Wyoming wind

		CA	OR	WA	NV	AZ	Baja	BC
Bio		1,725	454	449				1,520
		145	652	101	299	329		939
PV		27,460						
					18,960	20,178		
ST		65,200			7,429	7,129		
		16,931			18,960	20,178	5092	
Wind		16,208	4,688	3,762	1,475		5,000	2,405
		6,042	2,913	3,262	432	3,714	2,963	13,942
Geo		1,918	520		1,283			244
		1,434	832		1,408			340

Economic when combined with wind? To be evaluated

Review estimates based on new lease sales

???

Perform new detailed analysis, coordinate with EWG

Notes: PV and ST not differentiated in WREZ, assumed all ST

Changes Made Since October 1 Meeting

Impact on Delivered Cost

Bio Geo Wind Solar

Line utilization changed from resource capacity factor to flat 60%



Brought transmission to CA border gateways (no in-state transmission cost)

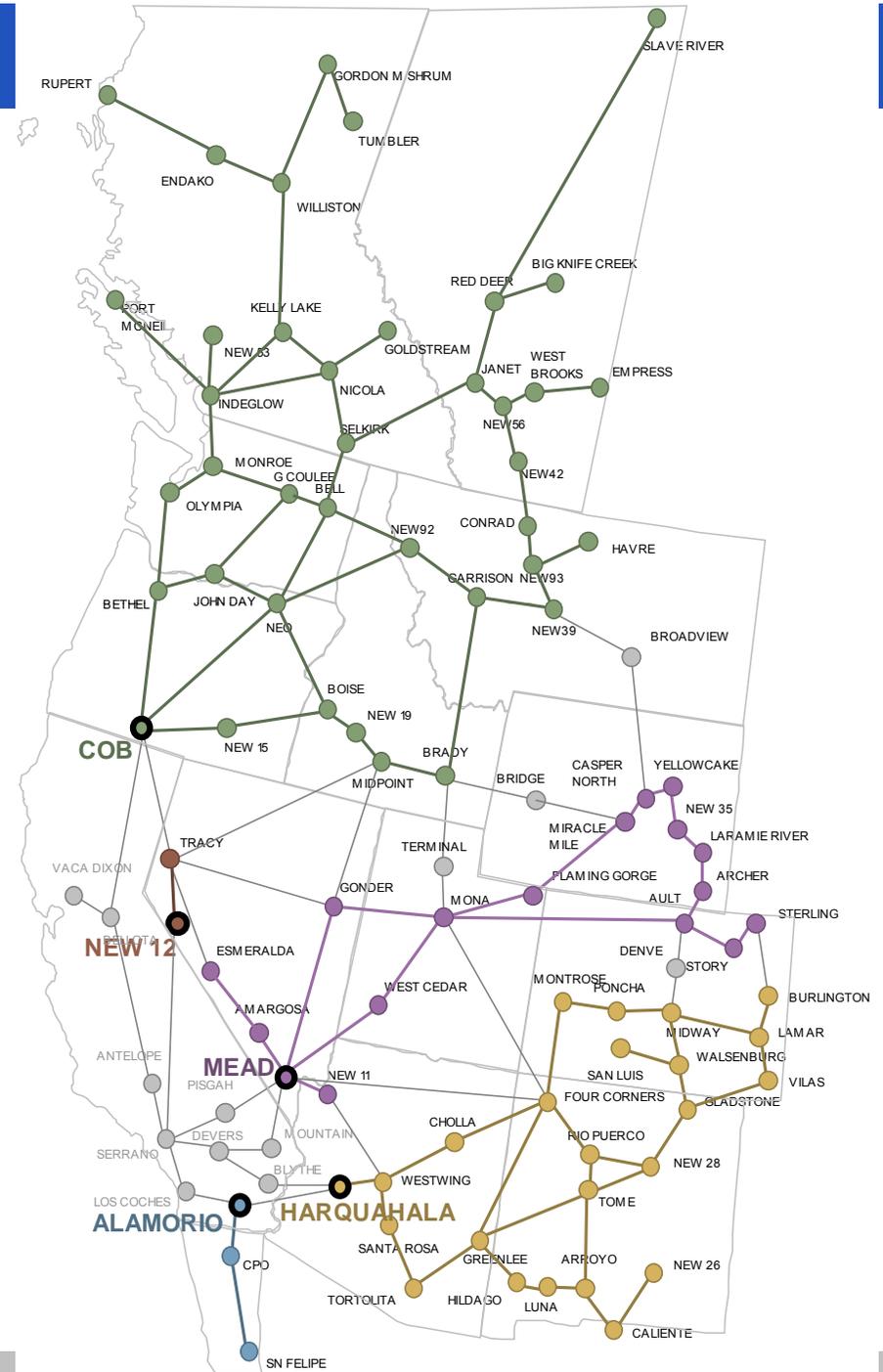


Updated wind capacity factor estimates



Resources Delivered to California Gateway Substations

- COB
- NEW 12 (CA/NV)
- MEAD
- ALAMORIO
- HARQUAHALA



Updated WREZ Model Wind Capacity Factor Estimates to Reflect Latest Performance Info

Wind power class	OLD	NEW
3	28%	32%
4	31%	35%
5	35%	38%
6	40%	41%
7	42%	43%

Still under review

Transmission Assumptions

- Assume all incremental transmission
- Line costs assume 500 kV single circuit, using WREZ assumptions
- Federal financing for new lines – low cost financing with no tax
- Line utilization = shared utilization for all lines 60%
- Transmission costs:
 - Line cost from resource hub interconnection point to CA grid access points (i.e COB, PV, Mead, etc.)

Transmission Financing Assumptions

Assumption	Value	Units
AFUDC	5%	of capital cost
Economic Life	40	years
Debt Percentage	100%	
Debt Term	30	years
Debt Interest Rate	5%	
Discount Rate	5.00%	
Tax Rate	0%	
Annual O&M	3%	Of capital cost

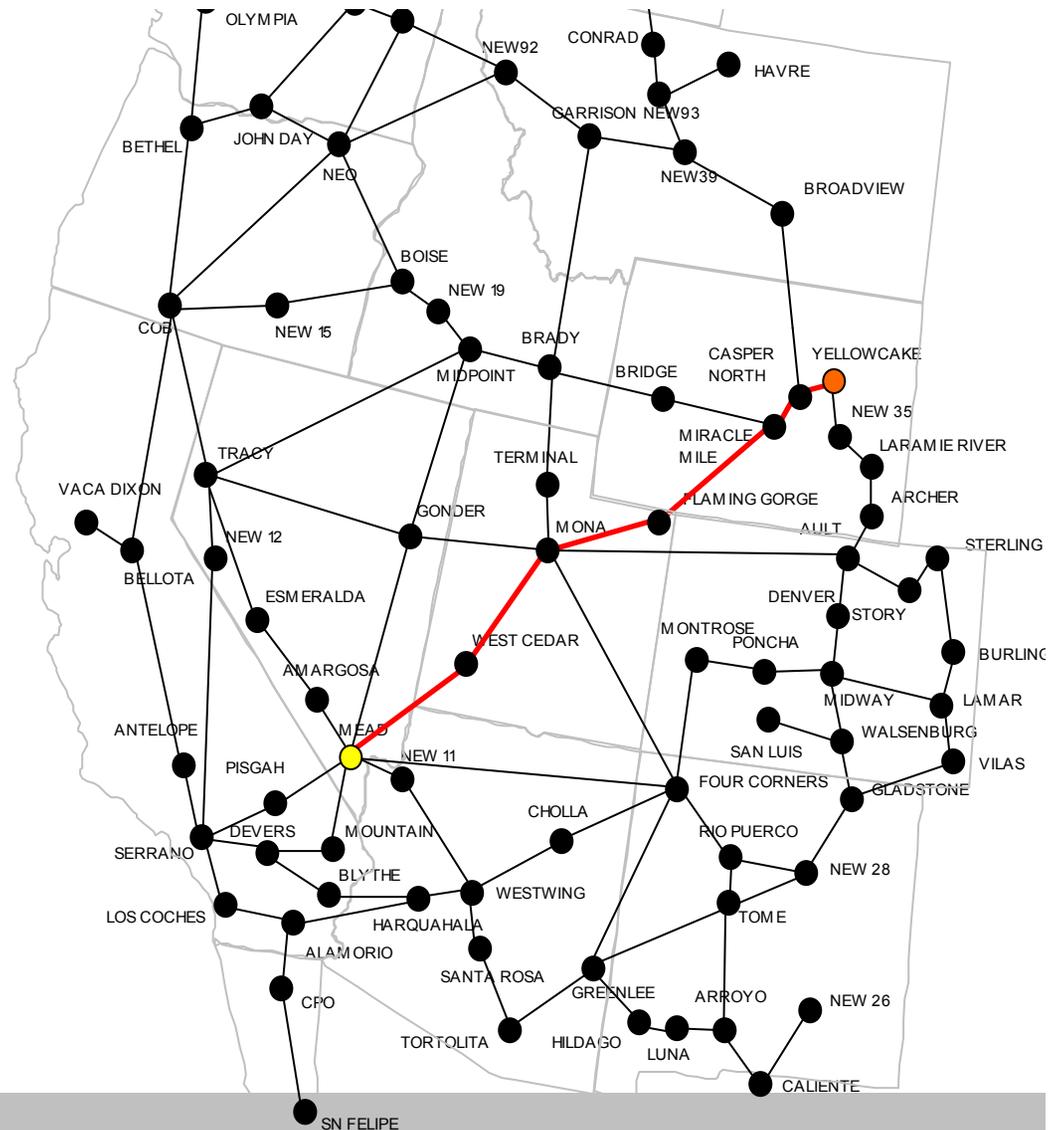
Example Levelized Transmission Cost Wyoming to Mead

Different line utilization and financing assumptions

- New Transmission
 - Federal at 60%: \$20/MWh
 - Federal at 40%: \$30/MWh
 - IOU at 60%: \$33/MWh
 - IOU at 40%: \$50/MWh

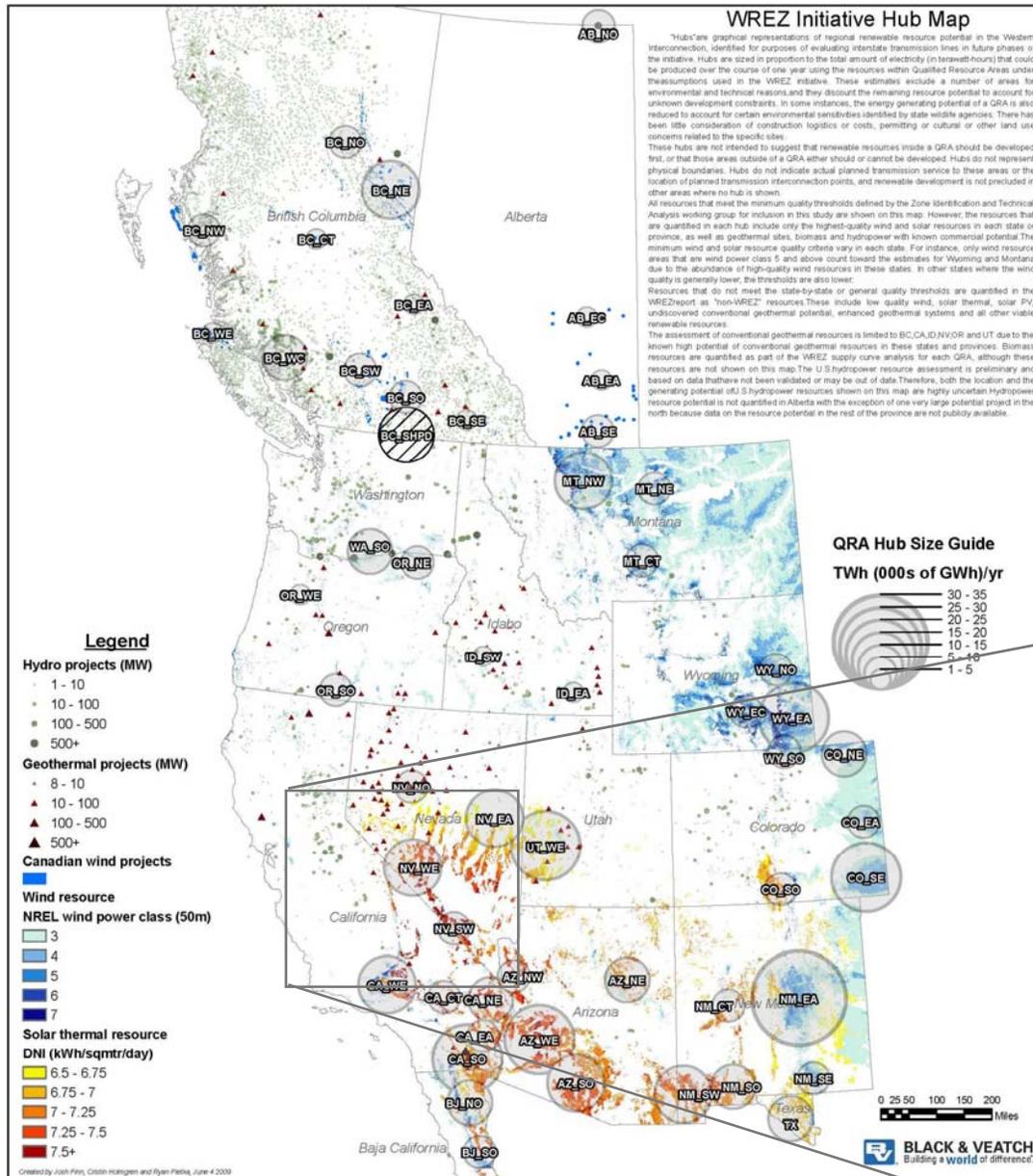
- WAPA Wheeling, (\$6.120/kW-mo current), levelized:*
 - 100% utilization: \$10/MWh
 - 60% utilization: \$17/MWh
 - 40% utilization: \$25/MWh

* Thanks Jan Strack



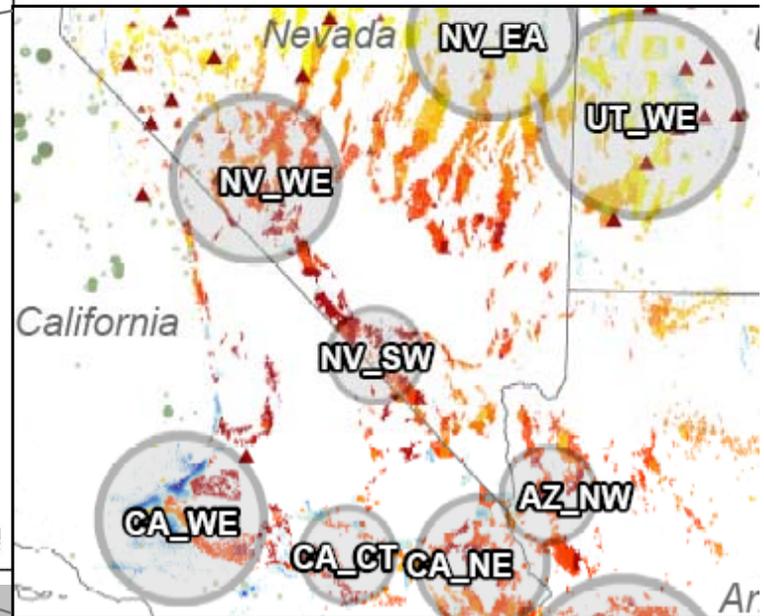
WREZ Supply Curve Assumptions

- Delivered to gateway substations, based on lowest cost import path for the state
- Transmission cost assumptions:
 - 500 kV AC single circuit
 - Financed by federal government
 - Line utilization equal to 60%
- IPP financing assumptions for generation
- Solar resources assumed to be fixed tilt thin film PV, was the least expensive solar technology
- Includes small hydro in Canada, and upgrades to existing large hydro in US



WREZ Resource Assessment

- Estimates resource potential at a particular price point in each "hub"



WREZ Economic Metric – Adjusted Delivered Cost

Adjusted Delivered Cost =

- + Generation Cost
- + Transmission Cost
- + Integration Cost
- Energy Value
- Capacity Value

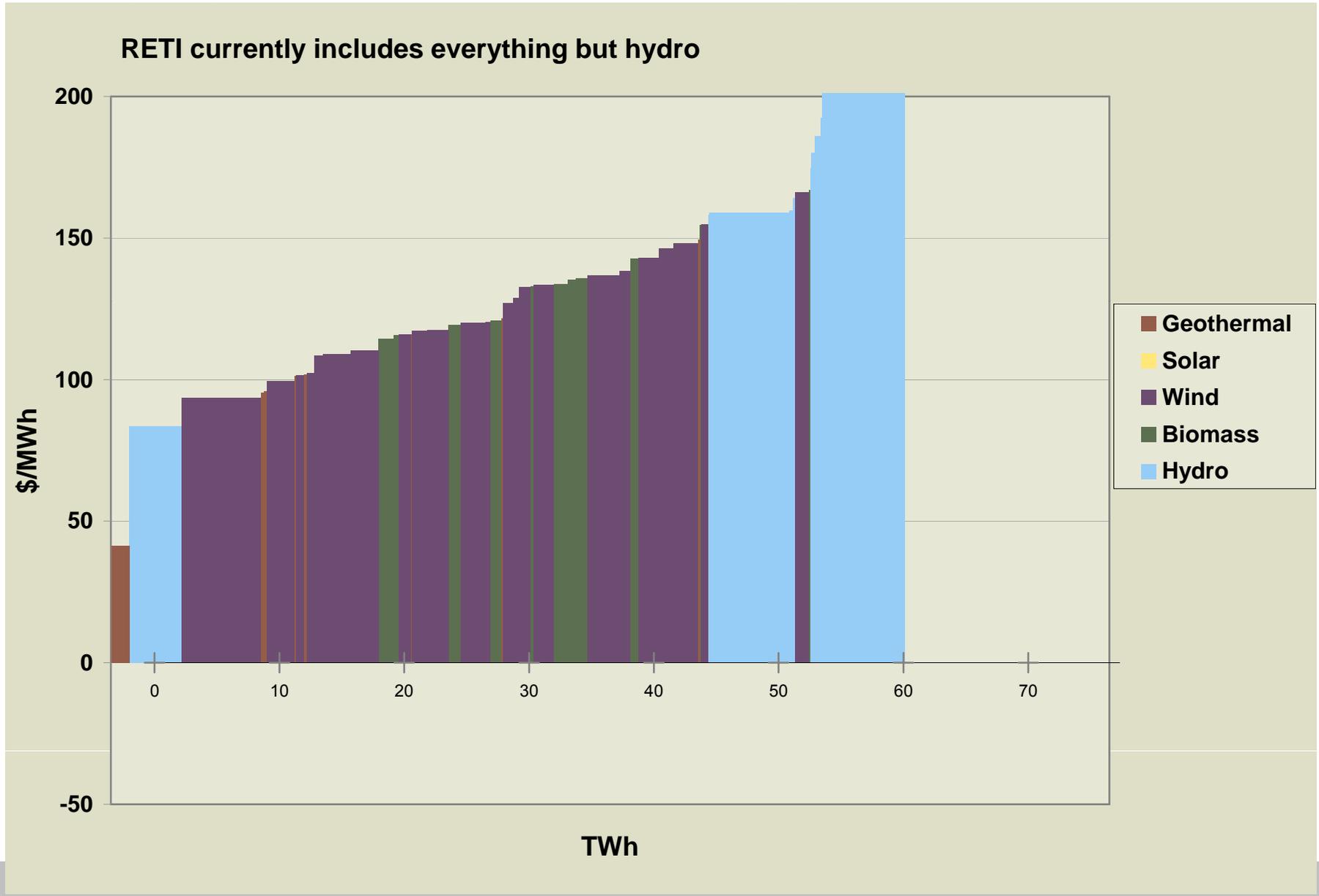
Similar concept as RETI, but numbers not directly comparable

Supply Curves

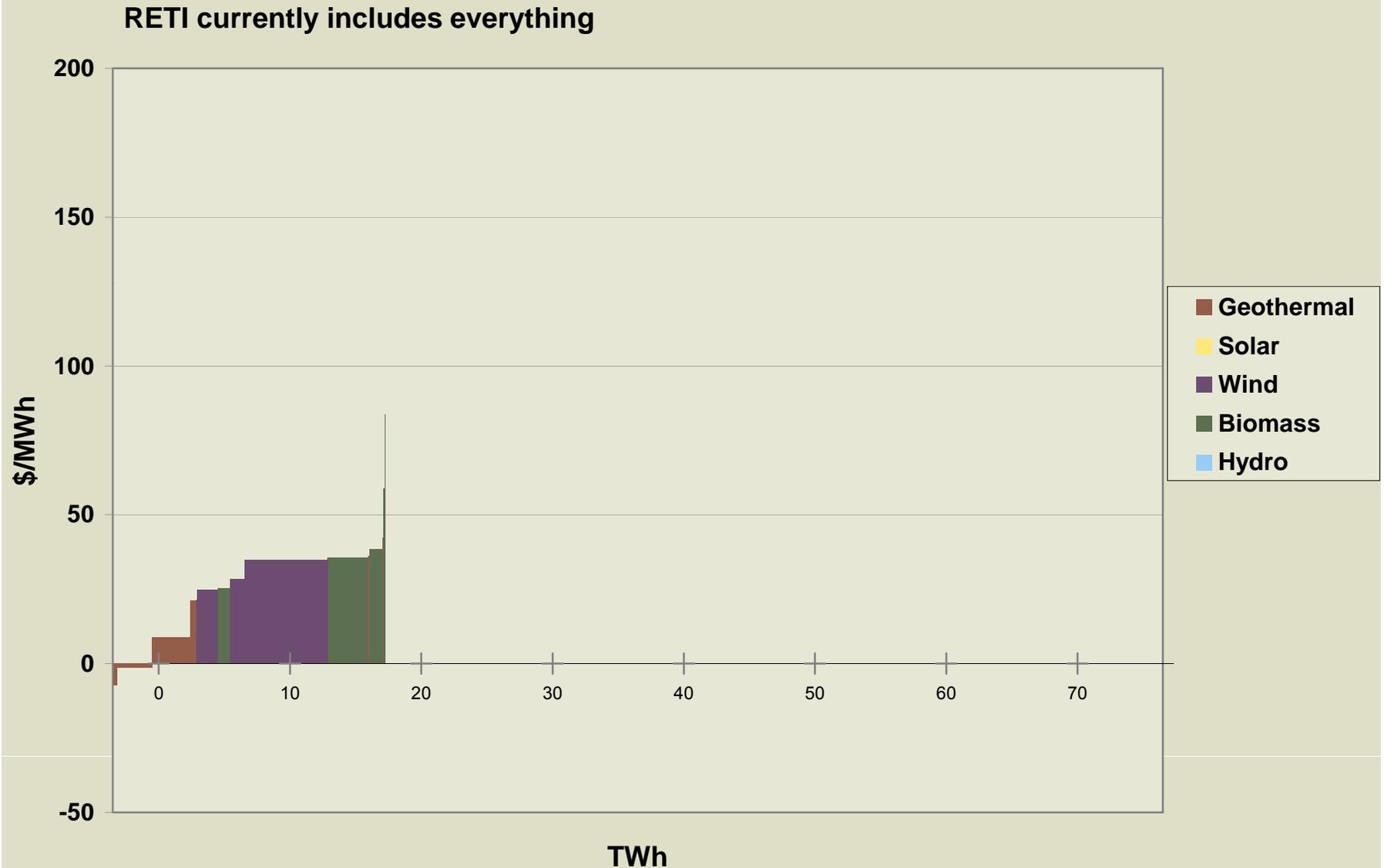
1. Current RETI states and provinces
2. Additional out-of-state areas

Note: X-axis should be from 0 to 80 TWh for all states

British Columbia to Northern California

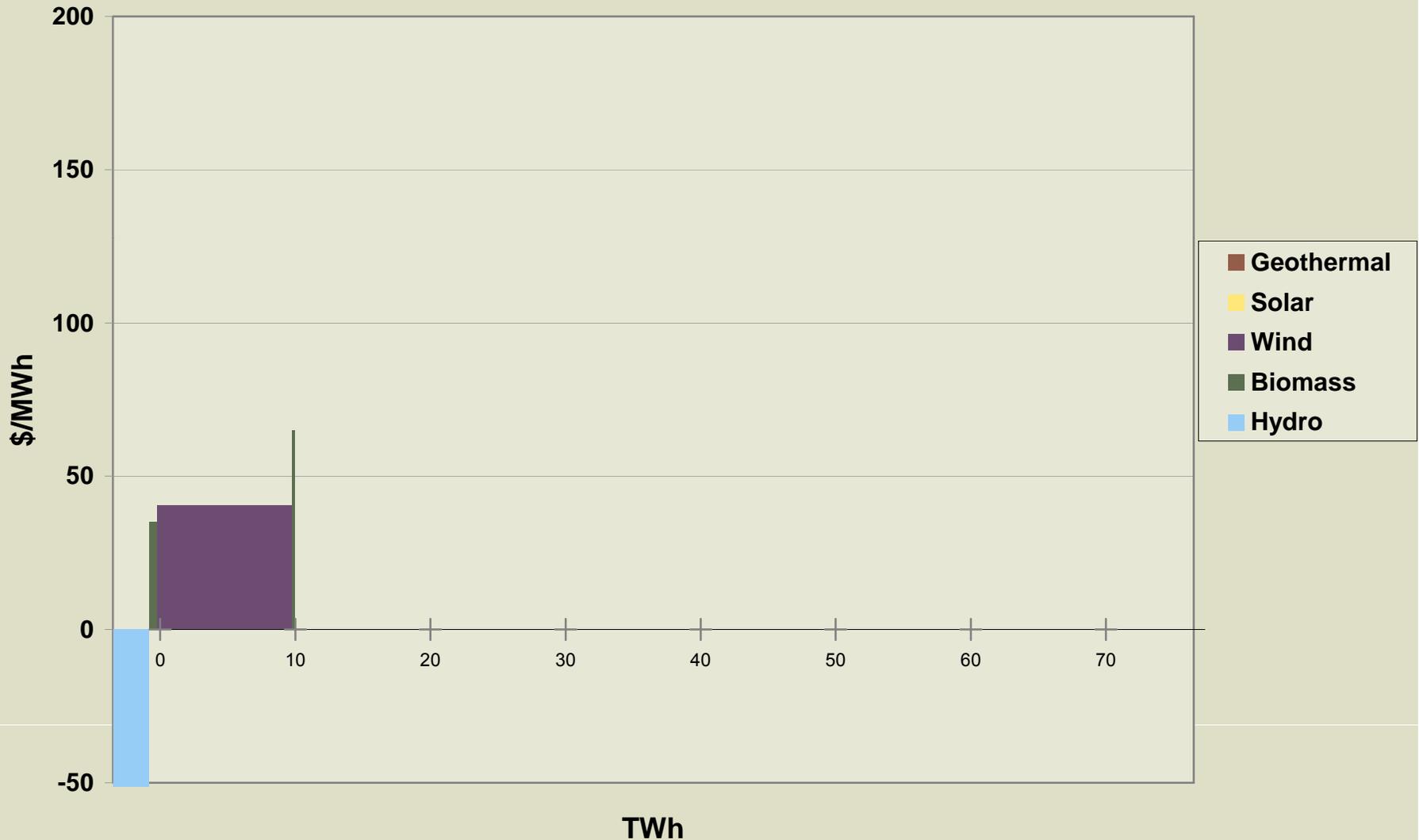


Oregon to Northern California



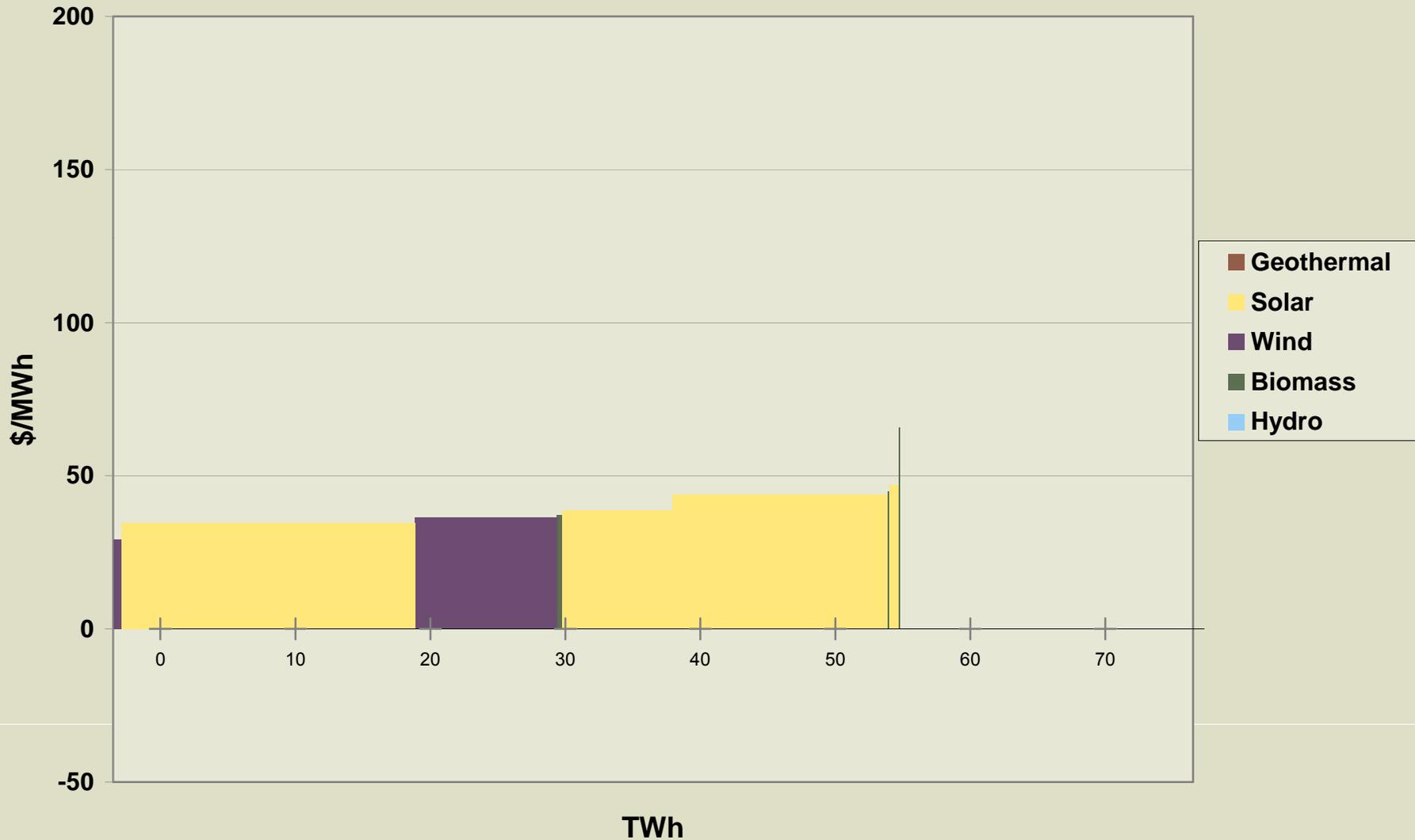
Washington to Northern California

RETI currently includes everything but hydro



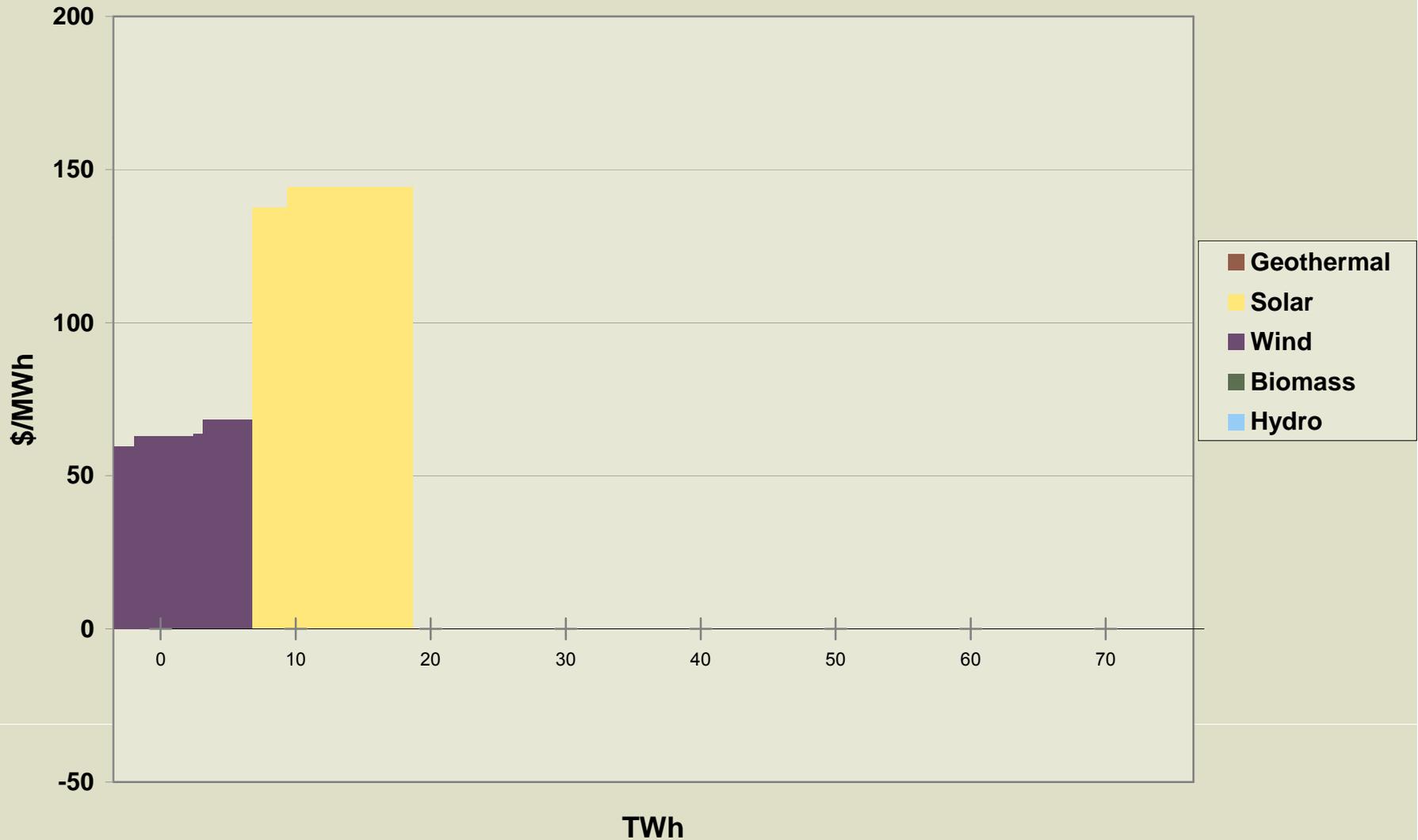
Arizona to Southern California

RETI currently includes only solar – add wind and biomass



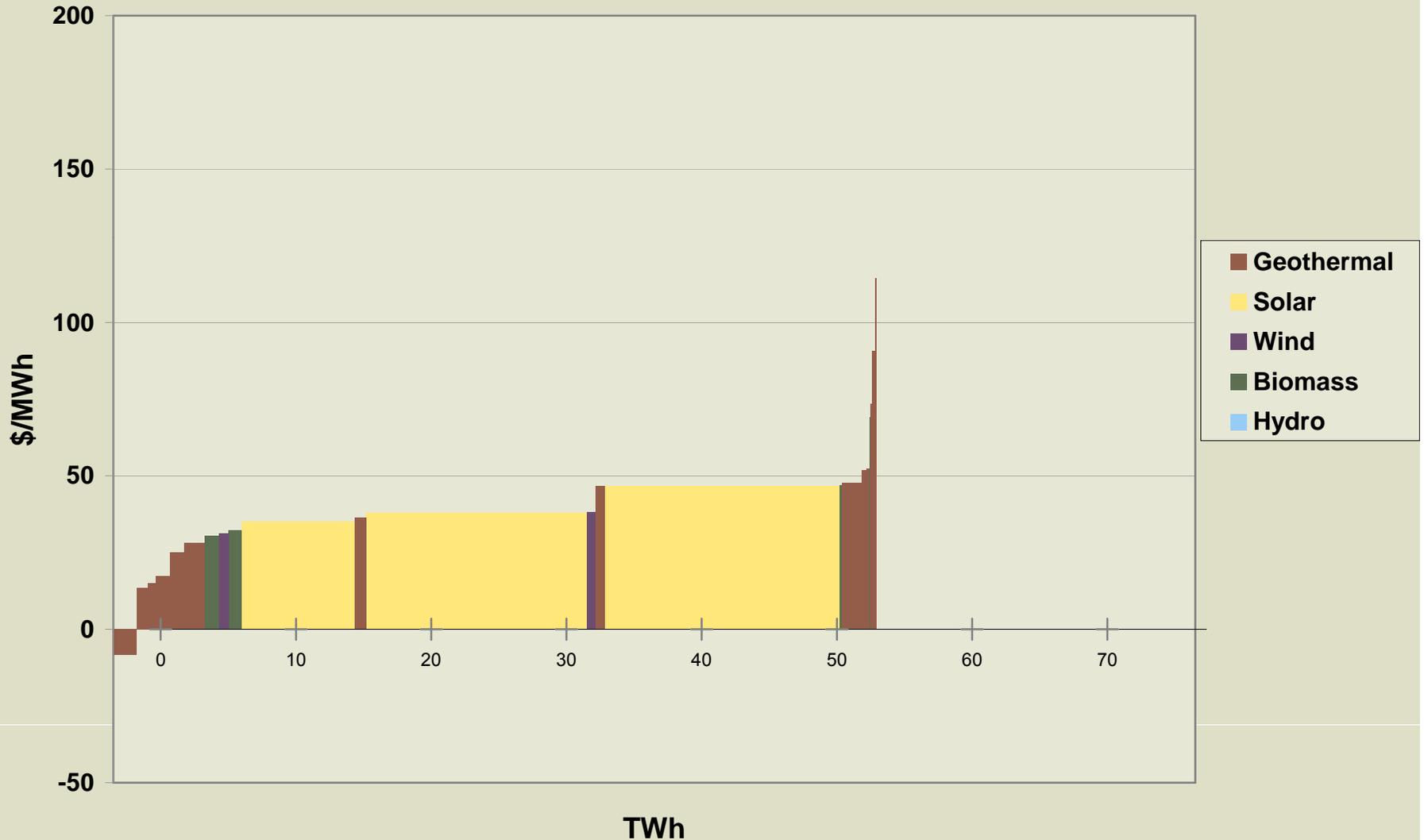
Baja to Southern California

RETI currently includes only wind – solar is not included as it is ~\$40/MWh more expensive than CA



Nevada to Southern California

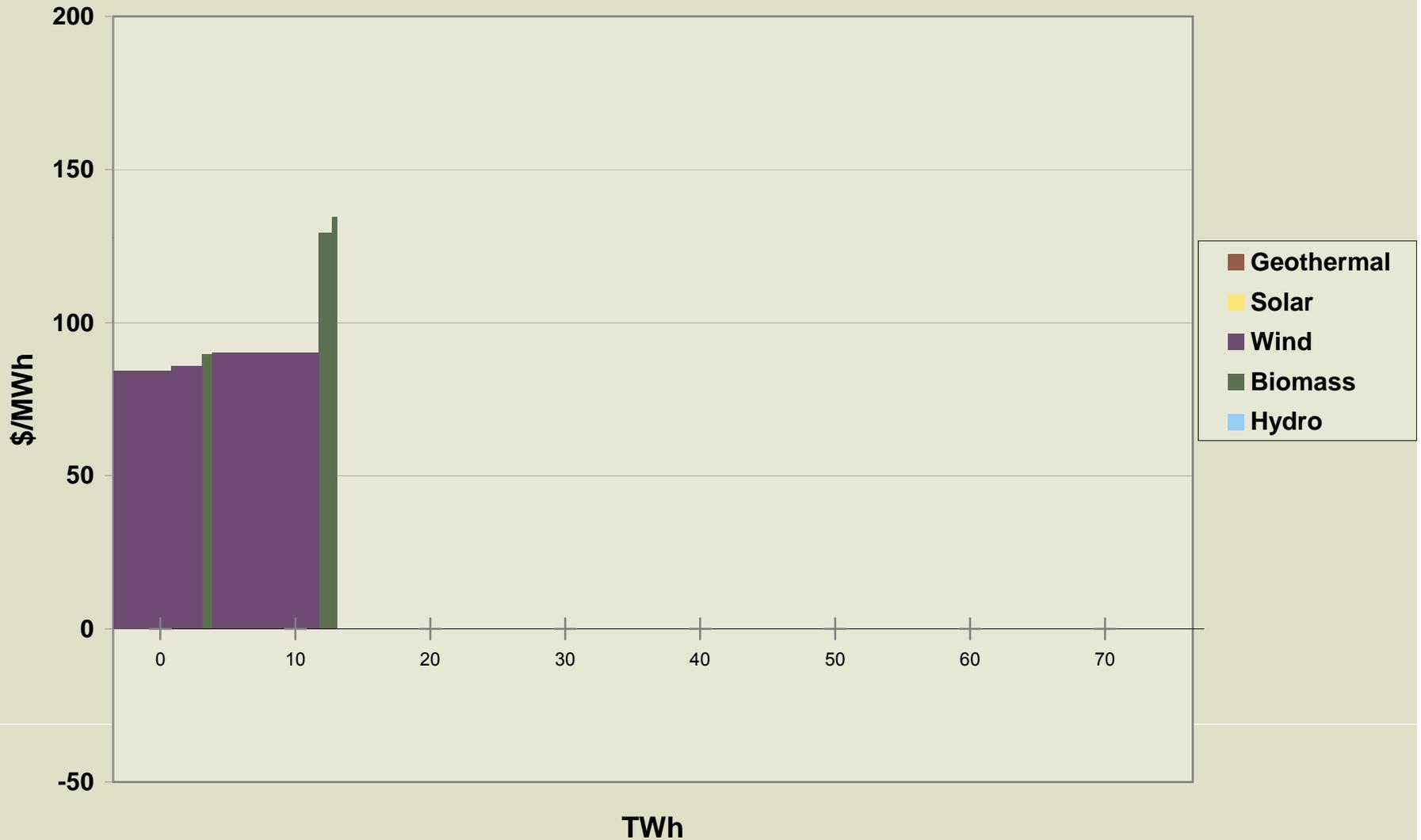
RETI currently includes geothermal plus solar and wind in southern NV. Add all other resources?
 NV RPS demand is about 10 TWh



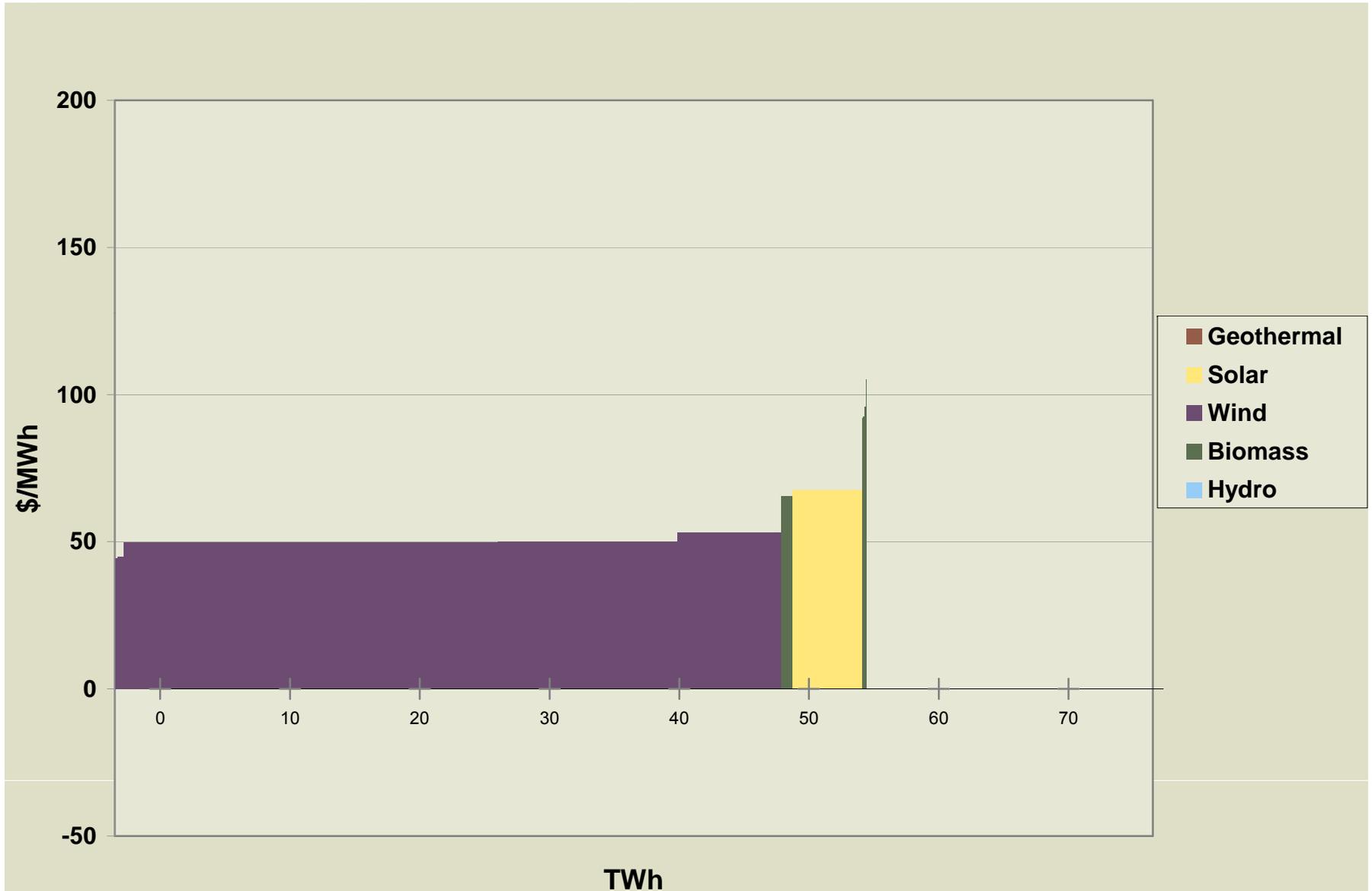
Other Out-of-State Resources



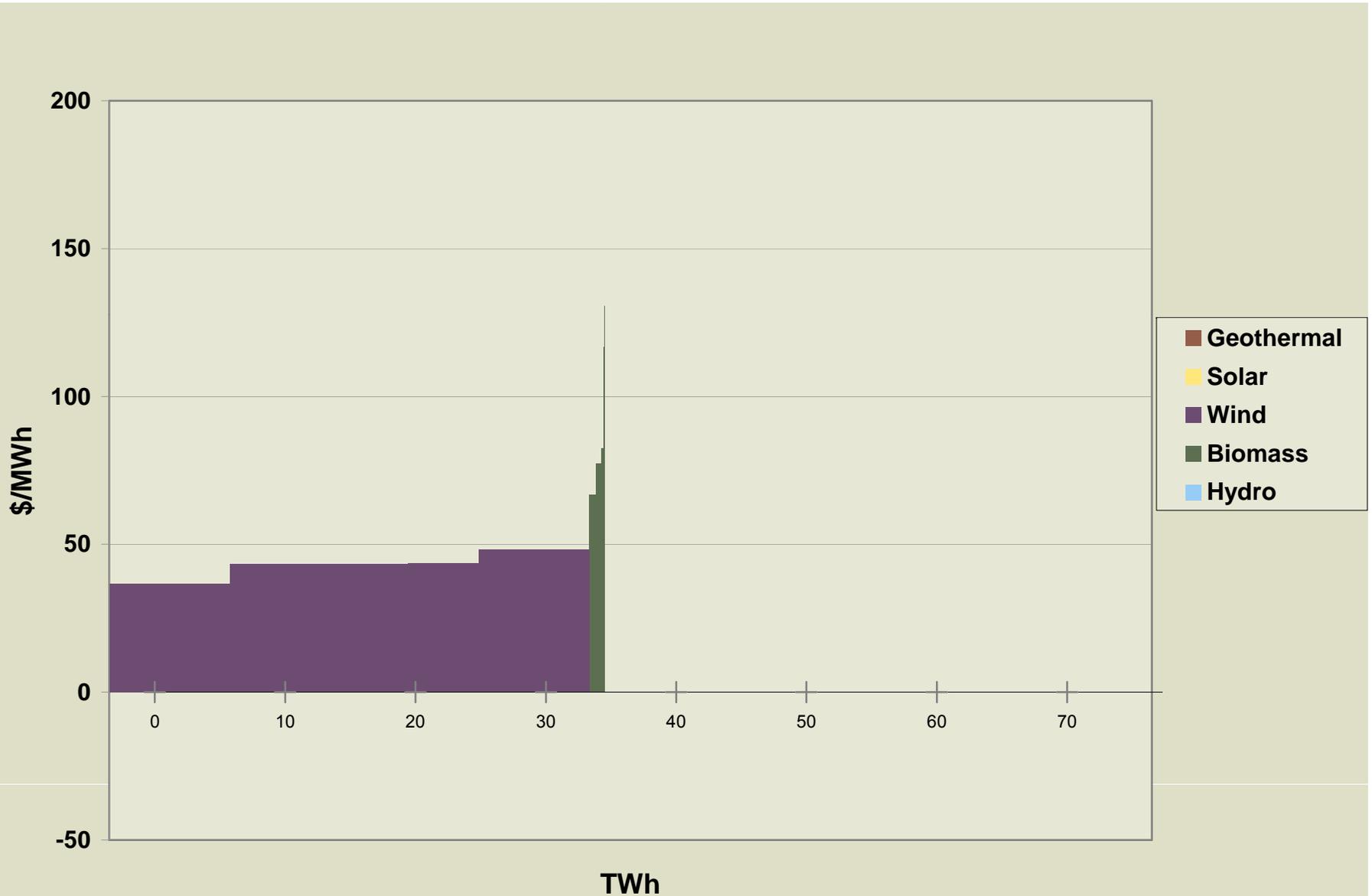
Alberta to Northern California



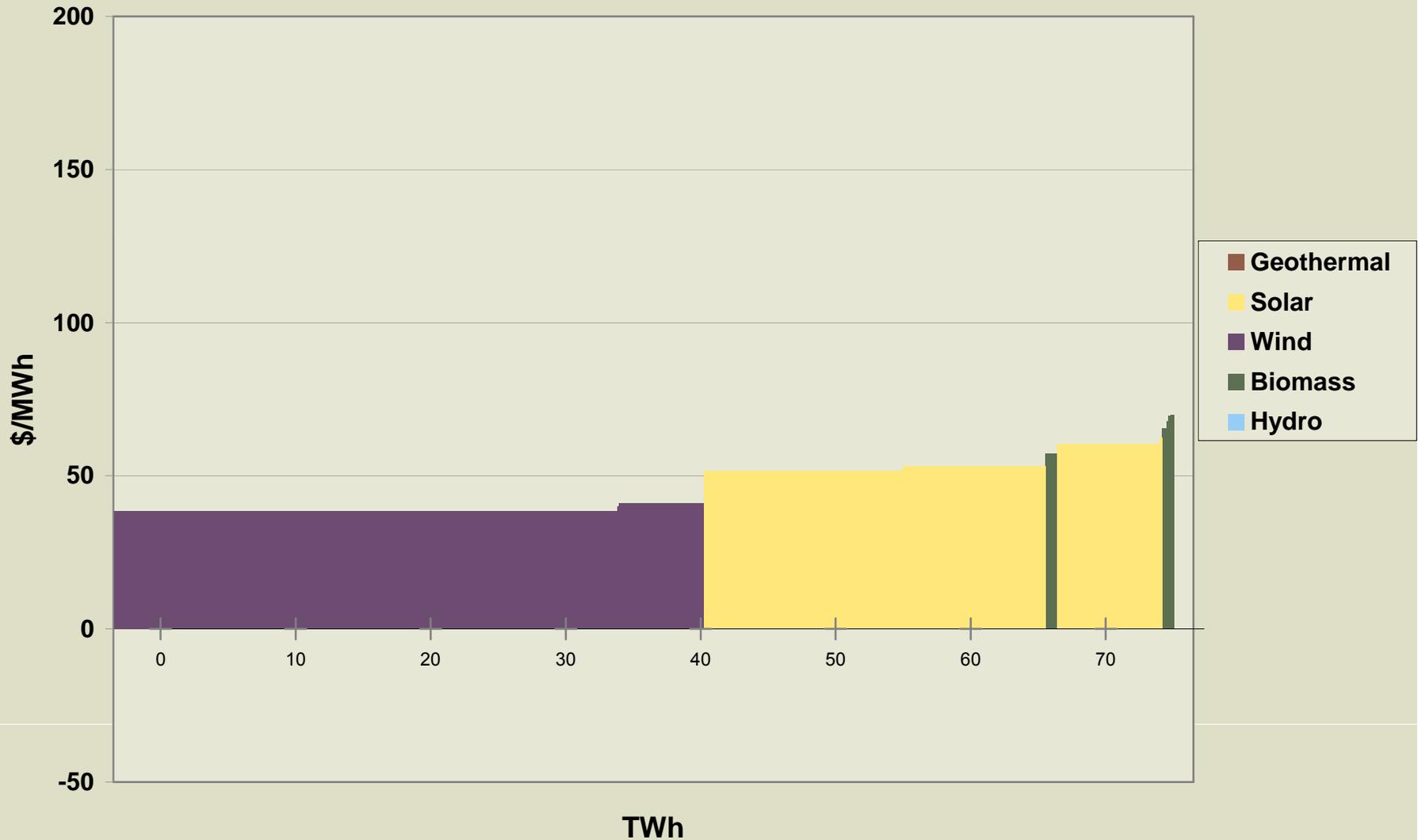
Colorado to Southern California



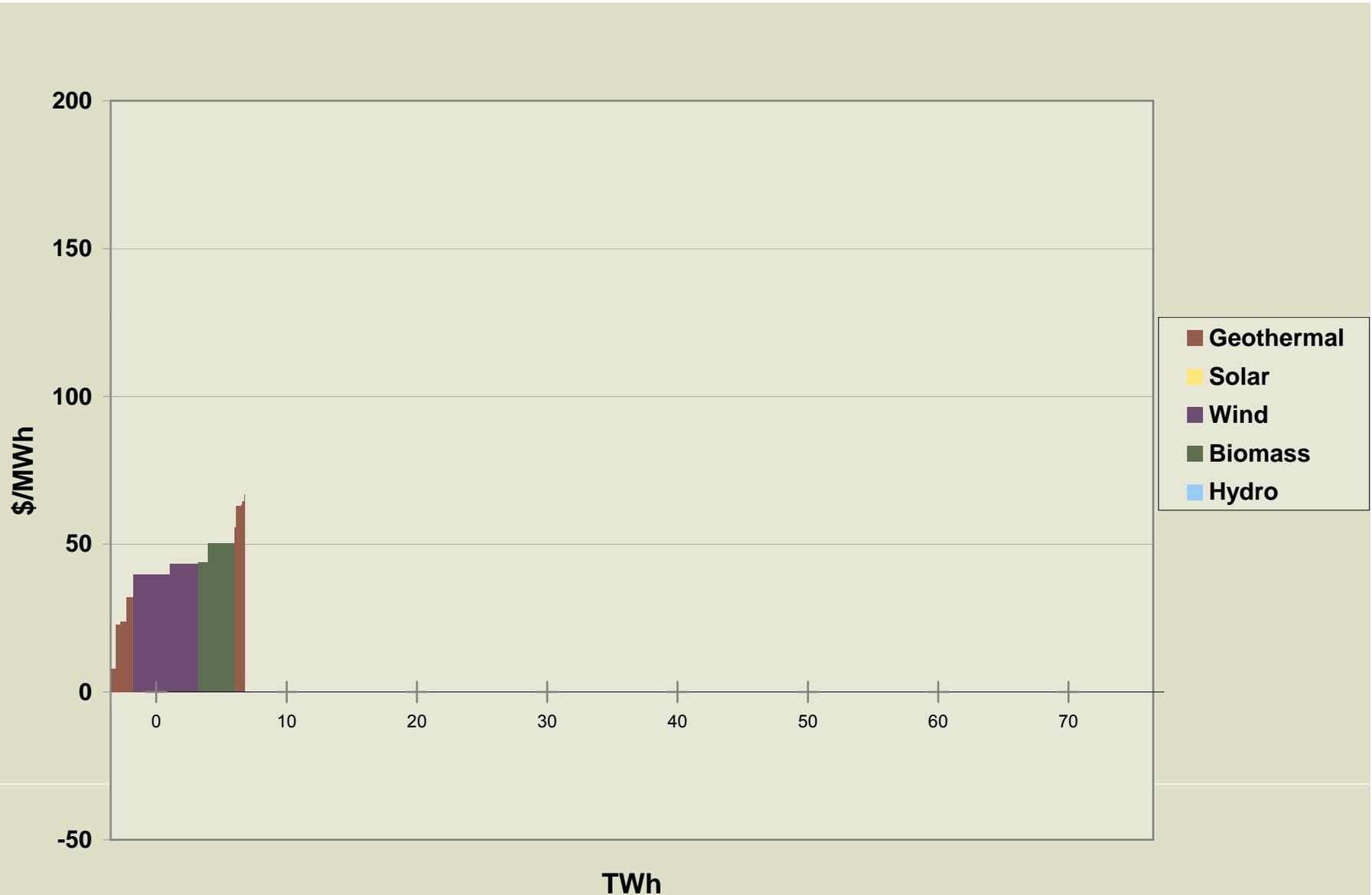
Montana to Northern California



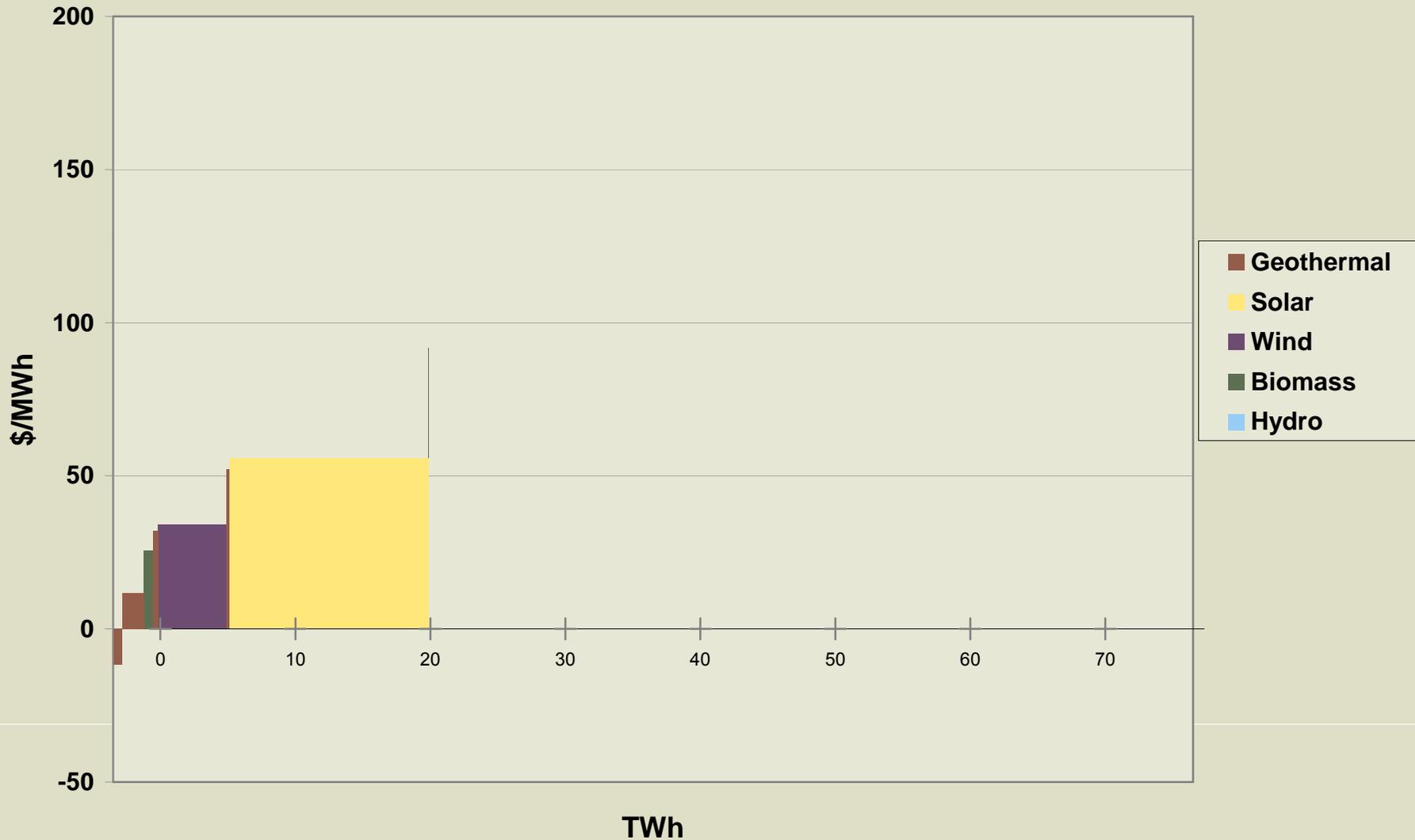
New Mexico to Southern California



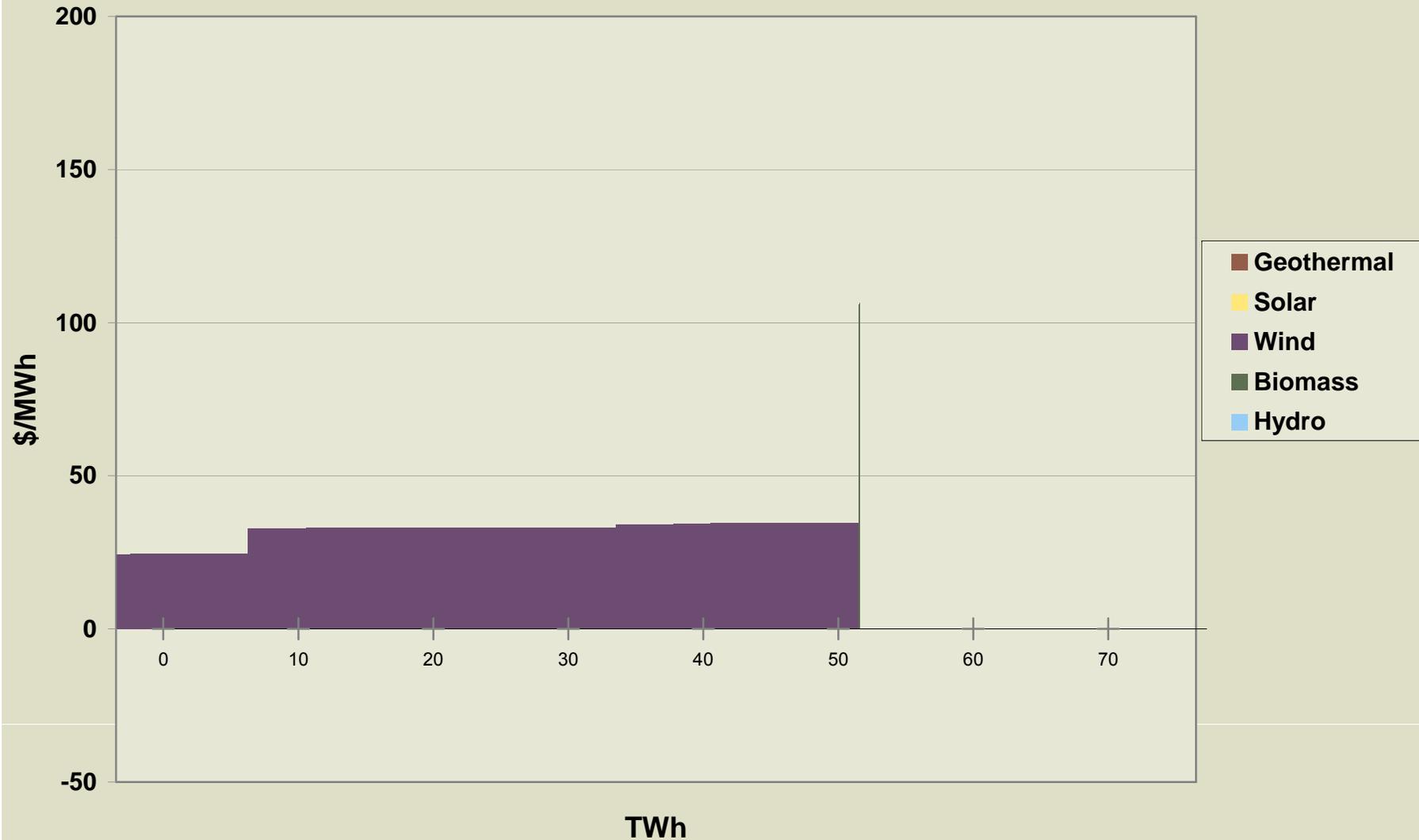
Idaho to Northern California



Utah to Southern California



Wyoming to Southern California



Recommended Out-of-State Resource Additions

October 1 Recommendations

	Included in 1B	Recommended Additions
Arizona		 
Nevada	  	 
Wyoming		
Idaho		 
Utah		  

OR, WA, BC, and Baja already included – no proposed changes

Recommended Out-of-State Resource Additions

October 15 Recommendations

	Included in 1B	Recommended Additions
Arizona		 
Nevada	  	 
Wyoming		
Idaho		  
Utah		  
New Mexico		

OR, WA, BC, and Baja already included – no proposed changes

Out of State Resource Imports and Limits

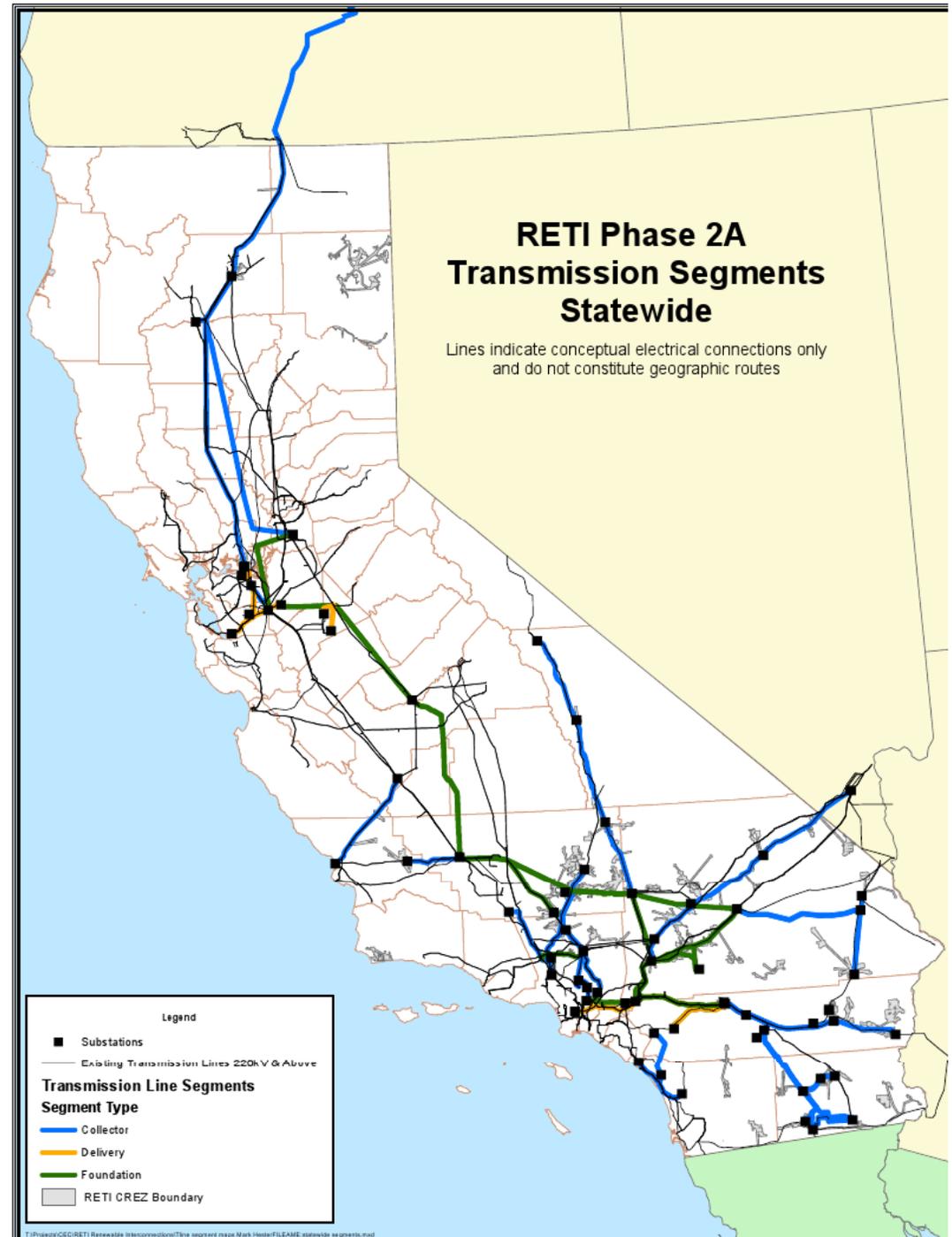
- Resources directly interconnected to CA grid located outside CA (Nevada, Baja, AZ, etc.)
 - Modeled identical to CA resources
 - Same transmission cost approach as CA resources
 - No import limit
 - *Environmental assessment?*
- Resource accessing CA grid through gateway
 - Total import limit (current = 2500 MW from COB, 2500 MW from SW)
 - *Remove import limit?*
 - Must pay transmission cost to get to California gateways
 - CA costs from CA grid gateway to load centers?

In-state Transmission Cost Options

- Potential options for assessing cost of in-state transmission:
 1. Zero
 2. RETI Phase 1 (every CREZ pays its share of cost to load center; utilization at resource CF)
 3. RETI Phase 2 – Shift factors
 4. CREZ collector system cost only (no delivery or foundation lines)

Collector Cost Option Proposal

- Costs will include costs for collector lines from CREZs to the foundation and delivery lines
 - Collector lines costs based on Phase 2A shift factors
- 50% of the foundation and delivery line costs will be applied to CREZs based on their shift factors
- Out-of-state costs will be applied using the shift factors for the gateways or the nearest CREZs



CREZ and Technology Updates

UPCOMING WORK FOR NEXT TWO WEEKS

- All technologies:
 - Update base technology cost and performance information
- Solar
 - Revisit solar technology assumptions (storage for solar thermal, thin film for PV)
 - Re-evaluate the assumptions for wet/dry cooling at solar thermal projects
 - Update site-specific solar project characteristics for large solar projects that have been moved
 - Update solar profiles to correct truncation issue. Likely to reduce solar thermal CFs by ~8% (e.g. from 24% to 22%)

CREZ and Technology Updates

UPCOMING WORK FOR NEXT TWO WEEKS

- Geothermal
 - Consider dry-cooling impacts on geothermal output profiles (current assumption is flat)
- Wind
 - Reassess Palm Springs wind resources
 - Reassess Fairmount wind resources
 - Review 12x24 typical output profiles against WREZ and new data
- Reassess need / definitions for sub-CREZs
- Update pre-ID project information
- Re-rank projects