SOUTHWEST POWER POOL
ECONOMIC STUDIES WORKING GROUP MEETING

October 9-10, 2019
Southwest Power Pool – Little Rock, AR

SUMMARY OF MOTIONS AND ACTION ITEMS

2021 ITP Scope Items

1. Approved Must Run Status Identification as presented in attachment 14.
2. Approved a motion to fully develop a portfolio for the third future and use it to inform consolidation decisions between futures 1 and 2.

SOUTHWEST POWER POOL
ECONOMIC STUDIES WORKING GROUP MEETING
October 9-10, 2019
Southwest Power Pool – Little Rock, AR

MINUTES

AGENDA ITEM 1 – ADMINISTRATIVE ITEMS

Economic Studies Working Group (ESWG) Chair Alan Myers called the meeting to order at 1:00 p.m. The following members were in attendance or represented by proxy:

Al Tamimi, SUNC
Alan Myers, ITC
Anita Sharma, AEP
Bennie Weeks, Xcel
Calvin Daniels, WFEC
Gayle Nansel, WAPA
Jeremy Severson, BEPC
Jody Holland, SCMCN
Jon Iverson, OPPD
John Olsen, Westar
Kurt Stradley, LES
Michael Watt, OMPA
Randy Collier, CUS
Tim Owens, NPPD
Warren Whitson, Southern
Zac Hager, OGE

(Attachment 1 – Attendance) (Attachment 2 – Proxy)

Amber Greb (SPP) confirmed there was a quorum and provided the antitrust statement. Alan Myers reviewed the agenda for any changes, but none were presented. (Attachment 3 – agenda)

> **Calvin Daniels made a motion, seconded by Zac Hager, to approve the agenda. The motion was approved unanimously.**

AGENDA ITEM 2 – REVIEW OF PAST ACTION ITEMS

Amber Greb reviewed past action items. (Attachment 4 – Past Action Items)

AGENDA ITEM 3 – SOFTWARE TOOL EVALUATION UPDATE

Juliano Freitas (SPP) reviewed information about the software evaluation retreat in Little Rock on November 18th-19th and discussed next steps. Staff will bring a recommendation to the December meeting. (Attachment 5 – Software Evaluation)

AGENDA ITEM 4 – 2020 ITP ASSESSMENT

AGENDA ITEM 4A – SCHEDULE

Sherri Maxey (SPP) reviewed the schedule for the 2020 ITP Assessment. (Attachment 6 – 2020 ITP Schedule) (Attachment 7 – ITP Quarterly Report Card)

AGENDA ITEM 4B – CONSTRAINT ASSESSMENT

Kirk Hall (SPP) gave an overview of the milestone schedule and reminded stakeholders of the opportunity to provide input on 69kV level constraints. (Attachment 8 – 2020 ITP Constraint Assessment)

AGENDA ITEM 5 – ACTION ITEM 197: DATA SOURCE FOR FUEL FORECASTS

Ahmed Azzawi (SPP) discussed fuel price data sources, potential options and next steps for this action item. The group expressed a preference for a hybrid approach rather than a single data source approach. (Attachment 9 – AI 197 – Fuel Price Forecast)

AGENDA ITEM 6 – 2021 ITP ASSESSMENT

AGENDA ITEM 6A – SCHEDULE

Sherri Maxey reviewed the schedule for the 2021 ITP Assessment. (Attachment 10 – 2021 ITP Schedule)

AGENDA ITEM 6B – SCOPE

AGENDA ITEM 6BI – ELCC EDUCATION

Chris Haley (SPP) presented an overview of the SAWG evaluation of an ELCC methodology for accreditation of wind, solar, and storage. (Attachment 11 – ESWG ELCC Overview)

AGENDA ITEM 6BII – ACCREDITATION

Kirk Hall brought discussion on changes to wind, solar, and battery accreditation. There was consensus that a static number for accreditation was not the way forward. Staff will bring back results of ELCC impact on 2020 ITP Resource Plan and continue discussion. (Attachment 12 – Accreditation Discussion)

AGENDA ITEM 6BIII – PROTOTYPES

Kirk Hall presented conventional prototypes and displayed the price curves for each. (Attachment 13 – Conventional Generation Prototypes)

AGENDA ITEM 6BIV – MUST RUN UNITS

Brooke Keene (SPP) reviewed the must run status identification and exceptions. She recommended approval of the criteria presented. (Attachment 14 – 2021 ITP Scope Must Run Criteria)

> **Calvin Daniels made a motion, seconded by Zac Hager, to approve the must run status identification criteria as laid out in slides 5, 6 and 7 for the 2021 ITP Scope. The motion was approved unanimously.**

AGENDA ITEM 6BV – CONSOLIDATION

Amber Greb reviewed previous consolidation methodologies and led a discussion on the direction for the 2021 Consolidation. (Attachment 15 – 2021 ITP Consolidation)

> **John Olsen made a motion, seconded by Tim Owens, to fully develop a portfolio for the third future and use it to inform consolidation decisions between futures 1 and 2. The motion was approved.**

AGENDA ITEM 6BVI – SENSITIVITIES

James Bailey (SPP) proposed changes to the ITP Manual language for required sensitivities and methodologies. He proposed requiring identification of sensitivities during futures scope development. There was concern from members of removing requirements but it was suggested to change the language so that if the required sensitivities are covered by the future scenarios then they will not need to be performed. (Attachment 16 – 2021 ITP Scope Sensitivities)

AGENDA ITEM 6C – LOAD & GENERATION REVIEW

Liz Gephardt (SPP) reviewed the Load and Generation Review milestone and reminded the group of upcoming stakeholder reviews. (Attachment 17 – 2021 ITP Load and Generation Review Update)

AGENDA ITEM 7 – ACTION ITEM 199: SITING PLAN

Joshua Norton (SPP) led a discussion on the ESWG action item for the siting plan. He mentioned the siting whitepaper which was sent out following the meeting. (Attachment 18 – Action Item 199 – Siting Plan)

AGENDA ITEM 8 – HITT ACTION ITEM: EVALUATE B/C RATIO FOR ECONOMIC PROJECTS

Amber Greb presented on the HITT recommendation to evaluate B/C ratio for economic projects. She reviewed SPP's current process, time value of money, and next steps for addressing the action item. (Attachment 19 – HITT Recommendation)

AGENDA ITEM 9 – CLOSING ITEMS

There were no action items taken.

Respectfully Submitted,

Amber Greb

Secretary

Name	Company/Email	Attendance
Aaron Vander Vorst	aaron.vandervorst@enel.com	Webex
Ahmed Alazzawi	SPP	In person
Alan Myers	ITC	In person
Amber Greb	SPP	In person
Andy Berg (MRES)	andrew.berg@mrenergy.com	Webex
Anita Sharma	AEP	In person
Antonio Barber	abarber@spp.org	Webex
Ben Abing	babing@itctransco.com	Webex
Bennie Weeks	Xcel	In person
Bill Leung	NPRB	In person
Brian Johnson	AEP	In person
Brian Rounds (AESL)	brian.rounds@aeslconsulting.com	Webex
Brooke Keene	SPP	In person
Calvin Daniels	WFEC	In person
Casey Cathey	SPP	In person
Charles Hendrix	chendrix@sp.org	Webex
Chris Cranford (SPP)	ccranford@spp.org	Webex
Chris Haley	chaley@spp.org	Webex
Chris matthes	camatthes@aep.com	Webex
Clayton Mayfield	cmayfield@spp.org	Webex
Cliff Franklin	Sunflower	In person
David Busse (Liberty-Empire)	david.busse@libertyutilities.com	Webex
David Mindham	david.mindham@edpr.com	Webex
Dee Edmondson	dedmondson@spp.org	Webex
Derek Sunderman	dsunderman@savionenergy.com	Webex
Don Frerking (SPP)	dfrerking@spp.org	Webex
Erica Brooks (SPP)	ebrooks@spp.org	Webex
Gayle Nansel	nansel@wapa.gov	Webex
Hakan Balci	hakan.balci@us.abb.com	Webex
Heather Starnes (MJMEUC/KMEA)	heather@healylawoffices.com	Webex
Ian Wren	iwren@spp.org	Webex
J.P. Maddock (BEPC)	JPMaddock@bepc.com	Webex
Jacob Justice (ACES)	jacobj@acespower.com	Webex
James Bailey	SPP	In person
Jason Mazigian (BEPC)	jmazigian@bepc.com	Webex
Jason Shook	jason.shook@gdsassociates.com	Webex
Jason Speer	jspeer@spp.org	Webex
Jay Rasmussen - Duke Energy	Jay.Rasmussen@duke-energy.com	Webex
Jeff Knottek	jeff.knottek@cityutilities.net	Webex
Jeremy Severson	JSeverson@bepc.com	Webex

Jim Jacoby	AEP	In person
Jody Holland	jholland@gridliance.com	Webex
Joe Fultz	jfultz@grda.com	Webex
Joey Schrepel	jschrepel@bepc.com	Webex
John Boshears	john.boshears@cityutilities.net	Webex
John Olsen	Evergy	In person
Jon Iverson	jiverson@oppd.com	Webex
Josh Norton	SPP	In person
JP Meitner	Evergy	In person
Kalen Coleman	kcoleman@misoenergy.org	Webex
Keith Collins	SPP MMU	In person
Kelsey Allen	kallen@spp.org	Webex
Kirk Hall	SPP	In person
Kurt Stradley	LES	In person
Kyle McKinney	GSEC	In person
Laura Cummings	Energy Exemplar	In person
Matt R.	mrudy@itctransco.com	Webex
matthews@mwec.com	matthews@mwec.com	Webex
Michael Wegner (ITC)	mwegner@itctransco.com	Webex
Mike Swan	mswan@oppd.com	Webex
Neeya Toleman (SPP)	ntoleman@spp.org	Webex
Pat Hayes	phayes@lspower.com	Webex
Randy Collier (CUS)	randy.collier@cityutilities.net	Webex
Robert Pick (NPPD)	rjpick@nppd.com	Webex
Robert Tallman (OG&E)	tallmarj@oge.com	Webex
Ryan Benton	rbenton@mwenergy.com	Webex
Sean Rogers	sean.m.rogers@xcelenergy.com	Webex
Serhat Guney	SPP MMU	In person
Sherri Maxey (SPP)	smaxey@spp.org	Webex
Simon Mahan	AWEA	In person
Steve Gaw	APA	In person
Steve Hohman	shohman@oppd.com	Webex
Tim Owens	NPPD	In person
Tracy Sykes	contractor-tsykes@spp.org	Webex
Tyler Fletcher	tjfletcher@burnsmcd.com	Webex
Warren Whitson	Southern Power	In person
Zac Hager	OGE	In person

SPP Southwest Power Pool

SOUTHWEST POWER POOL, INC.
ECONOMIC STUDIES WORKING GROUP MEETING

October 9th-10th, 2019
SPP Offices – Little Rock, AR

AGENDA

Wednesday, 1:00p.m. – 5:00p.m.
Thursday, 8:00a.m – 3:00p.m.

1. Administrative Items..Alan Myers (15 minutes)
   A. Call to Order, Introductions..Alan Myers
   B. Receipt of Proxies..Amber Greb
   C. Review of Agenda[1]..Alan Myers
   D. Antitrust Reminder..Amber Greb
2. Review of Past Action Items[1]..Amber Greb (10 minutes)
3. Software tool evaluation Update[1]..Juliano Freitas (30 minutes)
4. 2020 ITP Assessment..(20 minutes)
   A. Schedule[1]..Sherri Maxey (10 minutes)
   B. Constraint Assessment[1]..Kirk Hall (10 minutes)
5. Action Item 197: Data source for Fuel Forecasts[1]..Ahmed Azzawi (30 minutes)
6. 2021 ITP Assessment..(250 minutes)
   A. Schedule[1]..Sherri Maxey (10 minutes)
   B. Scope..(220 minutes)
      i) ELCC Education[1]..Chris Haley (60 minutes)
      ii) Accreditation..Kirk Hall (30 minutes)

---

[1] Background Material Included

iii) Prototypes[1] .... Kirk Hall (30 minutes)

iv) Must run units (Approval Item) [1] .... Brooke Keene (20 minutes)

v) Consolidation[1] .... Amber Greb (30 minutes)

vi) Sensitivities[1] .... James Bailey (30 minutes)

C. Load & Generation Review[1] .... Liz Gephardt (20 minutes)

7. Action Item 199: Siting plan[1] .... Joshua Norton (40 minutes)

8. HITT Action Item: Evaluate B/C ratio for Economic Projects[1] .... Amber Greb (60 minutes)

9. Closing Items .... All (10 minutes)

A. Summary of Action Items (Amber Greb)

B. November Meeting Agenda Items

C. Future Meetings

i) November 6-7, 2019: 41st floor AEP Office, Dallas Texas

ii) December 11-12, 2019: 41st floor AEP Office, Dallas Texas

iii) January 8-9, 2020: 41st floor AEP Office, Dallas Texas

iv) February 5-6, 2020: 41st floor AEP Office, Dallas Texas

v) March 5-6, 2020: 41st floor AEP Office, Dallas Texas

Southwest Power Pool, Inc.

ECONOMIC STUDIES WORKING GROUP

Pending Action Items Status Report

August 13-14, 2019

	Action Item	Date Originated	Status	Comments
151	SPP staff to look into optional software tools for use in ITP studies.	May 20th, 2015	In Progress SPP Staff	Vendor Reports are due September 27th. The 2-day retreat will be November 18-19th.
183	SPP staff to perform transmission outage analysis in the first part of 2017 to determine the appropriate APC benefit percentage to utilize for the mitigation of transmission outages benefit metric.	September 15th, 2016	In Progress SPP Staff	ESWG Approved the methodology and staff to begin analysis. Staff to bring an update by the December ESWG meeting
190	SPP staff to perform a full transmission outage analysis before the next RCAR	October 12th, 2017	SPP Staff	
193	Discuss separate load forecasts for resource planning purposes, and how to incorporate into the ITP process	January 22nd, 2018 November 15th, 2018	SPP Staff	Has been incorporated into the Load review for 2020. Bringing to September meeting Update the ITP Manual- Approved, going to Oct MOPC
196	From SSC: ESWG to look into including market to market payments/settlements in the ITP Planning Process	January 9th, 2019	In Progress SPP Staff	Staff presented an education session in February, bring additional information as available
197	Research data sources for Fuel Prices and determine methodology for averaging/removing bias	March 13, 2019	SPP Staff	Staff will bring a recommendation during 2021 Scope development
198	Research the appropriateness of the 2.5% inflation rate used in ITP Assessments	April 11, 2019	SPP Staff	Goal: to complete and implement for the 2021 ITP Assessment
199	How we inform our Siting Plan: Research the appropriateness of relying on the GI Queue for Siting of renewables and Battery Storage and looking into other available information	April 2019	SPP Staff	Goal: to complete and implement for the 2021 ITP Assessment
200	Address the Load shape issues provided by ABB	July 2019	SPP Staff	

201	Review the interchange methodology	July 2019	SPP Staff	Goal: To complete for the 2021 ITP Assessment
202	Re-Evaluate the existing wind 80/100 meter turbine height	July 2019	SPP Staff	Goal: 2021 ITP Scope
203	Conduct a Lessons Learned Session with the ESWG on the 2019 ITP Assessment	August 2019	SPP Staff	
204	Discuss the 2020 ITP consolidation methodology and if changes are needed in the scope.	September	All	

Formatted: Normal, Space Before: 0 pt, After: 0 pt

Formatted: Font color: Black

Member	Proxy	Note
Randy Collier	John Boshears	Thursday
Al Tamimi	Cliff Franklin	

Amber/Alan,

John Boshears has my proxy for the Thursday portion of the ESWG meeting.

Thanks,

Randy Collier

SPP Southwest Power Pool

SOFTWARE EVALUATION - RETREAT

JULIANO FREITAS

GENERAL INFORMATION

- Date: November 18th & 19th (8:30 AM – 4:30 PM)
- Location: Hilton Garden Inn West Little Rock
- Presentation Order:
  - Energy Exemplar November 18th
  - ABB November 19th

RETREAT AGENDA (BOTH DAYS)

- Introduction (SPP Staff – 20 minutes)
  - Process description
  - Score Card information
- Vendor Introduction (Vendor – 15 minutes)
- Benchmark Results (Vendor – 105 minutes)
  - Presentation (60 minutes)
  - Q&A Session (45 minutes)
- Software Functionality (Vendor – 105 minutes)
  - Presentation (60 minutes)
  - Q&A Session (45 minutes)

RETREAT AGENDA

- Hardware Specifications (Vendor – 45 minutes)
  - Presentation (30 minutes)
  - Q&A Session (15 minutes)
- Technical Support (Vendor – 30 minutes)
  - Presentation (20 minutes)
  - Q&A Session (10 minutes)
- Transition Plan (Vendor – 30 minutes)
  - Presentation (20 minutes)
  - Q&A Session (10 minutes)
- Closing Arguments (20 minutes)-Day 2 only

ATTENDANCE

- SPP Staff (Transmission Planning, Modeling, IT)
- SPP members
- ESWG participants
- ISOs/RTOs
- Consulting companies

NEXT STEPS

- Retreat in November
- ESWG evaluation and decision in December
  - Closed session during ESWG meeting
  - Retreat feedback
  - Score Card results
  - Cost evaluation

2020 ITP SCHEDULE

SHERRI MAXEY

OCTOBER 9, 2019

POWERFLOW MODEL

- Start: 7/09/2018
- End: 2/22/2019 (Final Approval)
- Member Review Time:
  - *Pass 0 – Trial 1: 7/13/2018 – 7/20/2018 (5 days)*
  - *Pass 0 – Trial 2: 8/03/2018 – 8/24/2018 (15 days)*
  - *Pass 1: 9/14/2018 – 9/21/2018 (5 days)*
  - *Pass 2: 10/05/2018 – 10/26/2018 (15 days)*
  - *Pass 3: 11/16/2018 – 12/07/2018 (15 days)*
  - *Pass 4: 12/21/2018 – 1/11/2019 (15 days)*
  - *Final Data Submission Deadline: 1/11/2019*
  - *Final Initial ITP: 2/11/2019 – 2/15/2019 (5 days)*
  - *Final Initial ITP Approval: 2/22/2019*
  - Final TWG Approval with Oct. 2019 Board approved projects in Nov. 2019
- Staff Leader: David Duhart (dduhart@spp.org)
- Working Group Approval: TWG

SHORT CIRCUIT MODEL

- Start: 11/14/2018
- End: 2/28/2019
- Member Review Time:
  - *Pass 1: 12/14/2018 – 1/11/2018 (6 days)*
  - *Pass 2: 2/08/2019 – 2/15/2019 (6 days)*
  - *Pass 3: 2/21/2019 – 2/28/2019 (6 days) (MDWG Approval) Complete*
  - Final ITP Approval with Oct. 2019 Board approved projects in Nov. 2019
- Staff Leader: Michael Odom (modom@spp.org)
- Working Group Approval: TWG

MARKET ECONOMIC MODEL BUILD

- Start: 2/01/2019
- End: 12/18/2019 (Member's Final Approval)
- Member Review Time:
  - Post 1: 6/13/2019 – 6/28/2019 (12 days)
  - Post 2: 9/30/2019 – 10/07/2019 (5 days)
  - Post 3: Post for Approval (Constraint Assessment): 10/11/2019 – 10/18/2019 (5 days)
  - ESWG Member Approval for use in Constraint Assessment via email by 10/18/19
  - Final Posting for ESWG Member Approval via email: 12/11/2019 – 12/18/2019
  - Final ESWG Approval via email vote by 12/18/2019
- Staff Leader: Kelsey Allen (kallen@spp.org)
- Working Group Approval: ESWG

CONSTRAINT ASSESSMENT

- Start: 10/14/2019
- End: 12/18/2019
- Member Review Time:
  - Post for Stakeholder Review: 11/20/2019 – 11/27/2019
  - Final Posting for TWG Member Approval via email: 12/11/2019 – 12/18/2019
  - Final TWG Approval email vote ending: 12/18/2019
- Staff Leader: Kirk Hall (khall@spp.org)
- Working Group Approval: TWG

MARKET POWERFLOW MODELS (BA RELIABILITY)

- Start: 10/18/2019
- End: 1/15/2020 (Member's Final Approval)

- Staff Leader: Michael Odom (modom@spp.org)
- Working Group Approval: TWG

BASE RELIABILITY NEEDS ASSESSMENT

- Start: 10/15/2019
- End: 3/12/2020

- Staff Leader: Joshua Pilgrim (jpilgrim@spp.org)

MARKET POWERFLOW RELIABILITY NEEDS ASSESSMENT

- Start: 1/15/2020
- End: 3/12/2020

- Staff Leader: Joshua Pilgrim (jpilgrim@spp.org)

ECONOMIC NEEDS ASSESSMENT

- Start: 12/18/2020
- End: 3/12/2020

- Staff Leader: James Bailey (jbailey@spp.org)

PUBLIC POLICY NEEDS ASSESSMENT

- Start: 12/18/2019
- End: 3/12/2020

- Staff Leader: Liz Gephardt (lgephardt@spp.org)

OPERATIONAL NEEDS ASSESSMENT

- Start: 1/02/2020
- End: 3/12/2020

- Staff Leader: Will Tootle (wtootle@spp.org)

SHORT CIRCUIT NEEDS ASSESSMENT

- Start: 10/15/2020
- End: 3/12/2020

- Staff Leader: Jason Terhune (jterhune@spp.org)

DPP WINDOW

- Start: 3/13/2020 12:00 a.m.
- End: 4/11/2020 11:59 p.m.
- Member Review Time:
  - Transmission-planning response window (30 calendar days)
- Staff Leader: Tammy Bright (tbright@spp.org)

SOLUTIONS DEVELOPMENT & VALIDATION

- Start: 3/16/2020
- End: 6/05/2020

- Staff Leaders:
  - Reliability: Kelsey Allen (kallen@spp.org)
  - Economic/Policy: Liz Gephardt(lgephardt@spp.org)
  - Operational: Will Tootle (wtootle@spp.org)
  - Short Circuit: Jason Terhune (jterhune@spp.org)

SOLUTIONS EVALUATION

- Start: 3/16/2020
- End: 6/10/2020

- Staff Leaders:
  - Reliability: Adam Bell (abell@spp.org)
  - Economic/Policy: Amber Greb (agreb@spp.org)
  - Operational: Will Tootle (wtootle@spp.org)
  - Short Circuit: Jason Terhune (jterhune@spp.org)

RELIABILITY PORTFOLIO DEVELOPMENT

- Start: 3/16/2020
- End: 7/31/2020

- Staff Leader: Kelsey Allen (kallen@spp.org)

ECONOMIC PORTFOLIO DEVELOPMENT (INCLUDES PROJECT GROUPING)

- Start: 3/16/2020
- End: 7/31/2020

- Staff Leaders: Liz Gephardt (lgephardt@spp.org)

STUDY COST ESTIMATES – ROUND 1

- Start: 6/08/2020
- End: 6/19/2020

- Staff Leader: John O’Dell (jodell@spp.org)

PLANNING SUMMIT

- Start: 6/22/2020
- End: 7/03/2020
- Member Review Time:
  - Summit Materials (7 days prior to meeting) – Date TBD
- Staff Leader: Tammy Bright (tbright@spp.org)

STUDY COST ESTIMATES – ROUND 2

- Start: 7/06/2020
- End: 7/18/2020

- Staff Leader: John O'Dell (jodell@spp.org)

FINALIZE RELIABILITY PORTFOLIOS

- Start: 7/31/2020
- End: 8/07/2020

- Staff Leader: Kelsey Allen (kallen@spp.org)

OPTIMIZATION & PORTFOLIO CONSOLIDATION

- Start: 7/31/2020
- End: 8/14/2020

- Staff Leaders:
  - Liz Gephardt (lgephardt@spp.org)
  - Amber Greb (agreb@spp.org)

PROJECT STAGING

- Start: 8/17/2020
- End: 8/31/2020

- Staff Leader: Liz Gephardt (lgephardt@spp.org)

BENEFIT METRICS CALCULATION

- Start: 8/17/2020
- End: 9/11/2020

- Staff Leader: Antonio Barber (abarber@spp.org)

STABILITY ANALYSIS

- Start: 8/17/2020
- End: 9/11/2020

- Staff Leader: Dee Edmondson (dedmondson@spp.org)

SENSITIVITY ANALYSIS

- Start: 8/17/2020
- End: 9/11/2020

- Staff Leader: James Bailey (jbailey@spp.org)

FINAL RELIABILITY ASSESSMENT

- Start: 8/17/2020
- End: 9/11/2020

- Staff Leader: Neeya Toleman (ntoleman@spp.org)

RATE IMPACTS/ATRR

- Start: 8/31/2020
- End: 9/18/2020

- Staff Leader: Antonio Barber (abarber@spp.org)

FINAL REPORT

- Start: 8/1/2020
- End: 9/18/2020
  - Final ESWG/TWG Approval in Sept. 2020
- Staff Leader: Tammy Bright (tbright@spp.org)

TWG/ESWG FINAL APPROVALS

- Start: 9/18/2020
- End: 10/2/2020

- Staff Leaders:
  - TWG – Dee Edmondson (dedmondson@spp.org)
  - ESWG – Amber Greb (agreb@spp.org)

MOPC AND SPP BOARD

- Start: 9/14/2020
- End: 10/27/2020

- Member Review Time:
  - MOPC: 10/2/2020 – 10/13/2020 (7 days)
  - SPP Board: 10/20/2020 – 10/27/2020 (5 days)

SPP Southwest Power Pool

ITP

ITP QUARTERLY REPORT CARD

ANTOINE LUCAS

OCTOBER 16, 2019

STATUS LEGEND

Status Indicator	Status	Milestone Tasks Are…
★	Complete	Completed on-time
●	On Track	In progress and on schedule
▲	Monitor/At Risk	Being monitored for potential schedule/ study impact(s)
▼	Late/Delayed	Completed late/behind schedule
■	In Mitigation	Following mitigation process

On Track

2019 ITP

COMPLETED MILESTONES

★	Complete

Milestone	Status	Start Date	End Date
Project Grouping Finalization	★	6/28/2019	7/08/2019
Portfolio Optimization & Consolidation	★	7/09/2019	8/02/2019
Benefit Metrics	★	8/05/2019	8/26/2019
Staging	★	8/05/2019	8/15/2019
Sensitivities Analysis	★	8/05/2019	8/26/2019
Stability Analysis	★	8/05/2019	8/26/2019
Final Reliability Assessment	★	8/05/2019	8/28/2019
Rate Impacts	★	8/15/2019	8/28/2019
Finalize Report with ESWG/TWG approval to post for October 2019 Market and Operations Policy Committee (MOPC)	★	4/1/2019	10/01/2019

On Track

CURRENT AND UPCOMING MILESTONES

Milestone	Status	Start Date	End Date
MOPC Recommendation Approval	●	10/15/2019	10/16/2019
Regional State Committee (RSC) Review	●	10/28/2019	10/28/2019
SPP Board of Directors Approval	●	10/29/2019	10/29/2019

Monitor/At Risk

2020 ITP

CURRENT AND UPCOMING MILESTONES

▲	Monitor/At Risk

Milestone	Status	Start Date	End Date
In mitigation; project end date not currently at risk			
Market Economic Model (MEM) Build	▲	2/01/2019	12/18/2019
Constraint Assessment	▲	10/14/2019	12/18/2019
Market Powerflow Model (MPM) Build	▲	10/18/2019	1/15/2020
Needs Assessments	▲	11/07/2019	3/15/2020

Monitor/At Risk

MITIGATION AND GO GREEN PLAN

- Mitigation
  - Experiencing issues in MEM simulations
    - Currently researching and working with software vendor
    - Impacts Constraint Assessment
  - Constrained resources due to work overlap finalizing the 2019 ITP
  - Project end date not currently impacted
- Go Green Plan
  - Reduce duration of needs assessment
  - Schedule is also being reviewed for other areas where efficiencies or schedule time may be gained

2020 ITP POWERFLOW MODEL - ENTITY ENGAGEMENT

Monitor/At Risk

Essentially all data submitters participated in model build and submitted data by deadlines; however, additional corrections were submitted after deadline by some entities

Entities that provided data/changes after the Final Data Submission Deadline are listed below:

APPLICABLE ENTITIES		
GLHP		

Note: SPP performed evaluations of all late requests/changes per Section 10.3 of the SPP ITP Manual

On Track

2021 ITP

CURRENT AND UPCOMING MILESTONES

On Track

Milestone	Status	Start Date	End Date
Scope Development	On Track	7/08/2019	1/03/2020
Powerflow Model Development	On Track	7/08/2019	3/06/2020
Load and Generation Review	On Track	7/16/2019	2/05/2020
Short Circuit Model Development	On Track	8/09/2019	3/06/2020

2020 ITP CONSTRAINT ASSESSMENT

KIRK HALL

HIGH LEVEL SCHEDULE

- Constraint evaluation: 10/7-11/12
- Post for stakeholder review: 11/20-11/27
- Final Posting: 12/4
- Email vote ending: 12/11

ADDITIONAL CONSTRAINT INFORMATION

- ITP Manual allows for members to submit constraints for 69 kV facilities
  - Include any 69 kV constraints with constraint assessment feedback or through RMS

In addition to the approved list of constraints, some 69 kV constraints may be included in the constraint list as needed to properly control the dispatch of resources on the 69 kV system and capture congestion in developing 100 kV and above solutions. These constraints will be suggested or provided by SPP stakeholders.

ACTION ITEM 197 – FUEL PRICE FORECAST

ESWG

OCTOBER 09, 2019

AHMED ALAZZAWI

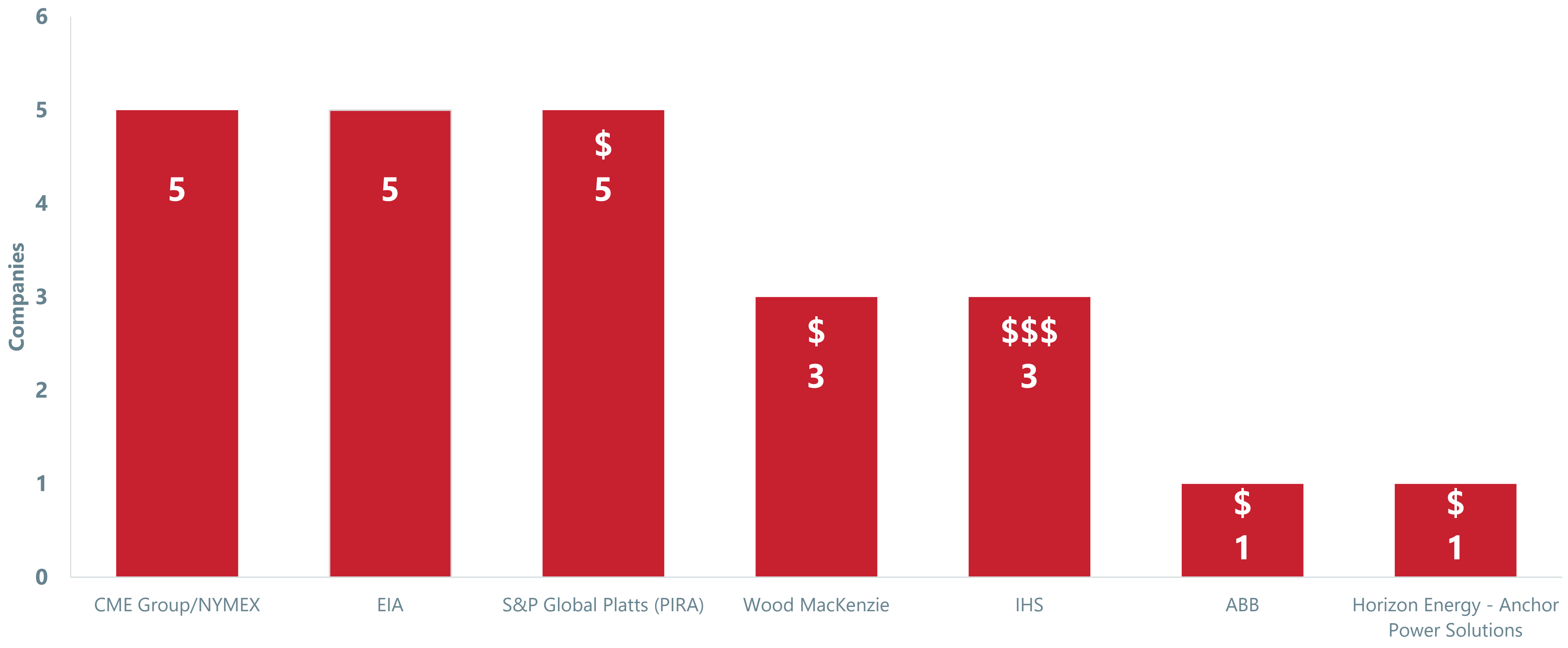
OVERVIEW

- ESWG Action Item 197: Research data sources for Fuel Prices and determine methodology for averaging/removing bias
- *Today's Goals*
  - Discuss data sources
  - Discuss Potential options and get feedback
  - Discuss Next Steps

ITP MANUAL LANGUAGE (SECTION 2.2.1.7)

- "Fuel price forecasts for the reference case future, including natural gas, oil, uranium, coal, and associated transportation costs, will be based upon the latest vendor data set.
- Potential adjustments to the fuel prices for the non-reference case future(s) will be determined by the ESWG to appropriately reflect each future and will be described in the ITP study scope document."

FUEL FORECAST SOURCES USED BY STAKEHOLDERS BASED ON 2021 ITP FUTURES SURVEY



PUBLICALLY AVAILABLE RESOURCES

- CME Group/NYMEX – Henry Hub Futures
  - Updates every 10 minutes
  - Contract prices
  - Should be considered as a reference used to speculate price
- EIA – Annual Energy Outlook
  - New Outlook every year released in January
  - Data provided annually

S&P GLOBAL PLATTS (PIRA)

- Forecasts data update frequency:
  - 20-year forward curves are published monthly.
- Methodology used to create the forecast:
  - "Platts aggregates multiple data sources to produce a single cross-checked series of curves. ICE Market Data, CME Group Henry Hub, and EIA are the primary inputs into the Platts M2MS curves. Platts incorporates ICE intra-day and end of day data for the forward curve derivation and apply a shaping methodology to generate monthly curves. Platts utilizes the Gas Pipeline Competition Model (GPCM), to extend curves beyond available market data. For 20 year curves, the first 120 months are consistent with the M2MS curve of the last trading day of the month. The latter part of the curve is determined with the help of a GPCM forecasting model that attempts to replicate the economics of the natural gas industry. The data is quality assured and checked for outliers, curve abnormalities, and are then verified with ICE Final Settlement data for consistency."
- Fee for purchasing the forecast:
  - $2K
- Historical data for comparison:
  - Available historical data

WOOD MACKENZIE

- Forecasts data update frequency:
  - Semi-annually
- Methodology used to create the forecast:
  - "Wood Mackenzie employs a rigorous methodology to analyze natural gas markets across the globe based on integrated, bottom-up data, modelling, and analysis. This global process begins with the release of the Wood Mackenzie GDP outlook, and flows through our entire global analytical framework. Wood Mackenzie uses a variety of simulation models to analyze the markets and produce our research. These models are one of the primary tools for forecasting our natural gas prices, gas flows, and supply/demand balances. Wood Mackenzie's proprietary Global Gas Model (GGM) produces market prices at which incremental demand and supply are in equilibrium. Wood Mackenzie also licenses the GPCM model from RBAC Inc. GPCM is used to produce our regional basis price forecast, identify pipeline constraints, flows, utilization, and need for new pipelines."
- Fee for purchasing the forecast:
  - Single report: $5400
- Historical data for comparison:
  - They can provide historical data

IHS MARKIT

- Forecasts data update frequency:
  - Semi-annually
- Methodology used to create the forecast:
  - "The IHS Markit natural gas projections are based on several detailed analytical models as well as judgments formed by IHS Markit proprietary research. The two principal, vendor-supplied models on which IHS Markit relies are the AURORA xmp® power market simulation model and the Gas Pipeline Competition Model GPCM —a highly detailed natural gas transportation model—that simulates flows of natural gas on pipelines. Inputs in the GPCM are on a state/provincial level. The GPCM solves the entire interconnected North American natural gas market, providing an outlook for flows and natural gas prices across the continent with monthly detail. IHS Markit uses a customized version of the GPCM that integrates with AURORA by utilizing state/provincial power sector demand as an input. The GPCM and AURORA model are iterated to arrive at converged forecasts that are monthly and weather normalized."
- Fee for purchasing the forecast:
  - $25K for a membership of the North American Power, Gas, Coal, and Renewables
- Historical data for comparison:
  - They can't share historical releases

ABB

- Forecasts data update frequency:
  - Semi-annually
- Methodology used to create the forecast:
  - "Natural gas prices for the first 12 months of the forecast are driven by Henry Hub futures market prices plus a basis hub differential forward price. For the following 13-48 months, ABB Advisors blend the futures market price expectations with our long-term fundamental forecast, so that by the end of this period the gas price forecasts are consistent with our fundamental view. To forecast future gas hub prices beyond the initial 48-month period, ABB Advisors utilized a cost-minimization linear program model of gas supply and demand."
- Fee for purchasing the forecast:
  - $6K
- Next Release date:
  - November
- Used in previous ITP assessments

HORIZONS ENERGY - ANCHOR POWER SOLUTION

- Forecasts data update frequency:
  - Semi-annually
- Methodology used to create the forecast:
  - "The methodology is judgment-based and combines information from a variety of public sources. For instance, the reference case is strongly influenced by market forwards for the first four years and then trended according to a long-term outlook of supply and demand. The high and low cases are impacted by the EIA Annual Energy Outlook when we capture variation from our reference case. Horizons Energy utilizes the EnCompass simulation engine provided by Anchor Power and uses it to derive simultaneous price forecasts."
- Fee for purchasing the forecast:
  - $2,500 per semi-annual release
- Historical data for comparison:
  - They can provide earlier releases of HH fuel price projections

MTEP – MISO

- Methodology used to create the forecast:
  - Planning team at MISO puts together their projected fuel forecasts.
  - MISO uses NYMEX gas prices for the first 2 years
  - For later years MISO uses an average of EIA and IHS (previously MISO used a combination of EIA and Wood MacKenzie).
  - According to internal analysis performed, MISO concluded that IHS and Wood McKenzie match very closely in long term fuel price forecasts.

POSSIBLE OPTIONS

- Keep using ABB Henry Hub forecast data
- Hybrid methodology:
  - Create a hybrid approach using ABB forecasts and available public resources (EIA, NYMEX)
  - Purchase additional fuel price forecast data from different vendors and create a hybrid approach with ABB forecasts
  - SPP MMU intends to use S&P Global Platts fuel price forecast data. Thus to keep consistency within different groups at SPP; creating a hybrid of ABB and Platts would be another option.

NEXT STEPS

- Benchmark previous fundamental forecasts from ABB against some hybrid approaches
- November ESWG
  - Requesting fuel price methodology approval for the 2021 ITP and discuss potential ITP Manual changes.

SPP Southwest Power Pool

2021 **ITP**

2021 ITP SCHEDULE

SHERRI MAXEY

OCTOBER 9, 2019

SCOPE DEVELOPMENT

- Start: 7/08/2019
- End: 1/14/2020 (Member's Final Approval)
  - MOPC Approval: 1/14/2020
- Member Review Time:
  - 12/03/2019 – 12/11/2019 (8 days)
  - Approved by ESWG: 12/11/2019
  - 12/10/2019 – 12/18/2019 (8 days)
  - Approved by TWG: 12/18/2019
- Staff Leader: Jason Speer (jspeer@spp.org)
- Working Group Approvals: ESWG and TWG

POWERFLOW & SHORT CIRCUIT MODELS

- Start: 7/09/2019
- End: 3/06/2020 (Final Approval)
- Member Review Time:
  - *Pass 0 – Trial 1: 7/19/2019 – 7/26/2019 (5 days) (complete) – Powerflow only*
  - *Pass 0 – Trial 2: 8/09/2019 – 8/30/2019 (15 days) – Powerflow only*
  - Pass 1 – Trial 1: 9/27/2019 – 10/18/2019 (15 days) – Powerflow only
    - Pass 1 – Trial 1: 10/4/2019 – 10/18/2019 (10 days) – Short Circuit
  - Pass 1 – Trial 2: 11/15/2019 – 12/13/2019 (20 days)
  - Last Chance Data Submission Deadline: 12/13/2019*
  - Pass 2: 1/17/2020 – 2/07/2020 (15 days)
  - Final Chance Data Submission Deadline: 2/07/2020**
  - Final Initial ITP: 2/28/2020 – 3/06/2020 (5 days)
  - Final Initial ITP Approval: 3/06/2020
  - Final ITP Approval with Oct. 2020 Board approved projects in Nov. 2020
- Staff Leader: David Duhart (dduhart@spp.org)
- Working Group Approval: TWG

* **Last Chance** - Data Submitters provide final Transmission Service Inputs (AG1) Data, review Pass 2 models/data submission through MOD, update load and generation reports/reconcile transaction discrepancies.
** **Final Chance** - Data Submitters submit final generation dispatch, DocuCheck corrections and topology data updates through MOD and EDST.

LOAD REVIEW

- Start: 7/19/2019
- End: 3/06/2020 (Member's Final Approval)
- Member Review Time:
  - Load Pass 1 – Trial 1: 9/27/2019 – 10/18/2019 (15 days)
  - Load Pass 1 – Trial 2: 11/15/2019 – 11/22/2019 (5 days)
  - Load Pass 2: 1/17/2020 – 1/24/2020 (5 days)
  - Final Posting for Approval: 2/28/2020
  - Final ESWG Approval: 3/06/2020
- Staff Leader: Liz Gephardt (lgephardt@spp.org)
- Working Group Approval: ESWG

GENERATION REVIEW

- Start: 7/19/2019
- End: 3/06/2020 (Member's Final Approval)
- Member Review Time:
  - Generation Pass 1 – Trial 1: 9/27/2019 – 10/18/2019 (15 days)
  - RAR & Waiver Request to Stakeholders: 9/27/2019 – 10/18/2019 (15 days)
  - Generation Pass 1 – Trial 2: 11/15/2019 – 11/22/2019 (5 days)
  - Generation Pass 2: 1/17/2020 – 1/24/2020 (5 days)
  - Final Posting for Approval: 2/28/2020
  - Final ESWG Approval: 3/06/2020
- Staff Leader: Liz Gephardt (lgephardt@spp.org)
- Working Group Approval: ESWG

ESWG ELCC OVERVIEW

OUTLINE

- Resource Adequacy Concepts
- SAWG Evaluation of ELCC
- ELCC Policy Highlights
- LOLE Refresher
- ELCC Overview
- ELCC Concepts and Impacts
- Wind ELCC Results
- Solar ELCC Results
- ELCC 3 Tier Study and Accreditation Process
- Next Steps

RESOURCE ADEQUACY CONCEPTS

- Establishes longer-term planning margins required to ensure resources are available to reliably serve load under normal and contingency conditions
- Determines how much resource capacity can be counted on to reliably serve load
- Accredited resource capacity has an obligation to be available when needed to meet real-time customer demand and contingencies

SAWG EVALUATION OF ELCC

- Review and research industry use of ELCC Methodology
  - Independent System Operators (ISOs) and Regional Transmission Organizations (RTOs), 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

ELCC POLICY HIGHLIGHTS

- ELCC will be an annual study and performed on both the summer and winter seasons
- Starting with the 2023 summer season, all wind and solar resources will be accredited using the ELCC methodology
  - Allows a three year transitional horizon
- SPP will start performing annual ELCC studies in 2020
  - Results will be used as informational only
- For facilities that come into service between the annual ELCC studies the facility would receive a 10% accreditation for wind and a 50% accreditation for solar for the upcoming summer peak season, or the average of the lowest tier whichever is lower

LOLE REFRESHER

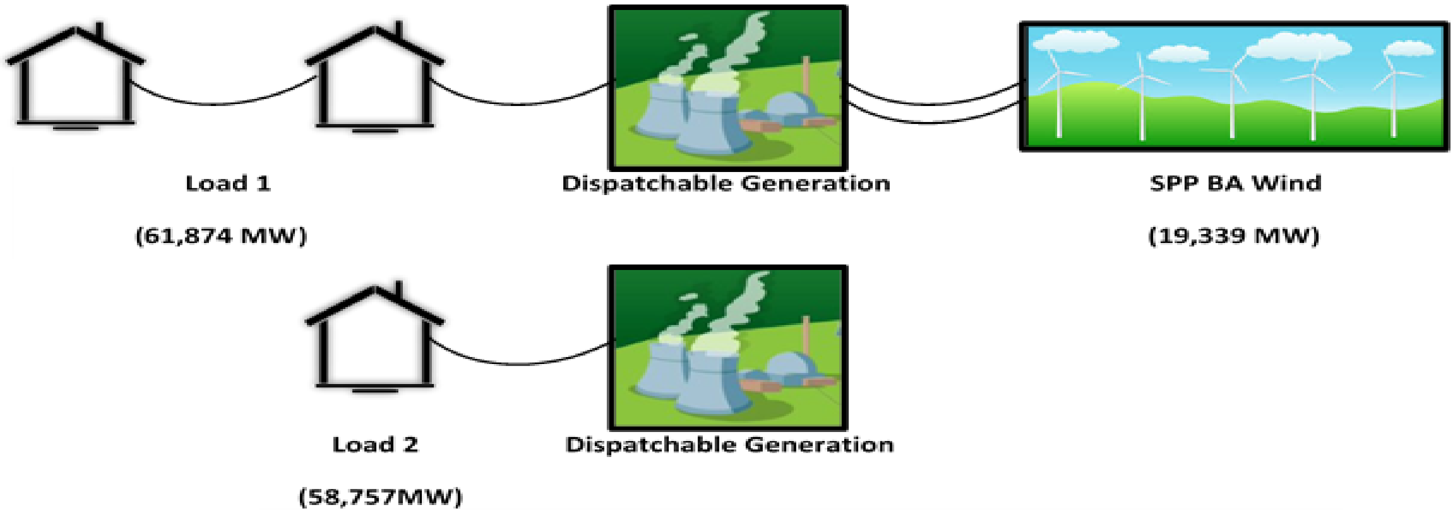
- Planning Reserve Margin validated/determined by a probabilistic Loss-of-load expectation (LOLE) study
- LOLE is the expected number of days or hours per year, that an entity does not have enough capacity to reliably serve the BA forecasted Peak Demand
  - The impact is measured with a reliability target, commonly expressed as an expected value, or LOLE of 0.1 days/year or 1 day in 10 years ("1 in 10")
- SPP performs an LOLE study every two years
- Supply Adequacy Working Group approves scope and report

ELCC OVERVIEW

- Effective Load Carrying Capability (ELCC) is defined as the amount of incremental load a resource can dependably and reliably serve during peak hours
- To effectively measure ELCC of a resource, its ability to serve load reliably has to be determined
  - This is accomplished by calculating the LOLE of the system with and without the studied resource
  - SPP utilizes the reliability metric of 1 day in 10 years (or 0.1 day/year), which is also used in the SPP Loss of Load Expectation (LOLE) analysis

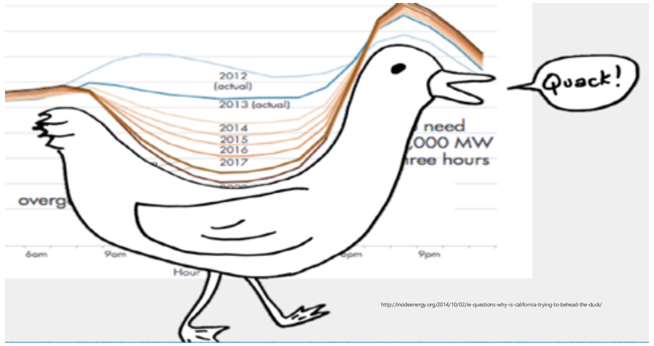
ELCC SIMULATION EXAMPLE

- This represents one example of 30 scenarios performed
- The incremental amount of load represented by "Load 1" and "Load 2" is the ELCC MW value
  - Load 1 = 61,874 MW
  - Load 2 = 58,757 MW
  - ELCC MW = Load 1 – Load 2 = 61,874 – 58,757 = 3,117 MW
  - ELCC % = ELCC MW/Nameplate Wind analyzed = 3,117 / 19,339 = 16.1%

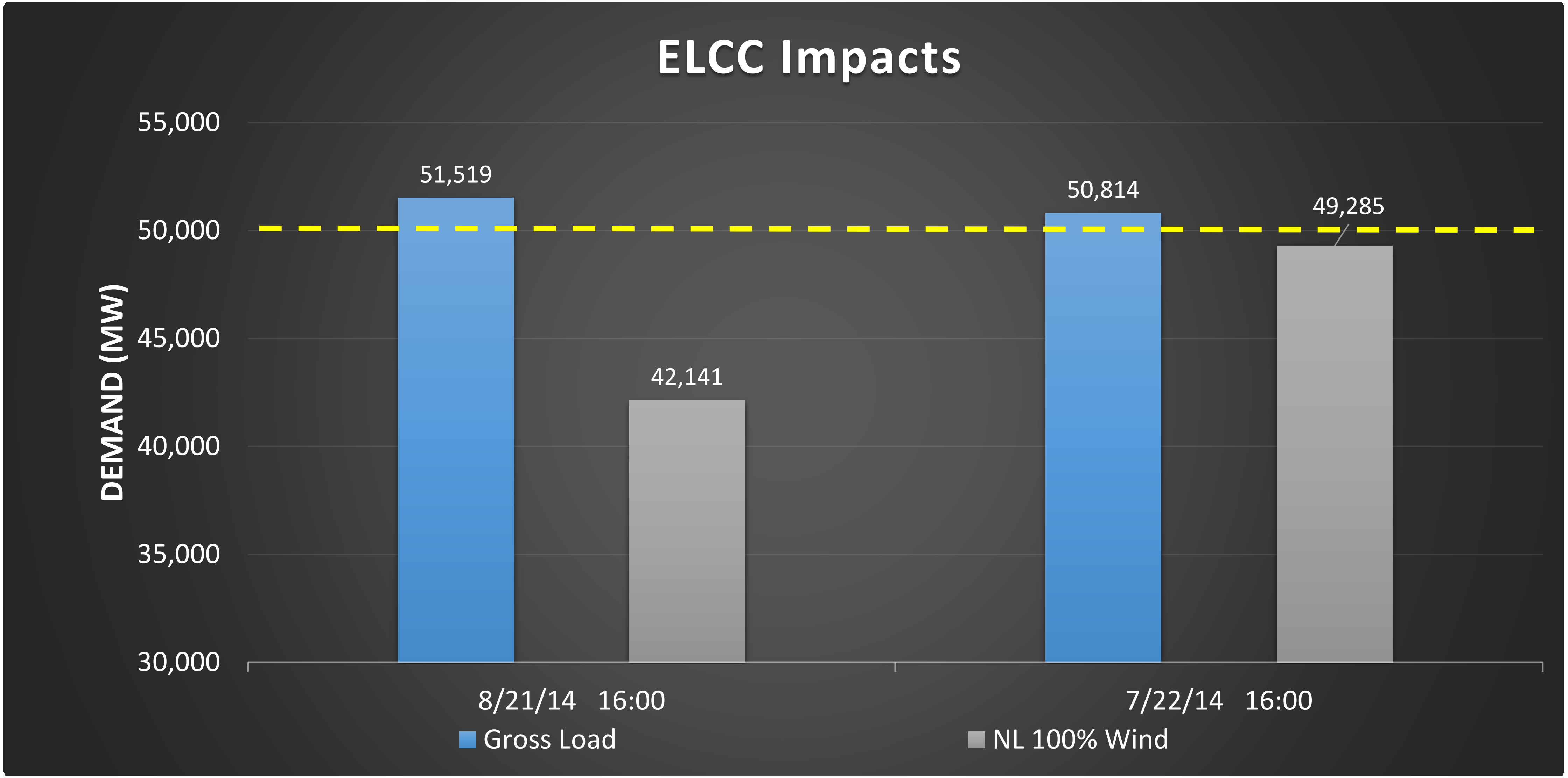


ELCC CONCEPTS/IMPACTS

- ELCC simulation focuses on dispatching capacity to meet "Net Load" amounts
  - "Net load" refers to the amount of demand less the output of renewable energy resources for every hour
    - Amount of wind generation for on-peak conditions shifts the hour of interest when considering "net load" instead of "gross load"
  - "Gross load" is defined as the amount of hourly demand without the consideration of energy from renewable resources
- The larger contribution that on-peak wind generation has on shifting the peak hours of interest, the higher capacity value the resources will have



NET LOAD EXAMPLE

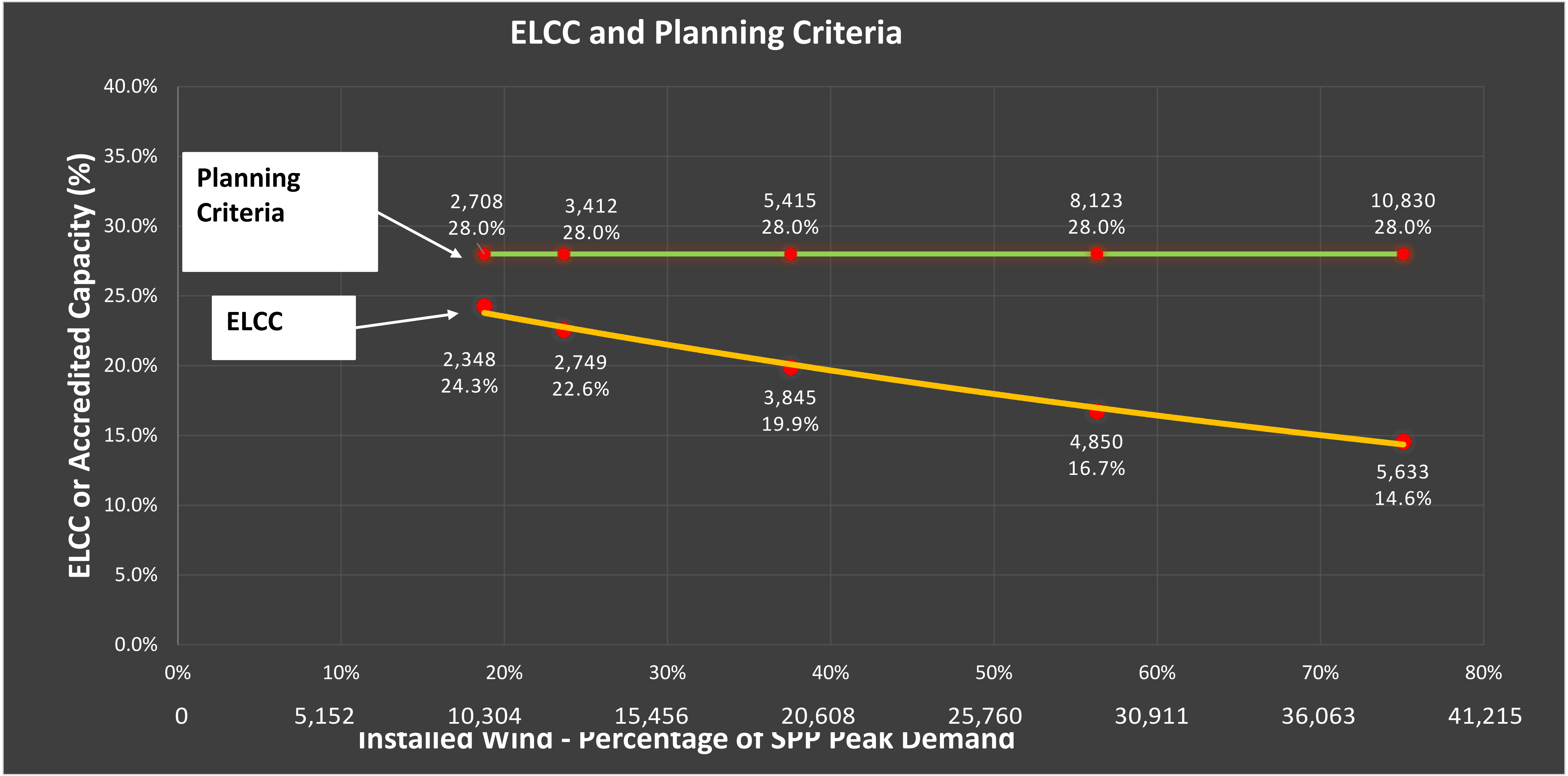


WIND ELCC RESULTS

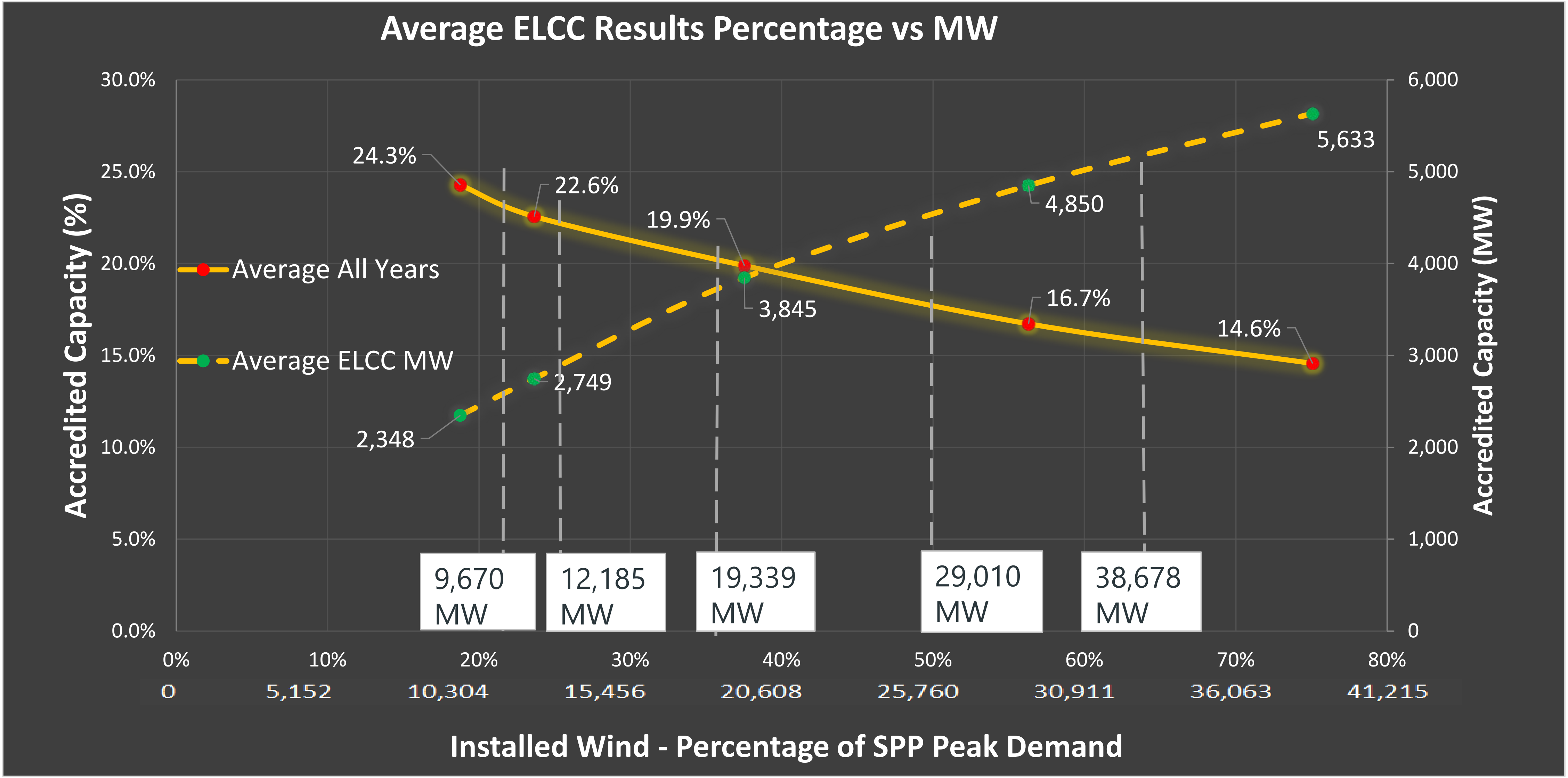
CURRENT WIND ACCREDITATION CRITERIA

- Criteria was originally adopted in 2004, measuring wind resource performance during the top 10% of peak load hours at a 85% confidence interval
  - 3% accreditation if no study was performed
  - Less than 1000 MW of wind on the system
- In 2014, an update to the methodology was approved that increased capacity accreditation by shifting to the use of the top 3% of peak load hours at a 60% confidence interval
  - 5% accreditation if no study was performed
  - Approximately 6,500 MW of wind on the system
- Since 2014, the SPP footprint has expanded geographically and wind on the system has increased to over 20,000 MWs
- Current methodology does not take into consideration the effects of incremental wind facilities added to the system

WIND METHODOLOGY RESULTS COMPARISON



WIND ELCC ACCREDITATION RESULTS



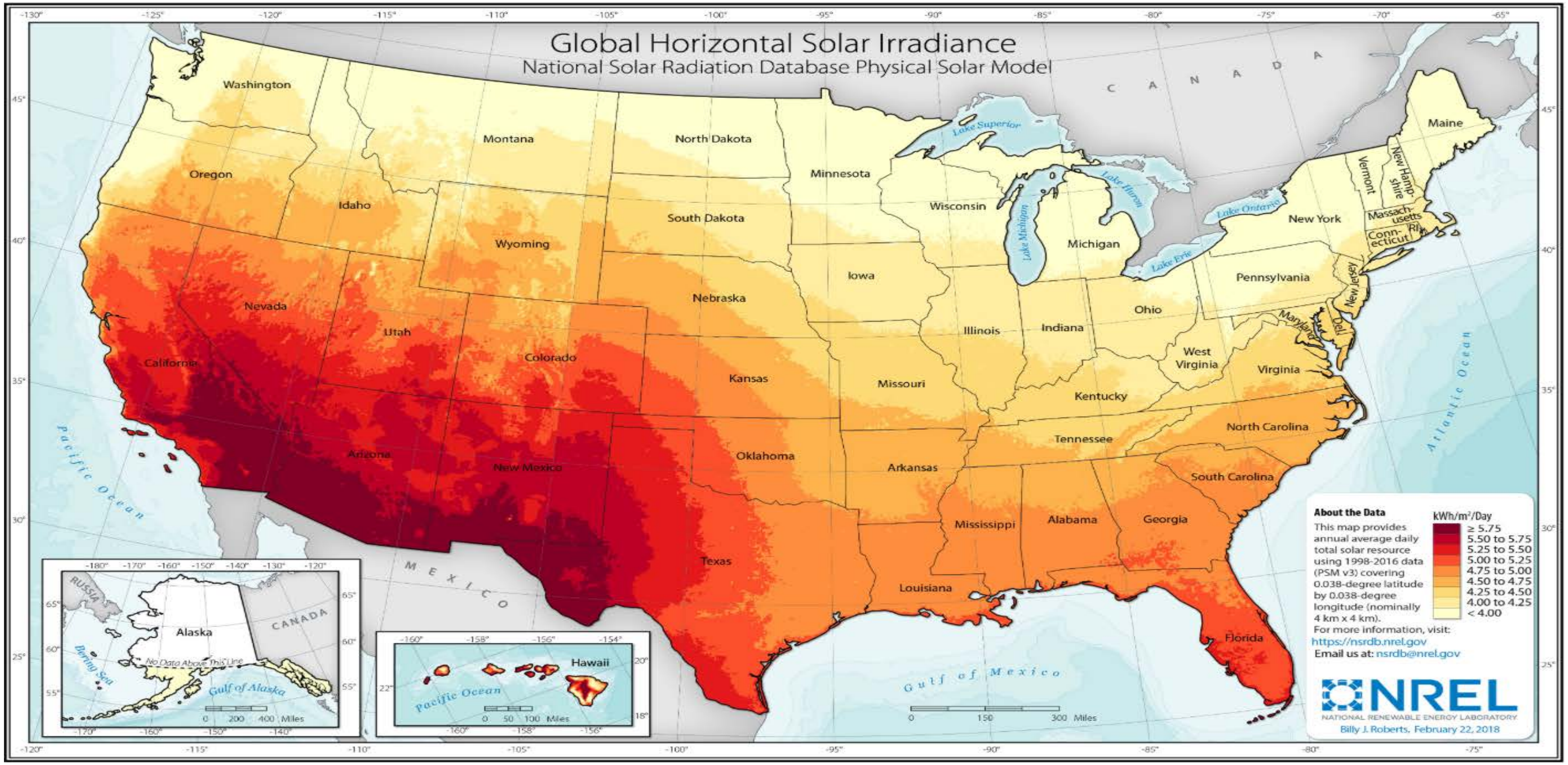
SOLAR ELCC RESULTS

HISTORICAL DATA

- Received historical MW data from SPP Operations for existing 215 MW of solar
- Based on in service solar, not enough historical geographical diversity to scale 215 MW to 4,000 MW
- Weather years 2012 to 2017
  - Solar and load shapes will be paired to form the weather years
- Utilized the current 2019 Integrated Transmission Plan (2019 ITP) Future 2 siting locations to obtain historical irradiance data from NREL for years 2012 to 2017
- Constructed correlation matrix between historical irradiance and MW output from exiting facility data for the additional ITP solar sites

IRRADIANCE

- Irradiance varies by location

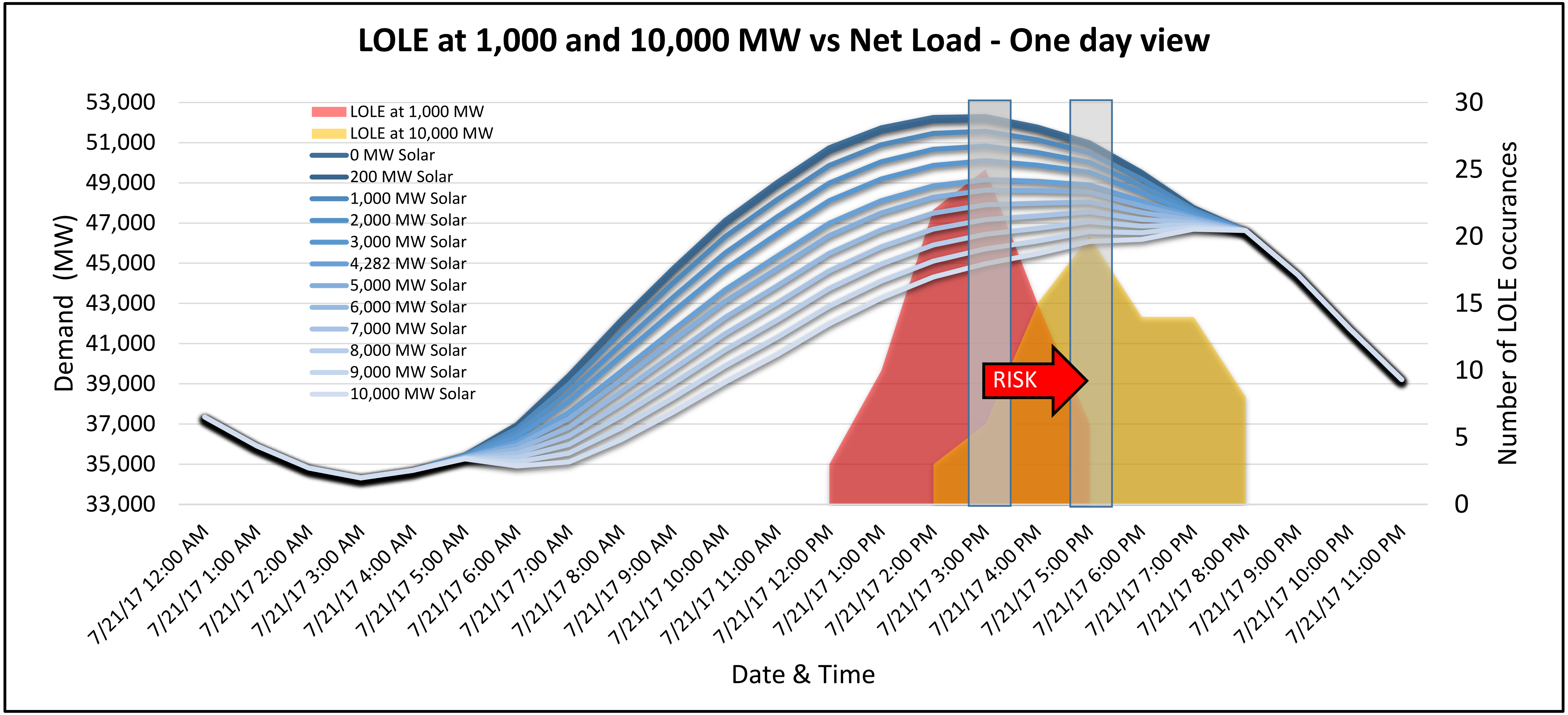


STUDIED SOLAR CAPACITY BY LOCATION

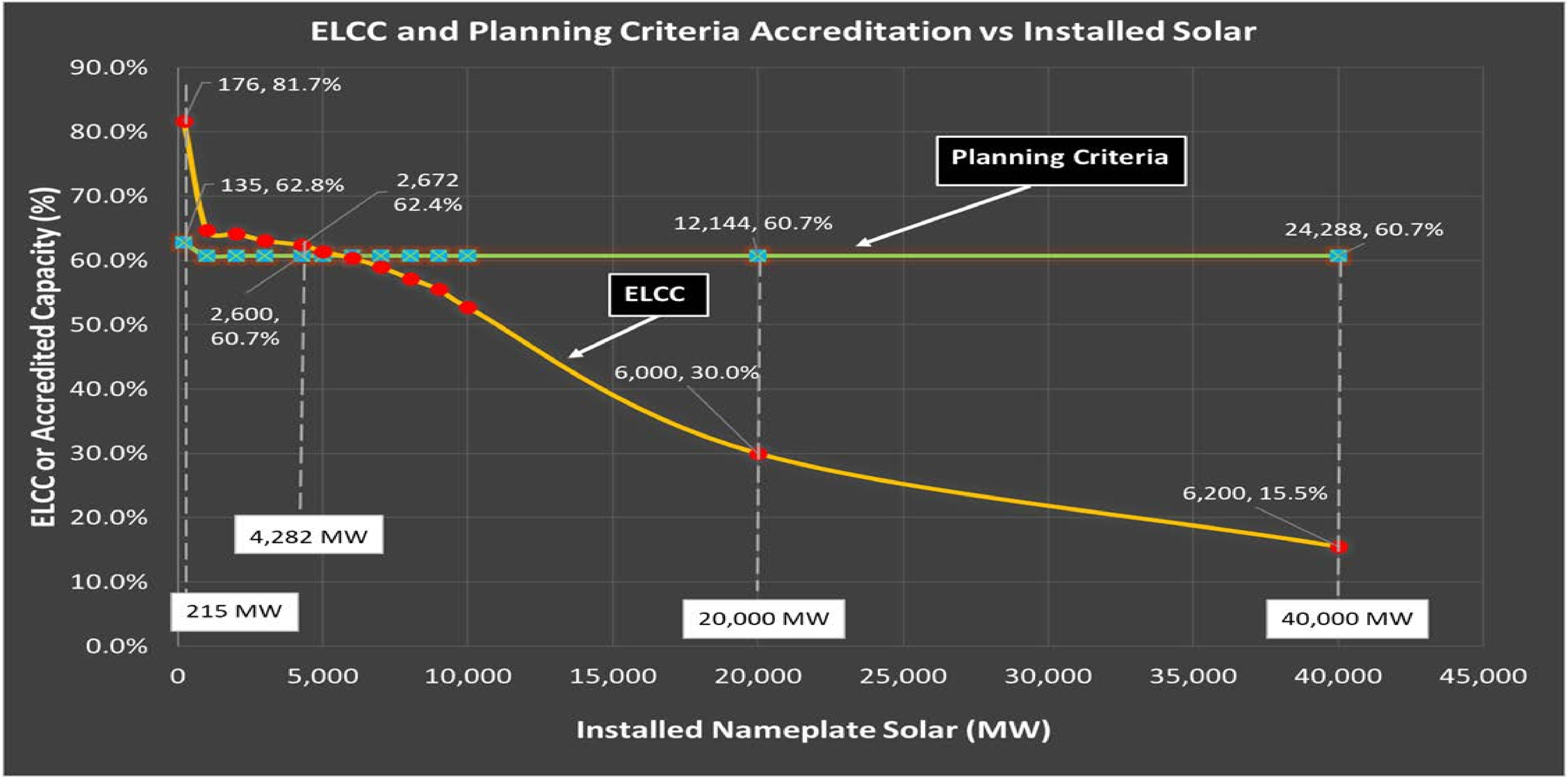
- 59 total sites in study
- 12 States
- States with largest nameplate:
    - Oklahoma
    - Kansas
    - Texas

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

SHIFT IN RELIABILITY AS SOLAR PENETRATION INCREASES



SOLAR METHODOLOGY RESULTS COMPARISON



ELCC 3 TIER STUDY AND ACCREDITATION PROCESS

PLANNING CONCERNS

- Capacity Uncertainty
  - Long term planning needs
  - Creates a floor for Tier 1 firm resources
- What is the value?
  - Creates a consistent certainty for all members
  - Bridges the gap between a regional vs zonal aspect
    - Would require 6 studies a year versus 24 if you went zonal (LOLE zones)

SOLAR AND WIND STUDY PRIORITY

Tier 1:

- Sum of each LRE's variable resources with firm transmission service up to a total equal to a percentage of LRE peak load
  - Solar is 20% of LRE peak load
  - Wind is 35% of LRE peak load

Example of Tier 1 using solar:

- LRE with 1000MW peak and 300 MWs of firm solar
  - 200MWs would be in Tier 1
  - Why just the 200?
    - 20% of 1000MW peak load = 200 MW

STUDY PRIORITY OPTION

Tier 2:

- Additional capacity from the LRE’s firm solar resource that was above the 20% of peak load
  - LRE with 1000MW peak and 300 MWs of firm solar
    - 200MWs would be in Tier 1
    - Additional 100MW would be studied in Tier 2

Tier 3:

- All additional solar resources

TIER 1 OF NEW PROPOSED METHODOLOGY

	Load	Solar Installed	Solar w/ Firm Service	Solar Available in Tier 1	Tier 1	Tier 1 %
LRE 1	5000	1000	1000	1000	610	61%
LRE 2	15000	700	500	500	305	61%
LRE 3	10000	3200	3000	2000	1220	61%
LRE 4	8000	0	0	0	0.0	0%
LRE 5	12000	2100	1500	1500	915	61%
	50000	7000	6000	5000	3050	

IN THE EXAMPLE BELOW LRE 1 HAS INSTALLED SOLAR GREATER THAN 20% OF THEIR PEAK LOAD

	Load	Solar Installed	Solar w/ Firm Service	Solar Available in Tier 1	Tier 1	Tier 1 %
LRE 1	5000	**2000**	**2000**	1000	610	61%
LRE 2	15000	700	500	500	305	61%
LRE 3	10000	3200	3000	2000	1220	61%
LRE 4	8000	0	0	0	0.0	0%
LRE 5	12000	2100	1500	1500	915	61%
	50000	8000	7000	5000	3050	

TIER 2&3 OF NEW PROPOSED METHODOLOGY

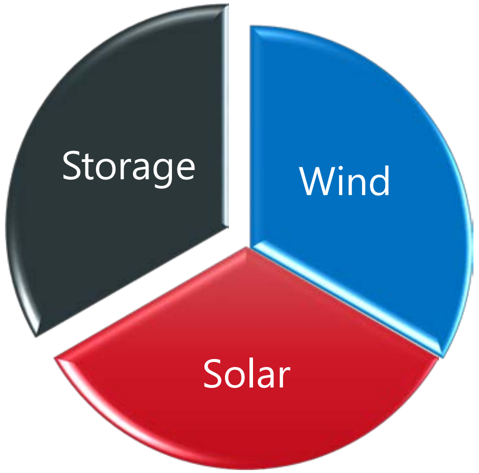
	Tier 2 Pool	Tier 2 MW Allocation	Tier 2 Accred %	Tier 3 Pool	Tier 3 MW Allocation	Tier 3 Accred %	Total Accreditation	Total % of Nameplate
LRE 1	0	0.0	0%	0	0.0	0%	610	61%
LRE 2	0	0.0	0%	200	92	46%	397	57%
LRE 3	1000	550	55%	200	92	46%	1862	58%
LRE 4	0	0.0	0%	0	0.0	0%	0.0	0%
LRE 5	0	0.0	0%	600	276	46%	1191	57%
	1000	550		1000	460		4060	

IN THE EXAMPLE BELOW LRE 1 HAS INSTALLED SOLAR GREATER THAN 20% OF THEIR PEAK LOAD

	Tier 2 Pool	Tier 2 MW Allocation	Tier 2 Accred %	Tier 3 Pool	Tier 3 MW Allocation	Tier 3 Accred %	Total Accreditation	Total % of Nameplate
LRE 1	1000	505	51%	0	0.0	0%	1115	56%
LRE 2	0	0.0	0%	200	88	44%	393	56%
LRE 3	1000	505	51%	200	88	44%	1813	57%
LRE 4	0	0.0	0%	0	0.0	0%	0.0	0%
LRE 5	0	0.0	0%	600	264	44%	1179	56%
	2000	1010		1000	440		4500	

NEXT STEPS

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 SERVM 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
- Approved by 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

ELCC POLICY TIMELINE

- Supply Adequacy Working Group
  - September Meeting
    - Approved 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
  - November
    - 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

2021 **ITP**

ACCREDITATION DISCUSSION

SUBTEXT

ACCREDITATION DISCUSSION

- 2019 ITP Scope
  - Existing units use SPP Planning Criteria
  - New wind accredited at 20%
  - Utility-scale solar accredited at 70%

- 2020 ITP Scope
  - Existing units use SPP Planning Criteria
  - New wind accredited at 20%
  - Utility-scale solar accredited at 70%
  - Battery Storage accredited at 100%

DISCUSSION QUESTIONS

- Should we continue at 20% & 70% for wind and solar?
  - What about ELCC methodology?
- How should we address hybrid sites (multiple fuel types at a single interconnection)?
  - Current individualized methodology or move to a hybrid methodology?
- Comfortable with stand-alone storage accredited at 100%

SPP Southwest Power Pool

2021 **ITP**

CONVENTIONAL GENERATION PROTOTYPES

KIRK HALL

10/9/2019

OBJECTIVE

- Review previous ITPs prototypes
- NG price update
- Review and feedback prototypes
  - CC and CT comparisons

PREVIOUS ITP STUDIES

- 2019 ITP
  - Lazard LCOE '17

Generation Type	Data Source	Tech Type	Size (MW)	Total Capital Cost ($/kW)	V O&M ($/MWh)	F O&M ($/kW-yr)	Heat Rate (Btu/kWh)
Combined Cycle (CC)	Lazard	High	550	1,333	2.05	5.64	6,900
Combustion Turbine (CT)	Lazard	Low	216	820	4.82	5.13	10,300
Gas Recip Engine	Lazard	Low	50	897	12.82	17.94	8,500

- 2020 ITP
  - EIA AEO '18

Generation Type	Data Source	Tech Type	Size (MW)	Total Capital Cost ($/kW)	V O&M ($/MWh)	F O&M ($/kW-yr)	Heat Rate (Btu/kWh)
Combined Cycle (CC)	EIA AEO '18	Conv.	702	1,007	3.63	11.39	6,600
Combustion Turbine (CT)	EIA AEO '18	Adv.	237	697	11.08	7.04	9,800

GAS PRICE FORECAST UPDATE

- Previous prototype developments used NERC nodal data for NG prices
- SPP has previously used ABB's Fundamental Forecast for NG prices in PROMOD
- Prototypes shown in slide deck utilize ABB FF instead of NERC Nodal data

PREVIOUS DISCUSSION

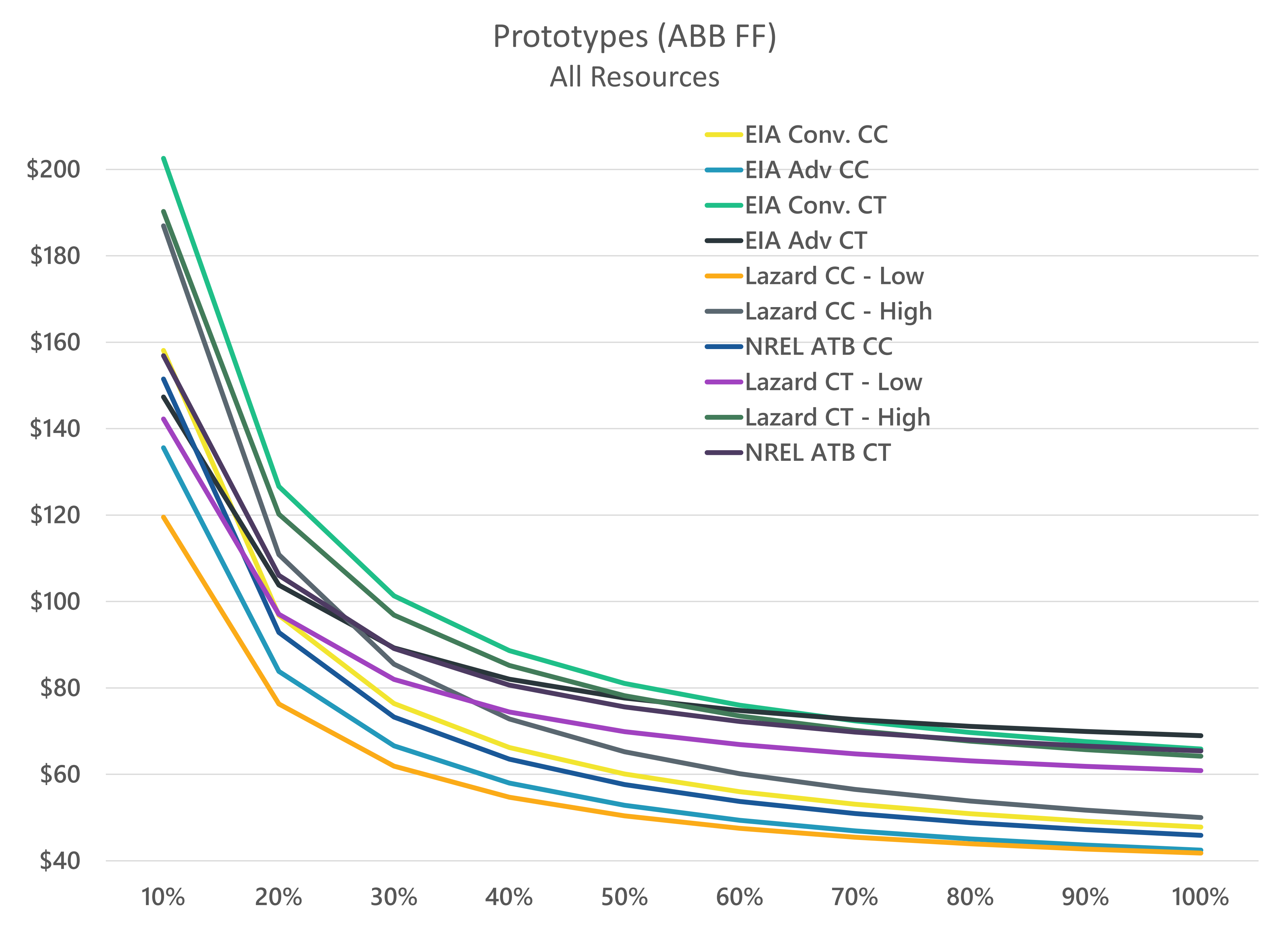
- Lazard 2018 LCOE report posted in November
  - 2019 iteration expected to come out in November 2019
  - EIA 2019 Annual Energy Outlook posted January 24, 2019
  - Updated version likely too late for scope consideration
- Staff suggested using only CC and CT gas resources for the 2021 ITP scope
  - Utilize 2019 EIA AEO and Lazard 2019 LCOE as main data sources
  - Members suggested NREL Annual Technology Baseline as a 3rd resource

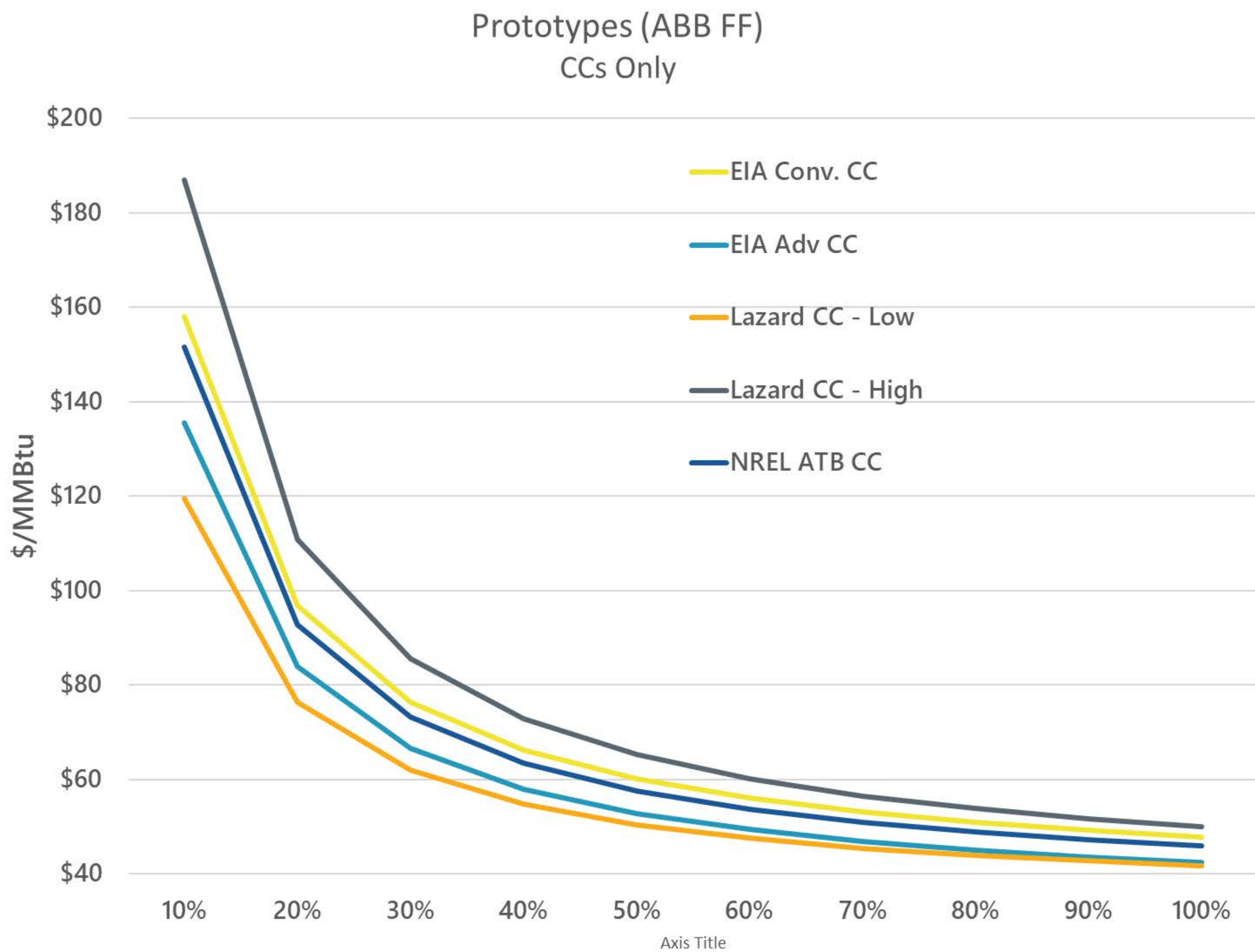
PRICE CURVE ASSUMPTIONS

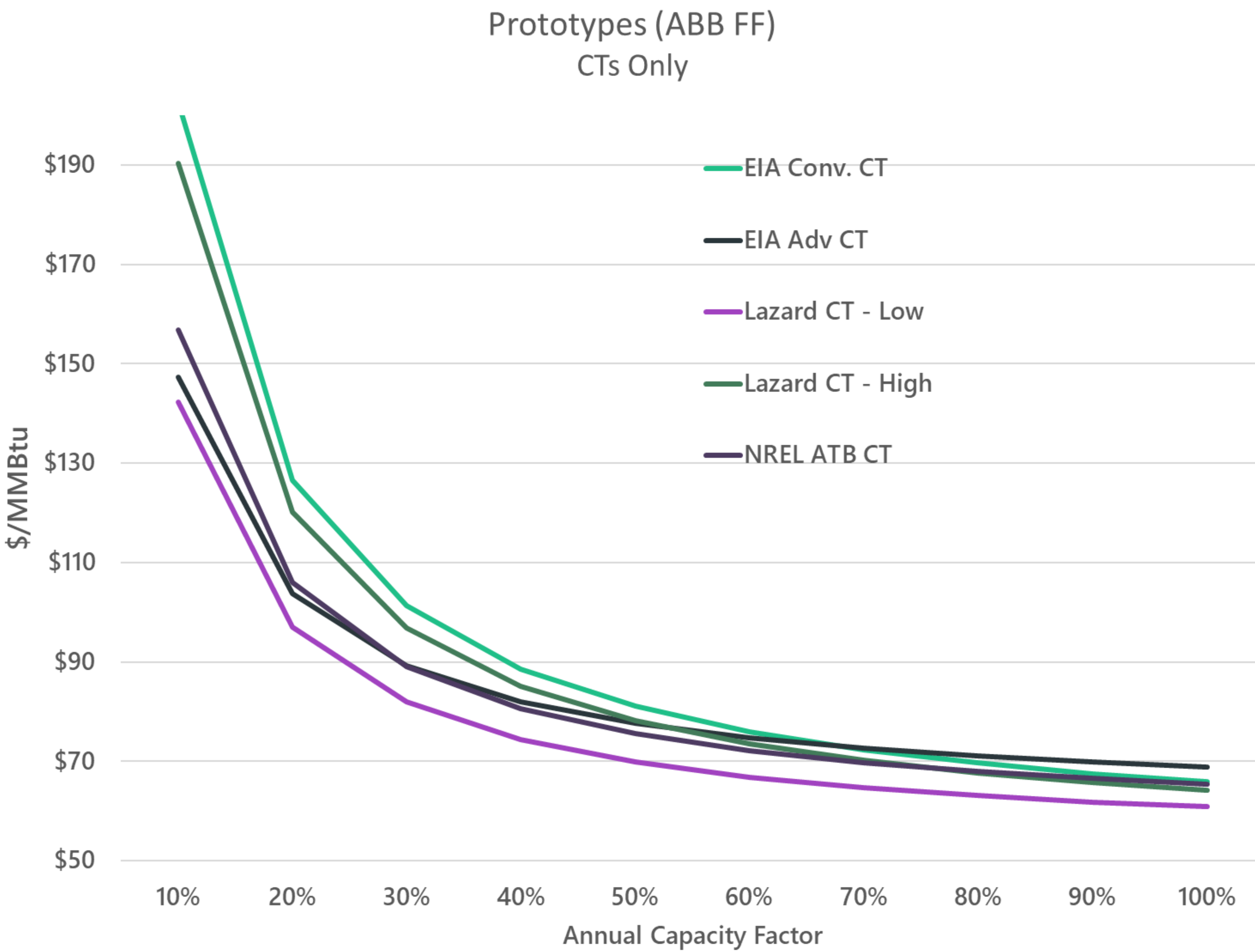
- All curves in 2019$, over 20 years, @ 8% discount rate

PROTOTYPE COMPARISON

Data Source	Generation Type	Tech Type	Size (MW)	Total Capital Cost ($/kW)	V O&M ($/MWh)	F O&M ($/kW-yr)	Heat Rate (Btu/kWh)
EIA AEO '19	Combined Cycle (CC)	Conv.	702	999	3.61	11.33	6600
EIA AEO '19	Combined Cycle (CC)	Adv.	1100	794	2.06	10.3	6300
Lazard LCOE 12	Combined Cycle (CC)	High	550	1300	2.00	5.50	6900
Lazard LCOE 12	Combined Cycle (CC)	Low	550	700	3.50	6.00	6133
NREL ATB 2019	Combined Cycle (CC)	N/A	702	906	3.00	11.00	6450
EIA AEO '19	Combustion Turbine (CT)	Conv.	100	1126	3.61	18.03	9840
EIA AEO '19	Combustion Turbine (CT)	Adv.	237	691	11.02	7.01	9800
Lazard LCOE 12	Combustion Turbine (CT)	High	50	1000	10.00	20.00	8000
Lazard LCOE 12	Combustion Turbine (CT)	Low	241	750	4.70	5.00	9804
NREL ATB 2019	Combustion Turbine (CT)	N/A	100	750	7.00	12.00	9820


Prototypes (ABB FF)
All Resources
EIA Conv. CC
EIA Adv CC
EIA Conv. CT
EIA Adv CT
Lazard CC - Low
Lazard CC - High
NREL ATB CC
Lazard CT - Low
Lazard CT - High
NREL ATB CT
$200
$180
$160
$140
$120
$100
$80
$60
$40
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%


Prototypes (ABB FF)
CCs Only
$200
$180
$160
$140
$120
$100
$80
$60
$40
$/MMBtu
EIA Conv. CC
EIA Adv CC
Lazard CC - Low
Lazard CC - High
NREL ATB CC
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Axis Title



Prototypes (ABB FF)
CTs Only
EIA Conv. CT
EIA Adv CT
Lazard CT - Low
Lazard CT - High
NREL ATB CT
$/MMBtu
$190
$170
$150
$130
$110
$90
$70
$50
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Annual Capacity Factor

2021 ITP SCOPE MUST RUN CRITERIA

BROOKE KEENE

OCTOBER 9, 2019

OBJECTIVE

- Seek approval for Must Run Criteria for the 2021 ITP Scope

ITP MANUAL LANGUAGE (SECTION 2.2.1.11)

- "Must-run units in the ITP assessment are dispatched during all available hours to their minimum capacity states, regardless of economics. Must-run statuses will be removed from all units at the start of each study. In the development of the ITP study scope, the ESWG will determine if must-run units will be allowed and the criteria needed for such designation. Individual generating units meeting must-run criteria will be identified by SPP or stakeholders during the generation review and subject to approval by the ESWG."

MUST RUN STATUS BACKGROUND

- 2020 ITP Economic Model
  - All Co-generation and Nuclear Units
  - Hydro Must Run assignments based on ABB Simulation Ready data
  - Exceptions were made to ESWG

MUST RUN STATUS IDENTIFICATION

- SPP Areas
  - All nuclear and hydro units
  - Identified co-generation units based on EIA 860 data as well as any co-generation units in ABB data that were not identified in EIA 860 data
    - If a unit was originally identified as a must run in a previous ITP, but was removed as an exception, it will not be identified as a must run in the 2021 ITP.
  - Exceptions allowed for other types of conventional generation

MUST RUN STATUS EXCEPTIONS

- These units do not normally operate as a co-gen

Unit Name	MW Amount (Total)
AES Shady Point Inc 1&2	280 MW
Lake Road Units 1-3	60 MW
El Dorado Refinery	38 MW
Powersmith Cogeneration Project: CC	112 MW
Russell Energy CNTR: GT1&GT2	15 MW
Wichita Plant: GEN1	33 MW

MUST RUN STATUS IDENTIFICATION

- External Areas
  - All nuclear and hydro units
  - Identified co-generation units based on EIA 860 data subject to SPP Staff Review

RECOMMENDATION

- SPP Staff recommends approval of the Must Run Status Identification criteria, as laid out in slides 5, 6, and 7 for the 2021 ITP Scope.

2021 ITP CONSOLIDATION

AMBER GREB

OCTOBER ESWG

OBJECTIVE

- Review previous consolidation methodologies
- Discuss direction for the 2021 Consolidation
  - Make a decision about the inclusion of Future 3 in the consolidation methodology

Goal of the Final Portfolio:

- *Develop a regional plan that provides reliable and economic delivery of energy and facilitates achievement of public policy objectives, while maximizing benefits to the end-use customer*

ITP MANUAL LANGUAGE

Section 6.2 Portfolio Consolidation

To determine a recommended plan, the portfolios of potential projects must be consolidated. SPP and stakeholders will discuss, determine and document details of the study-specific consolidation criteria during each study scope development.

HISTORICAL CONSOLIDATION CONCEPTS

- Coupling Criteria
  - Generally gives more emphasis to one future over the others and allows projects from other futures to be included if additional criteria is met
- Weighted Futures
  - Weighting of futures determined based on confidence in each future
  - Project selected if weighted sum of B/C ratios from futures exceeds threshold
- Individual Project Review
  - Review project drivers and benefits if B/C ratio exceeds certain threshold and present the project and justification to the appropriate stakeholder groups for approval

NEXT STEPS

- Make a decision about the inclusion of Future 3 in the consolidation methodology
- Staff will bring a proposal with details for the consolidation methodology to the November meeting

CONSOLIDATION RECOMMENDATION

- Fully develop a portfolio for the third future and use it to inform consolidation decisions between futures 1 and 2

2021 ITP SCOPE SENSITIVITIES

JAMES BAILEY

OCTOBER 9, 2019

OBJECTIVE

- Propose ITP Manual changes around required sensitivities and their methodologies

ITP MANUAL LANGUAGE (SECTION 7.2)

Sensitivity analyses will be defined in the scope and conducted to measure the flexibility of the final portfolio in each ITP assessment. Generally, these sensitivities will not be used to select the proposed transmission projects, nor to filter out projects. The sensitivities to be performed on the final portfolio of each ITP assessment shall include, at a minimum:

- High natural-gas price
- Low natural-gas price
- High demand
- Low demand

Typically, for the demand sensitivities, one standard deviation on either side of the expected values will be used, and for the natural gas price sensitivities, two standard deviations of expected values will be used.

PROPOSED CHANGES

- Remove requirements for specific sensitivities and methodologies
- Require identification of sensitivities during futures scope development

NEXT STEPS

- Draft revision request for ITP Manual Section 7.2
- Propose sensitivities to stakeholders for 2020 ITP depending upon outcome of futures development


SPP Southwest Power Pool
HELPING OUR MEMBERS WORK TOGETHER
TO KEEP THE LIGHTS ON... TODAY AND IN THE FUTURE.

2021 ITP Load and Generation Review Update

Liz Gephardt

October 9-10, 2019

Objective

- Acquire an accurate representation of load forecast and existing generation within and outside of the SPP footprint
- Data to be utilized in the ITP Powerbase Model

Vendor Powerbase ABB F18 (Base) + Select 2020 ITP Gen & Load Updates + ITP Manual, Gen & Load Review Updates = 2021 ITP Powerbase

Gen and Load Review Overview

- Timeline
  - August 2019 – February 2020
  - Stakeholder review starts in September
  - Generation and Load locked in Mid-January
  - Working Group Final Approval in February
- Study years
  - 2023, 2026, 2031
- Vendor data
  - 2018 Fall NERC Nodal Simulation Ready Model from ABB
  - MTEP20 from MISO
- Internal and external Gen and Load performed in parallel

Stakeholder Review

- Generation and Load Workbooks
  - Pass 1 Trial 1 posted on 9/27/2019
  - Feedback due via RMS on 10/18/2019
  - Pass 1 Trial 2 to be posted 11/15/2019
- Resource Addition Request (RAR) and Waiver Request
  - Posted on 9/27/2019
  - Completed applications due via RMS on 10/18/2019
  - Inclusion Criteria Outline
    - Base Reliability Models – ITP Manual Section 2.1.1.1
    - Economic Models – ITP Manual Section 2.2.1.4

Stakeholder Review

- Guidelines for workbooks
  - Yellow tabs and columns are open for stakeholders to make edits
    - Highlight changes
  - Green tabs are primarily vendor data and stakeholders ***do not*** need to make updates
    - Stakeholders can provide updates to green tabs but with justification
    - SPP staff will consider utilizing provided updates if specific units are found to not operate as expected

ACTION ITEM 199 – SITING PLAN

ACTION ITEM BACKGROUND

- Review how we inform our Siting Plan
  - Research the appropriateness of relying on the GI Queue for siting of renewables and battery storage and look into other available information
- Goal to complete and implement for the 2021 ITP Assessment

APPENDIX

STANDARD SITE PRIORITIZATION

ESWG Approved
Included in Siting Manual

- Utility solar ranking
  - Within zone or state of operation
    - Site source preference:
      - Active GI queue requests
      - Stakeholder repository feedback
      - Previous ITP sites
      - Other NREL conceptual sites
  - Within each site source:
    - Capacity factor
      - If only lower than average SPP capacity factors available, site some portion in higher capacity factor area
    - Generator outlet capability based on FCITC and scope of GOF

STANDARD SITE PRIORITIZATION

ESWG Approved
Included in Siting Manual

- Wind
  - GI queue requests
    - Cost/MW for transmission owner interconnection facilities and network upgrades
      - Includes consideration of potentially directly-assigned upgrades needed, unknown third-party system impacts, and scope of GOF
      - Currently suspended IAs and/or GIA commercial operation date past not considered for siting
    - If cost data not available
      - Use generator outlet capability based on FCITC and scope of GOF
      - Identify/relate recurring issues within GI groupings

STANDARD SITE PRIORITIZATION

ESWG Approved
Included in Siting Manual

- Conventional
  - Within zone of majority ownership
    - Adjacent zone if limited site availability or generator outlet capability
    - Stakeholder repository feedback
      - Unless limited by generator outlet capability and/or scope of GOF
    - Preference to existing and assumed retirement sites then ITP sites
    - Generator outlet capability based on FCITC and scope of GOF
  - Limit conventional capacity to 1,500 MW at any site

EXCEPTIONS

ESWG Approved
Included in Siting Manual

- SPP to post preliminary look at siting plans
  - Stakeholders to confirm sites of interest selected for siting
  - Stakeholders to present sites not selected for siting as exceptions
  - Initial siting plan list will not ensure inclusion
  - Any capacity approved as an exception by ESWG removed from lowest ranked sites
- Stakeholder materials on requested exceptions **must** include:
  - Generation interconnection status
  - PPA, firm service, or utility ownership information
  - Status of necessary regulatory filings and/or approvals
  - Procurement of financing
  - PTC safe harbor eligibility
  - Additional supporting information (public announcements, etc.)

SPP Southwest Power Pool

HITT RECOMMENDATION

AMBER GREB

Helping our members work together to keep the lights on... today and in the future.

SouthwestPowerPool SPPorg southwest-power-pool

OBJECTIVE

- Review the HITT Recommendation
- SPP's Current Process
  - MISO Comparison
- Value of Money
- Next steps

TRANSMISSION PLANNING RECOMMENDATION #5

- Evaluate the benefit-to-cost ratio for economic projects
  - Action: The ESWG should evaluate and make a recommendation to the MOPC on whether SPP should increase the B/C ratio for economic projects to between 1.05 to 1.25

TRANSMISSION PLANNING RECOMMENDATION #5

- Evaluate the benefit-to-cost ratio for economic projects
  - Comments: SPP should evaluate the merits of adding a requirement for positive net benefit over an appropriate benefit period.

SPP'S CURRENT PROCESS

- ITP Economic Projects
  - 1.0 Benefit to Cost Ratio
    - 40yr APC benefit / 40yr NPV cost
    - Assumes an 8% discount rate

MISO'S CURRENT PROCESS

- Market Economic Projects (MEPs)
  - 1.25 Benefit to Cost Ratio
    - 20yr APC Benefit / 20yr NPV Cost
    - Assumes 7.22% Discount Rate (MTEP 19)

THE VALUE OF MONEY

- Does the $100 you received the first year have same PURCHASING VALUE as the $100 received in the last year?

NO!

THE VALUE OF MONEY

- Net Present Value (NPV) calculates the current value of a stream of dollars based on an interest rate.
- Determines the minimum return to make the investment worthwhile
- Is this about making money?

YES!

It is also about breaking even, given our required rate of return

THE VALUE OF MONEY

SPP Southwest Power Pool → 8%

Random Sampling of 8 SPP Members

Weighted Average Cost of Capital

7.856%	8.887%	6.064%	7.538%
7.543%	7.628%	8.621%	6.843%

THE VALUE OF MONEY

- Benefit/Cost Ratio measures how close you are to breaking even.
- Meeting the expected rate of return means a Benefit/Cost Ratio = 1.
- Because of the 8% discount rate:

  - Loaning $1,000 & getting back $100/year for ten years = Benefit/Cost ratio of .72
  - Loaning $1,000 & getting back $138/year for ten years = Benefit/Cost ratio of 1

SPP

WHY INCREASE THE B/C THRESHOLD?

- Economic uncertainty of transmission projects
- Related requirements are less stringent
  - B/C threshold must only be realized in a single SPP future
  - B/C is based on 40yr values
- Recent stakeholder pushback of Economic Projects that meet all of the current requirements

WHAT DOES A 1.25 B/C MEAN?

- A 1.25 B/C ratio with an 8% discount rate is the equivalent of a 15% discount rate
- Equivalent of a B- or a C investment grade
  - Considered non-investment grade
- How risky do we consider transmission investments?

SPP

NEXT STEPS

- What additional information should be considered in forming a recommendation?
- Bring an SPP staff recommendation to the November ESWG meeting

SCHEDULE

- November-December
  - ESWG discussion and Approval
- January-February
  - RTWG review/approval
- March
  - Develop/approve Revision Request
- April
  - MOPC approval