

ELCC Update

Cost Allocation Working Group

August, 2019

Outline

- Timeline
- SAWG Evaluation of ELCC
- SAWG Action
- ELCC Whitepaper
- Solar Results
- Battery Storage
- Ongoing Actions

ELCC Policy Timeline

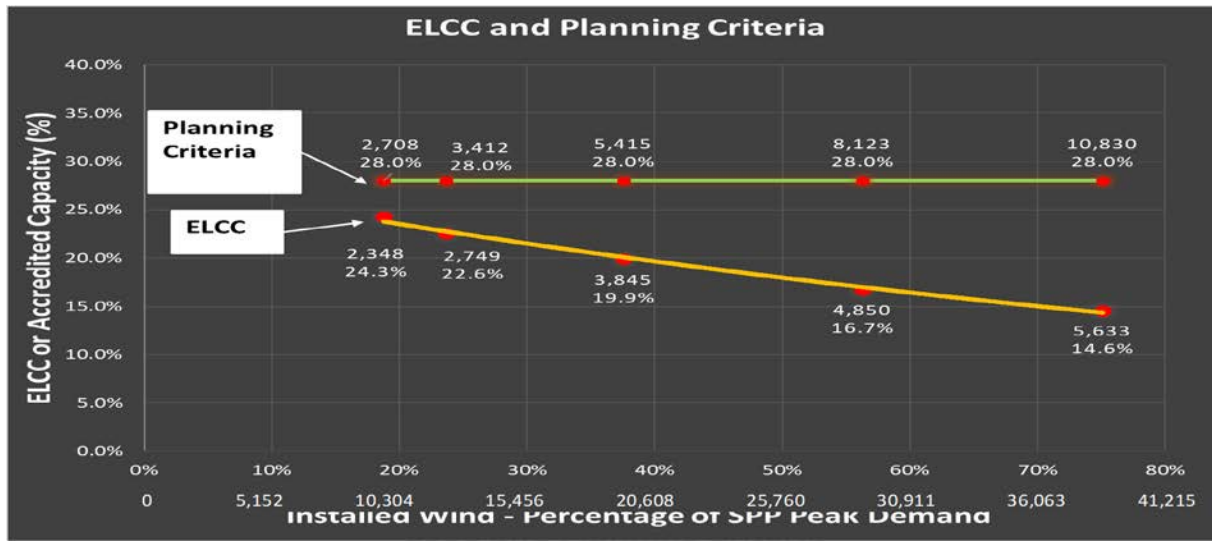
- Supply Adequacy Working Group
 - July 31st Meeting
 - Rolled out the draft of the ELCC wind whitepaper
 - August Meeting
 - Discuss member comments on the wind whitepaper
 - Kickoff discussion on solar language
 - September Meeting
 - Continue discussion and approve wind and solar whitepaper
- Cost Allocation Working Group
 - August Meeting
 - Introduce the wind whitepaper and expectations
 - Tee off the solar discussion
 - September Meeting
 - Continue discussion on wind and solar discussion
 - October Meeting
 - Endorse the wind and solar whitepaper

ELCC Policy Timeline

- Market and Operations Policy Committee
 - October Meeting
 - Seek approval of wind and solar ELCC whitepaper
- Board of Directors
 - January 2020 Meeting
 - Seek approval of wind and solar ELCC whitepaper
- Regional State Committee
 - January 2020 Meeting
 - Seek approval of wind and solar ELCC whitepaper

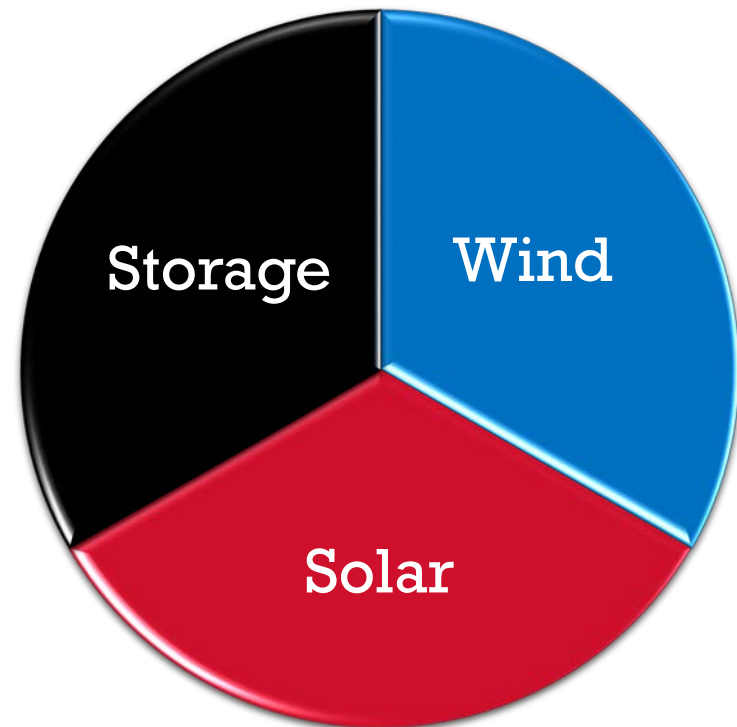
SAWGW Evaluation Of ELCC

- Review and research industry use of ELCC Methodology
 - Independent System Operators (ISOs), Regional Transmission Organizations (RTOs) and Balancing Authorities (BAs), including MISO, Xcel Energy, PacifiCorp, CAISO and PJM utilize ELCC practices to determine capacity value of variable resources
- Determine the reliability need for establishing ELCC methodology in SPP
- Determine the amount of accredited capacity for wind in the SPP footprint based on ELCC based methodology
- Compare ELCC results to SPP Planning Criteria methodology

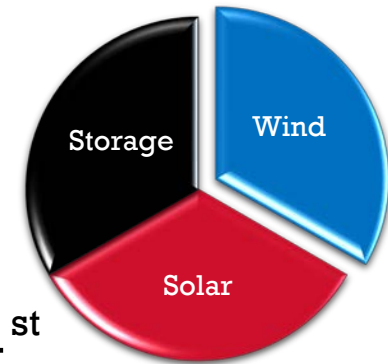


SAWG ELCC Rollout

- SAWG approved the use of Effective Load Carrying Capability as the guiding principle for the accreditation of solar, wind and storage resources in the SPP Balancing Authority, replacing the current accreditation methodology found in section 7.1.6.1 (7) of the SPP Planning Criteria once new criteria language is approved
- ELCC Wind Report was approved by the SAWG at the March meeting
- Each resource type will be studied and an associated report and allocation methodology will be approved by the SAWG

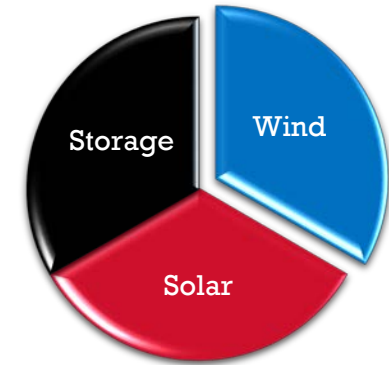


ELCC Whitepaper



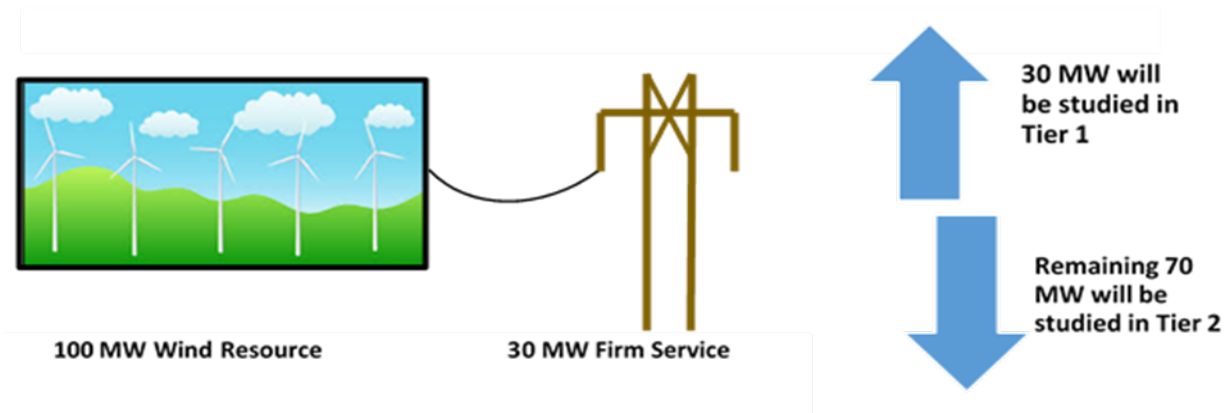
- Winter and Summer ELCC will be performed
- ELCC results will be posted annually October 1st
- ELCC Transition Period
 - Wind resources will maintain their accreditation as calculated by 7.1.6.1 (7) until the end of the transition period
 - ELCC for all wind resources would become effective in the 2023 summer season
 - SPP will allocate the SAWG approved 2019 ELCC study results to each LRE as informational only
 - SPP will perform an ELCC study in 2020 and 2021 and allocate to each LRE as informational only
 - ELCC performed annually on the summer and winter seasons starting in 2020

ELCC Whitepaper

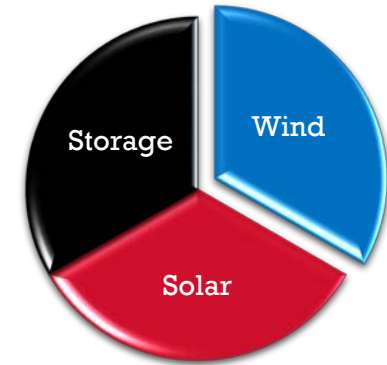


- **Study Priority**

- In Tier 1, Designated Resources get priority and will be allocated the higher percentage of capacity accreditation
 - Study all Designated Resources (DR) up to the firm service amount only
- Tier 2 consist of additional wind and will be accredited the incremental value, which will result in a lower accreditation
 - The additional MWs between the firm service amount and contract or nameplate amount



ELCC Whitepaper



- **ELCC Allocation Load Shape**

- Tier 1: Allocate to Firm Designated Resources first
- Tier 2: Allocate to all additional wind next

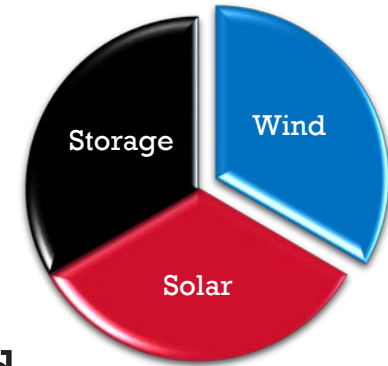
- **Tier 1 MW Allocation**

- Allocation based on LRE load
 - This requires LREs to submit hourly load data to SPP
 - If LRE doesn't provided data by June 1, their resource will get studied in Tier 2

- **Tier 2 MW Allocation**

- Allocate all Tier 2 resources to SPP BA load
 - Leftover MW's and Deliverable Capacity

ELCC Whitepaper



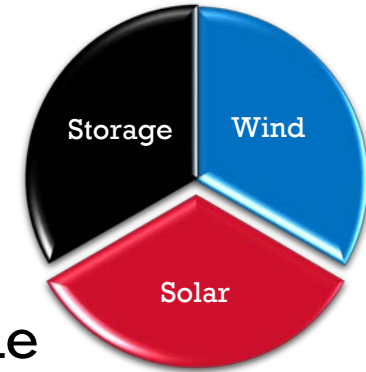
- **ELCC Allocation Load Hours**

- Select the hourly values occurring during the top 3% of LRE/BA load hours for the analyzed peak season
- Data needs for facilities in commercial operation less than three years or more than four years is consistent with current Planning Criteria

- **New Wind Facilities**

- Facilities that come into service between the annual ELCC studies will receive a flat 10%
- This is still being reviewed by the SAWG

Solar Results

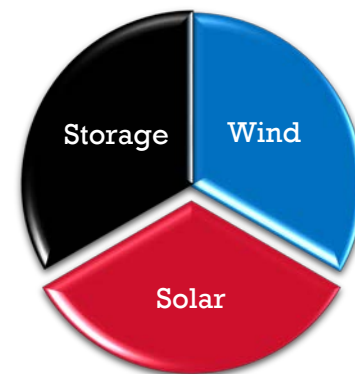


- Finalized solar results were presented to the SAWG at the July meeting
- Solar report will be presented to the SAWG at the August meeting
- Solar will be included in the whitepaper

- 59 total sites in study
- 12 States
- States with largest nameplate:
 - Oklahoma
 - Kansas
 - Texas

State	Nameplate (MW)
Arkansas	93
Iowa	1
Kansas	1,061
Louisiana	9
Minnesota	2
Missouri	66
Nebraska	585
New Mexico	316
North Dakota	7
Oklahoma	1,077
South Dakota	293
Texas	772
Total	4,282

Solar Results



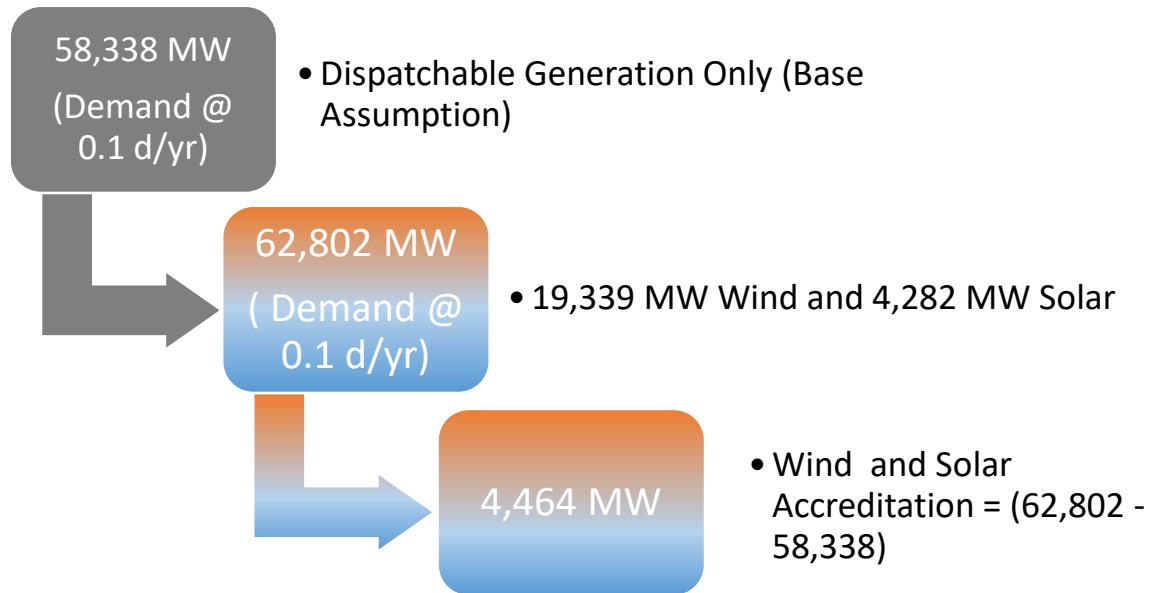
ELCC Solar Results		
Nameplate Wind (MW)	0	0
Nameplate Solar (MW)	215	4,282
2012	87%	54%
2013	36%	55%
2014	84%	64%
2015	84%	69%
2016	99%	64%
2017	99%	69%
Average Accreditation	82%	62%

Solar Results

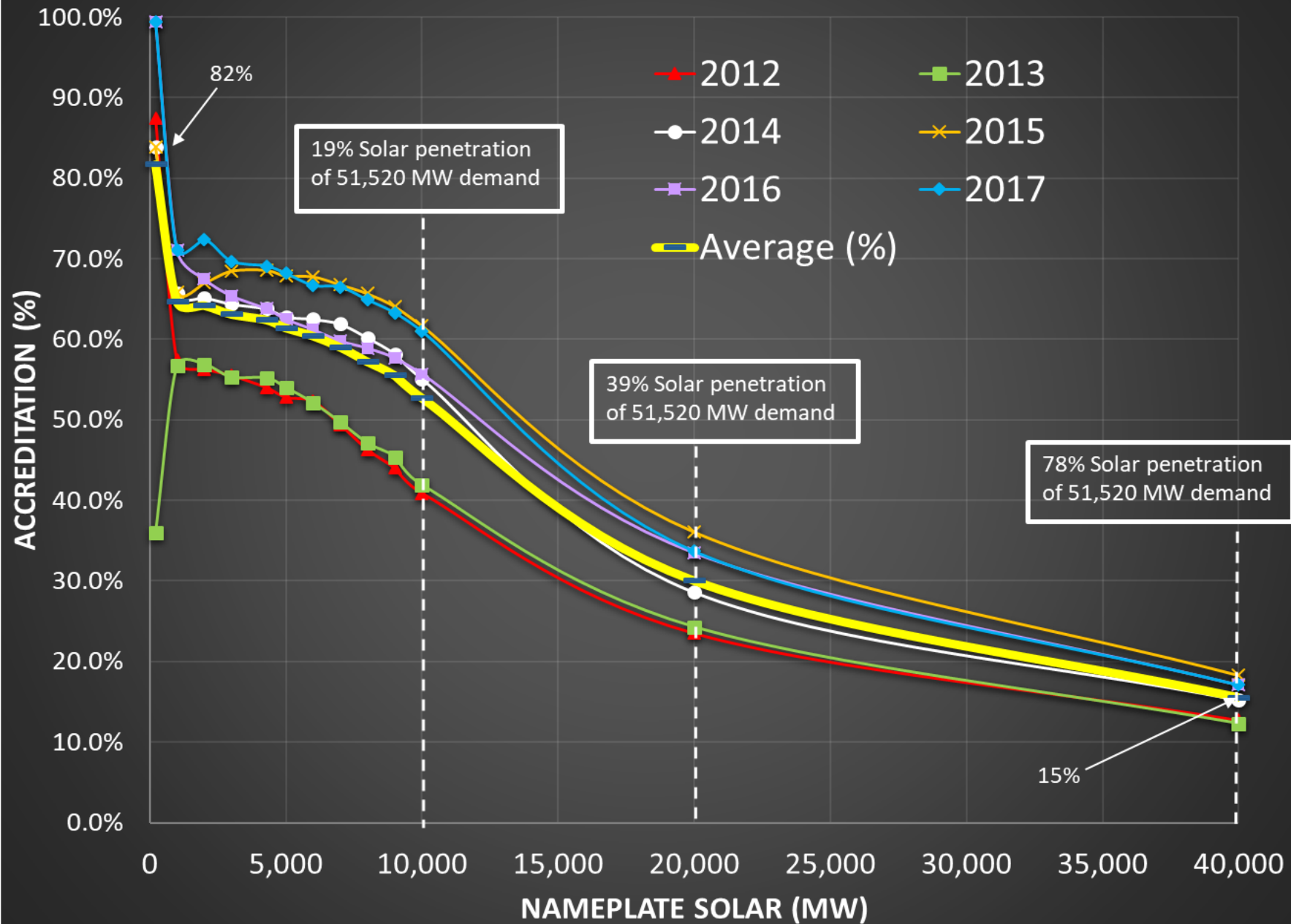
- 4,282 MW Nameplate Solar
- 19,339 MW Nameplate Wind

Year	Wind & Solar (MW)	Total %
2012	4,464	18.9%
2013	4,495	19.0%
2014	6,100	25.8%
2015	7,099	30.1%
2016	9,114	38.6%
2017	8,823	37.4%
Average	6,682	28.3%

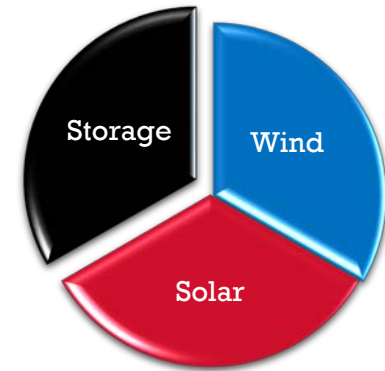
Year 2012 Wind and Solar Studied Together Example



ELCC Solar Results (No Wind)



Battery Storage Study



- Staff has engaged Astrape to perform an ELCC study on battery storage
 - SPP's ELCC and LOLE analysis currently utilizes Astrape's SERVIM software
 - SPP is utilizing Astrape's expertise
 - Study kicks off early August and will take approximately 3 months to complete
 - The results will determine the battery accredited capacity
- Presented to the MOPC at the July meeting
- Batteries will be studied at multiple MW capacity amounts
 - 500, 1000, 2000, 4000 and 8000 MWs
- Storage durations assessed will be 2, 4, 6, and 8 hours
- Battery charging will consist of both grid and solar charging scenarios
- Dispatch strategy will include both preservation of reliability and economic arbitrage

Ongoing Actions

- Staff has performed an ELCC solar study and presented the initial results to the SAWG
- Solar report presented to SAWG in August
- Update whitepaper presented in August to include solar along with the wind policy
 - Whitepaper will be approved by the SAWG and then presented to CAWG, MOPC, BOD and RSC before becoming a revision request
- Continue evaluating battery storage
- Questions sent to ResourceAdequacy@spp.org

