

**Southwest Power Pool**  
**ECONOMIC STUDIES WORKING GROUP**  
**August 20, 2013**  
**Web Conference**

**• SUMMARY OF ACTIONS TAKEN •**

1. SPP Staff will provide further information based on available data to show the impact of reducing base load unit capacity in order to have a resolution regarding Future 2 assumptions.

**Southwest Power Pool  
ECONOMIC STUDIES WORKING GROUP**

**August 20, 2013  
Web Conference**

**• MINUTES •**

**Agenda Item 1 – Administrative Items**

**Agenda Item 1a - Call to Order, Introductions**

Chair Alan Myers (ITC Great Plains, LLC) called the meeting of the Economic Studies Working Group (ESWG) to order at 1:36 p.m., welcomed those in attendance, and asked for introductions. (Attachment 1 – Attendance List)

There were 34 web conference participants representing 7 of 11 members.

**Agenda Item 1b – Receipt of Proxies**

Juliano Freitas (SPP staff) requested proxy statements. Two proxies were identified. (Attachment 2 – Proxies)

**Agenda Item 1c – Review of Agenda**

Chair Alan Myers (ITC Great Plains, LLC) presented the agenda for review and asked for any additions or corrections. Agenda was approved. (Attachment 3 – Agenda)

**Agenda Item 2 – 2015 ITP10 Policy Survey**

Kelsey Allen (SPP Staff) presented and requested the 2015 ITP10 Policy Survey for approval. The two main topics approached by the ESWG members were the use of Non-Designated Resources (Non-DR) and how to calculate the required energy. The discussion about the Non-DR resources centered around whether or not to use these resources to reach unmet renewable mandates, goals and other. The main concern, according to members, is whether it is realistic to assume that a utility will be purchasing power from existing resources to meet these requirements 10 years from now. A decision was made by the ESWG members after evaluating the pros and cons, ***the ESWG members decided to not use the Non-Designated Resources to achieve renewable mandates, goals and other.*** The second issue was about how to calculate required renewable energy. ***The ESWG members decided to include renewable mandates, goals and other to calculate the required energy for development of the renewable resource plan.*** During the project development phase, SPP Staff will differentiate the category for projects related to the policy survey, not necessarily the projects will be classified as “policy”, and they also could be classified as “economic” projects in case needs are related to renewable other. (Attachment 4 – 2015 ITP10 Policy Survey)

**A motion to approve the 2015 ITP10 Policy Survey was made by Kurt Stradley (LES) and seconded by Leon Howell (OGE). The motion was approved unanimously.**

**Agenda Item 3 – 2015 ITP10 Methodology**

The third item in the agenda approached three different items: 1) Juliano Freitas (SPP staff) presented and requested member feedback regarding the assumptions to be used in Futures 2 and 3 including the assumptions to be adopted in the resource plan; 2) Kelsey Allen (SPP Staff) presented the capacity factor and wind accreditation calculations using the last three years wind dispatch data from operations; 3) Juliano Freitas (SPP Staff) requested feedback from members in order to determine how to simulate the HVDC facilities sensitivity analysis.

For Future 2 assumptions, criteria for decreasing base load unit capacity, SPP Staff provided examples of criteria that could be applied to implement drivers for future 2, including:

- Retire coal units under 200 MW
- Retire coal units with no NO<sub>x</sub> or SO<sub>2</sub> emissions control
- Reduce hydro capacity by 20%

Staff was asked to show further information in the next ESWG meeting, detailing actual capacity reduction due to the drivers outlined. It will provide a better understanding of the impact caused by EPA regulations and/or drought/water shortage in the SPP region. Based on this data and further discussions the members will be able to have a recommendation on how to reduce the base load unit capacity.

**ACTION ITEM:** SPP Staff will provide further information based on available data to show the impact of reducing base load unit capacity in order to have a resolution regarding Future 2 assumptions.

Another idea for implementing future 2 drivers is to reduce the annual energy generated by base load units but not the capacity, this way it would not affect the capacity margin calculation. The idea is to replace this reduced energy by distributed generation (small wind farms) allocated close to load pockets. For Future 3, increased input prices, the suggestion is to double the natural gas prices and include carbon taxes in our simulations. Also, the ESWG members did not have a recommendation for the Futures 2 and 3 resource plan prototypes. There is a slight tendency to use the same prototypes applied for Future 1 and to let the members decide what kind of units should be used based on the capacity needed indicated by the resource planning software (Strategist).

SPP Staff used the last three years wind dispatch data and developed updated numbers in order to calculate capacity factors and wind accreditation in the SPP region. ***The ESWG members decided to not use the NREL data for new wind farms (from renewable resource plan), SPP Staff will propose a new capacity factor based on new technologies. The ESWG members decided to use 5% wind accreditation towards capacity margin for the 2015 ITP10 Study.***

Juliano Freitas (SPP Staff) presented two options to perform sensitivity analysis to test the effect of adding HVDC facilities in the 2015 ITP10 Study. SPP Staff proposed two alternatives to perform the sensitivity analysis: 1) Analyze full export and full import capacity; 2) Model economic trades with ERCOT and WECC areas. ***The ESWG members decided to analyze full export and full import capacity due to complexity and cost associated with option 2.*** The estimated cost to buy the Standard Zonal data for ERCOT and WECC is \$ 17,000.00; also a resource plan for WECC and ERCOT areas is needed. Another reason to select option 1 is nonexistence of projects coming out of this analysis as it will be conducted as a sensitivity. (Attachment 5 – 2015 ITP10 Study Methodology)

#### **Agenda Item 4 – 2015 ITP10 Scope**

This item will be discussed in the next face to face ESWG meeting in Austin, Texas (09/05/2013). (Attachment 6 – 2015 ITP10 Scope)

#### **Closing Items**

Chair Alan Myers (ITC Great Plains, LLC) requested if any other items merited discussion. The meeting was adjourned at 5:10 p.m.

Respectfully Submitted,

Juliano Freitas,

Secretary

Name

Aaron Smith (OPPD)  
Al Tamimi  
Alan Myers  
Amber Greb (SPP)  
Antoine Lucas (SPP)  
Bill Leung (NPRB)  
Clayton Mayfield (SPP)  
James Okenfuss KCPL  
James Sanderson  
Jeremy Harris (Westar Energy)  
Jon Iverson  
Jon Shipman (OPPD)  
Josh Ross (SPP)  
Juliano Freitas(SPP)  
Kelsey Allen  
Kirk Hall  
Kurt Stradley (LES)  
Leon Howell  
Liz Cofield (SPP)  
Meena Thomas  
Mike Knapp (OCC)  
Mitch Williams (WFEC)  
Nathan McNeil  
Noumvi Ghomsi  
Pat McCool  
Pat Wilkins  
Randy Collier - City Utilities  
Rosemary Sacris (SPP)  
Roy bBoyer  
Sam Loudenslager (SPP)  
Sandeep Baidwan  
Steve Gaw  
Tim Owens (NPPD)  
Wayman Smith (AEP)

Roy Boyer (Xcel Energy) was Bennie Weeks (Xcel Energy ) proxy.

**From:** Weeks, Bennie F [<mailto:Bennie.Weeks@XCELENERGY.COM>]  
**Sent:** Thursday, August 15, 2013 3:11 PM  
**To:** 'Juliano Freitas'; Myers, Alan K.; 'Fox, Kip'; 'Collier, Randy'; 'Dietz, Paul'; 'Howell, Leon'; 'Stradley, Kurt'; 'Swearingen, Mike'; 'Sweet, Greg'; 'Tamimi, Al'; 'Walkup, Bruce'; 'Watt, Michael'; 'Proctor, Mike'; 'Sanderson, James'  
**Cc:** 'Antoine Lucas'; 'Kelsey Allen'  
**Subject:** RE: ESWG Conference Call next week

Please have this email serve as documentation for Roy Boyer as my proxy for the Tuesday 8/20 Conference call.

Wayman Smith (AEP) was Kip Fox (AEP) proxy.

**From:** Kip M Fox [<mailto:kmfox@aep.com>]  
**Sent:** Thursday, August 15, 2013 1:40 PM  
**To:** Juliano Freitas  
**Cc:** Myers, Alan K.; Collier, Randy; Dietz, Paul; Howell, Leon; Stradley, Kurt; Swearingen, Mike; Sweet, Greg; Tamimi, Al; Walkup, Bruce; Watt, Michael; Weeks, Bennie; Proctor, Mike; Sanderson, James; Antoine Lucas; Kelsey Allen; Wayman L Smith; David E Kidd  
**Subject:** Re: ESWG Conference Call next week

Please have this email serve as documentation for Wayman Smith as my proxy for the Tuesday 8/20 Conference call. Any questions, please advise.

Sent from my iPad  
Kip Fox

972-400-1384 cell

**ECONOMIC STUDIES WORKING GROUP**

**August 20<sup>th</sup>, 2013**

**Conference Call**

**• A G E N D A •**

**1:30 pm – 5:00 pm**

1. Administrative items
  - a. Call to Order, Introductions..... Alan Myers (5 minutes)
  - b. Receipt of Proxies ..... Juliano Freitas (1 minute)
  - c. Review of Agenda ..... Alan Myers (1 minute)
2. 2015 ITP10 Policy Survey (Approval Item) ..... Kelsey Allen (30 minutes)
3. 2015 ITP10 Methodology ..... Juliano Freitas (2 hours)
4. 2015 ITP10 Scope ..... Juliano Freitas (1 hour)
  - a. Portfolio Consolidation Methodology
  - b. Project Staging
5. Closing Items ..... All

# 2015 ITP10 Policy Survey

August 20<sup>th</sup>, 2013



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

# Utilization of Data

- **Mandates, Goals and Other are additive**
  - All will be added to determine required energy
    - $\text{Required Energy} = \text{Mandates} + \text{Goals} + \text{Other} - \text{Existing}$
- **Actual capacity based on siting**
  - Calculate capacity utilizing available capacity factors per location
- **Excess existing capacity**
  - DR: Labeled as 'contract' capacity
  - Non-DR: Available for allocation?



# Next Steps

- **Finalize Survey**
- **Resource Planning**
  - **Utilization of Data**

# 2015 ITP10 Study Methodology

August 13, 2013



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today and in the future

# Overview

- **Today**
  - **Seeking ESWG input for:**
    - **Future 2 & 3 Details**
    - **Resource Plan**
      - Prototypes
      - Wind Accreditation/Capacity Factor
    - **DC Ties**
- **Next Steps:**
  - **Resource Plan**
  - **Siting Plan**

# FUTURES ASSUMPTIONS

# Future 1 & 2 Assumptions

- **Future 1 & 2**
  - **Fuel Prices – Decided**
    - Utilize Ventyx Reference (coal, oil, uranium)
    - Utilize NYMEX futures and DOE growth rates for gas
  - **Wind Price – Decided**
    - O&M and Curtailment: \$8/MWhr
  - **Hurdle Rates – TBD in benchmarking**
  - **Must Run Units – Staff proposal in future meeting**
  - **High Priority Incremental Load hourly shape – Requested**

# Future 2 Assumptions

- **Future 2 – Decreased Base Load Capacity**
  - **Methodology for Decreasing Capacity**
  - **Discussion Today**

# Optional Criteria for Decreasing Capacity

## EPA/Emissions Driver

- **Coal Units Under 200 MW**
  - 2012 ITP10 Criteria
  - Cost for unit upgrades not economically feasible
- **Coal Units With No NO<sub>x</sub> or SO<sub>2</sub> Emissions Control**
  - Potentially first to go in case of EPA regulations
- **Constrained Water Use**
  - Some effects similar to drought/water shortage

# Optional Criteria for Decreasing Capacity

## Drought/Water Shortage Driver

- **Units Using Once-Through Cooling and Surface Water**
  - Using water first to go in drought one time, not recirculating
- **Water Intake within 10 Feet of Surface & High Drought Susceptibility**
  - EIA data for water intake information lacking
  - Historical Palmer Drought Severity Index data available
- **Reduce Hydro Capacity by 20%**
  - Argonne studies on WECC/ERCOT indicate 30% hydro reduction
  - Refine using Palmer historical drought data
- **Overall Capacity Reductions for Other Units**
  - Recirculating using water at higher temperatures



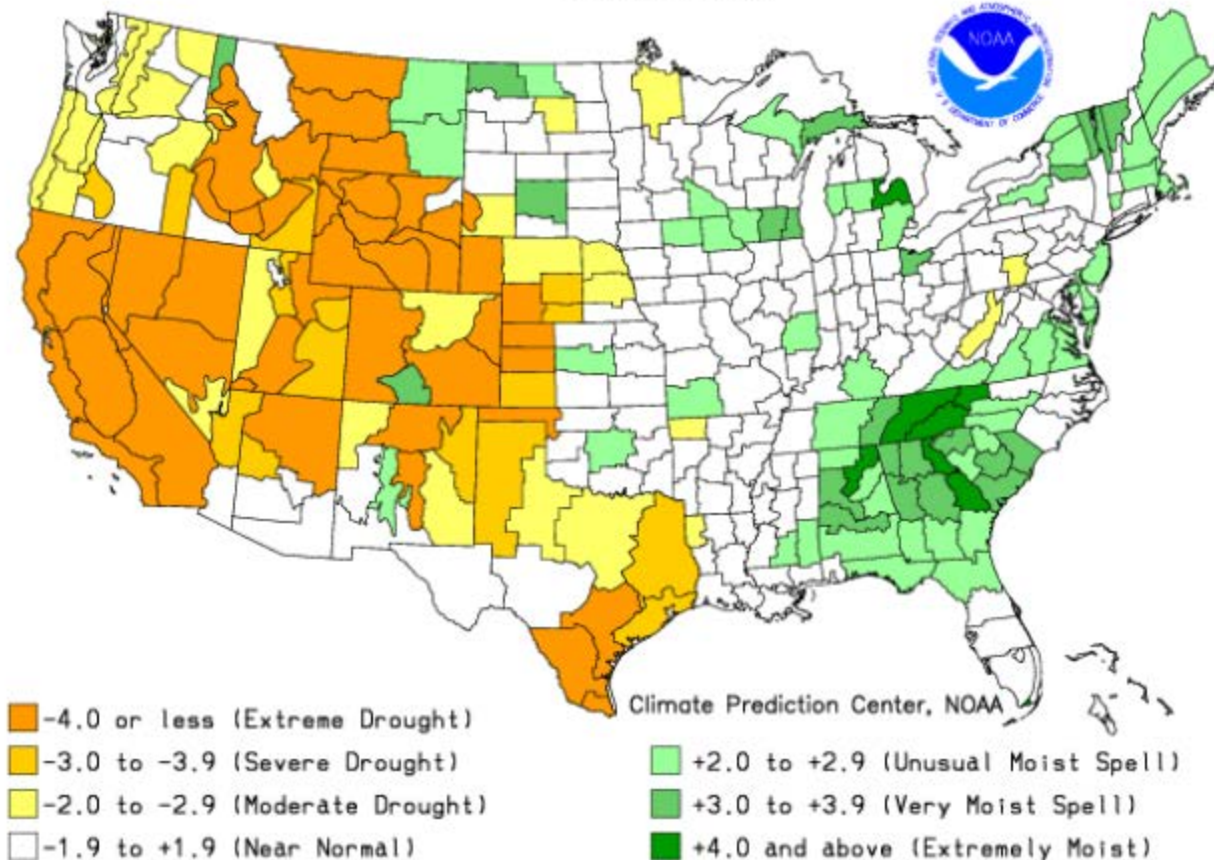
# Available Drought Data

- **SPP GIS data**
- **Palmer Drought Severity Index (PDSI)**
  - Quantitatively compares the actual amount of precipitation received in an area during a specified time period with the normal or average amount expected during that same period
- **Monthly data from 1931 to 2012**
- **Generation units linked with PDSI, max cap, fuel type, and area**
- **Indicates units impacted by at least moderate drought**
  - 26 hydro units
  - 128 non-renewable units

# Available Drought Data

## Palmer Drought Severity Index

Drought Severity Index by Division  
Weekly Value for Period Ending AUG 3, 2013  
Long Term Palmer



# Optional Criteria for Decreasing Capacity

## Cyber Attack Driver

- **More abstract concept**
  - Member data required to gauge specific effects on units
  - Units with remote capabilities most vulnerable
- **Utilize distributed generation across footprint to replace lost capacity**
- **Consider less reduction in gas generation**
  - More cost effective to retrofit gas units lost from other criteria
  - Recirculation and dry cooling retrofits

# Future 3 Assumptions

- **Future 3 – Increased Input Prices**
  - **Input Prices**
    - Methodology
    - Fuel types affected
  - **Other Impacts?**
    - Prototype assumptions
    - Resource Plan assumptions

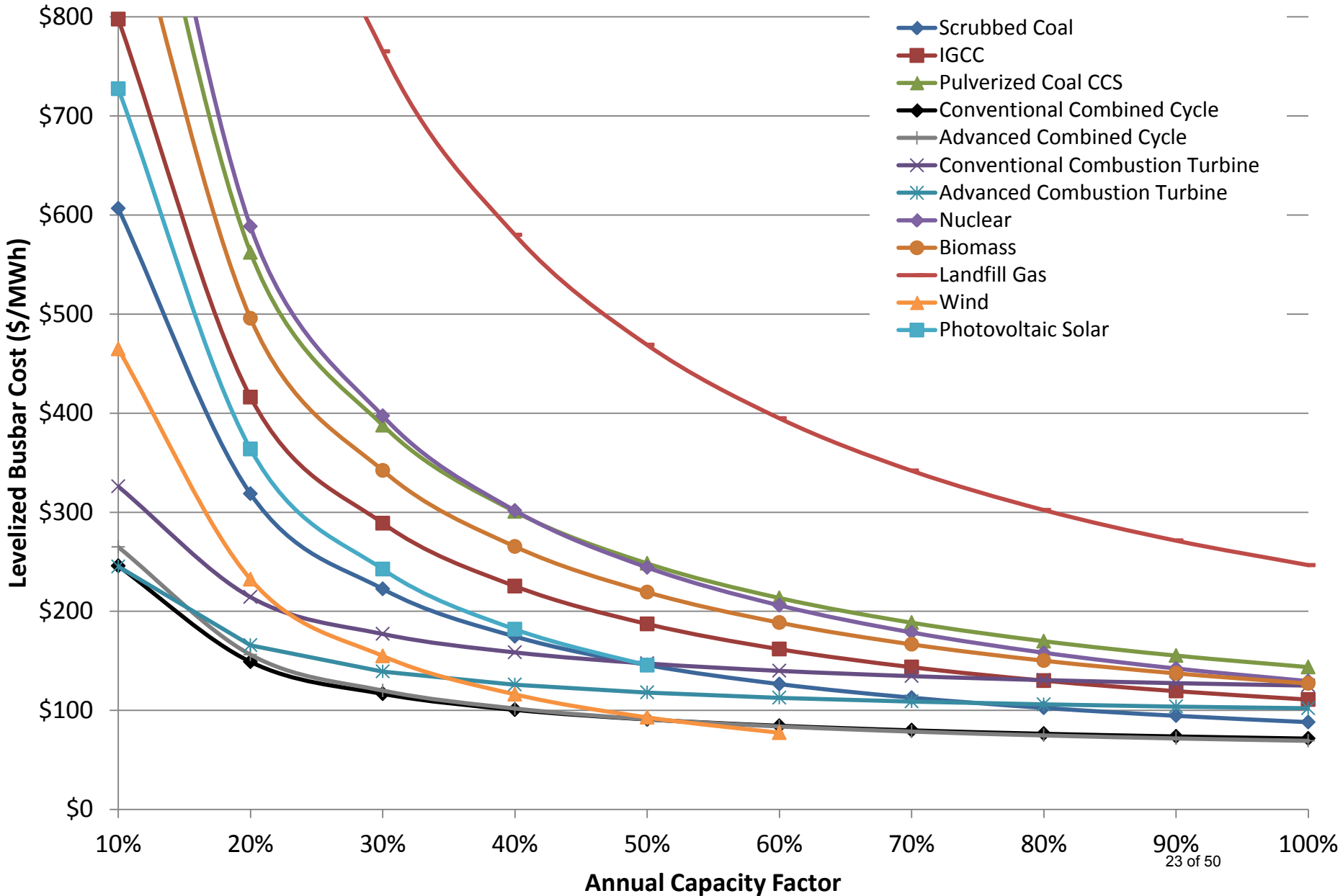
# RESOURCE PLAN PROTOTYPES

# Resource Plan - Generation Prototypes

- **Options**
  - EIA 2013 Annual Energy Outlook (AEO)
  - Burns & McDonald: \$3,000 per technology

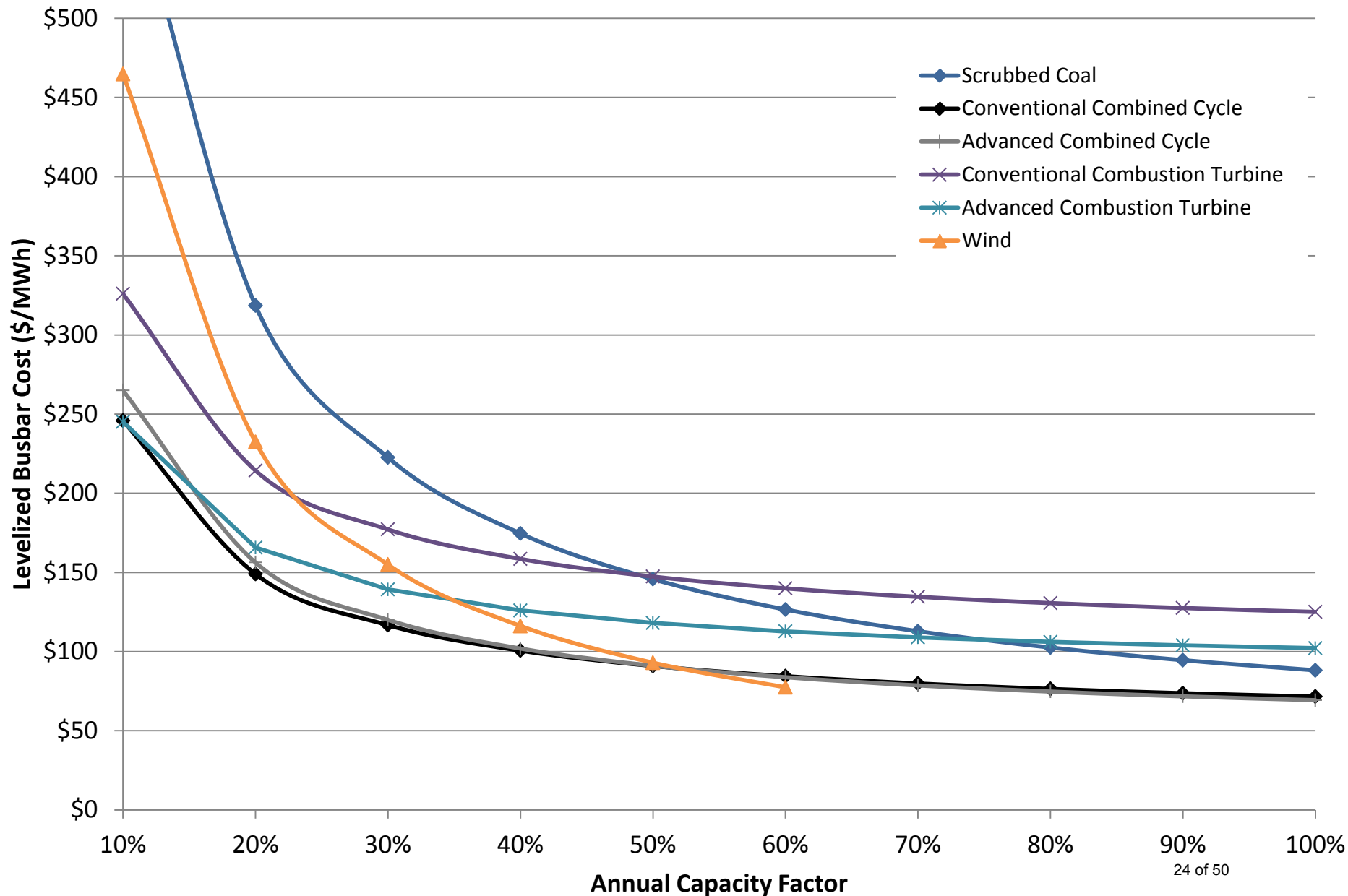
# Levelized Busbar Costs for Dispatchable Resource Options - EIA

20 Years, 8.0% Discount Rate, 2013\$



# Levelized Busbar Costs for Dispatchable Resource Options - EIA Select

20 Years, 8.0% Discount Rate, 2013\$





# RESOURCE PLAN

## WIND CAPACITY FACTOR / ACCREDITATION

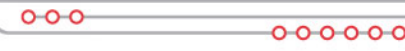
# Overview

- **2013 ITP20 – Average 42.5% Wind Capacity Factor**
- **DOE Research:**
  - **Average Capacity factor increase**
    - **22% before---1998**
    - **35% 2004----2007**
    - **40% 2010 New wind turbine Technology**
- **SPP Staff Research:**
  - **Revisiting the usage of 5% towards capacity margin**
  - **5 min. data since January 2010**
  - **Utilizing multiple methodologies**

# SPP Operations Data

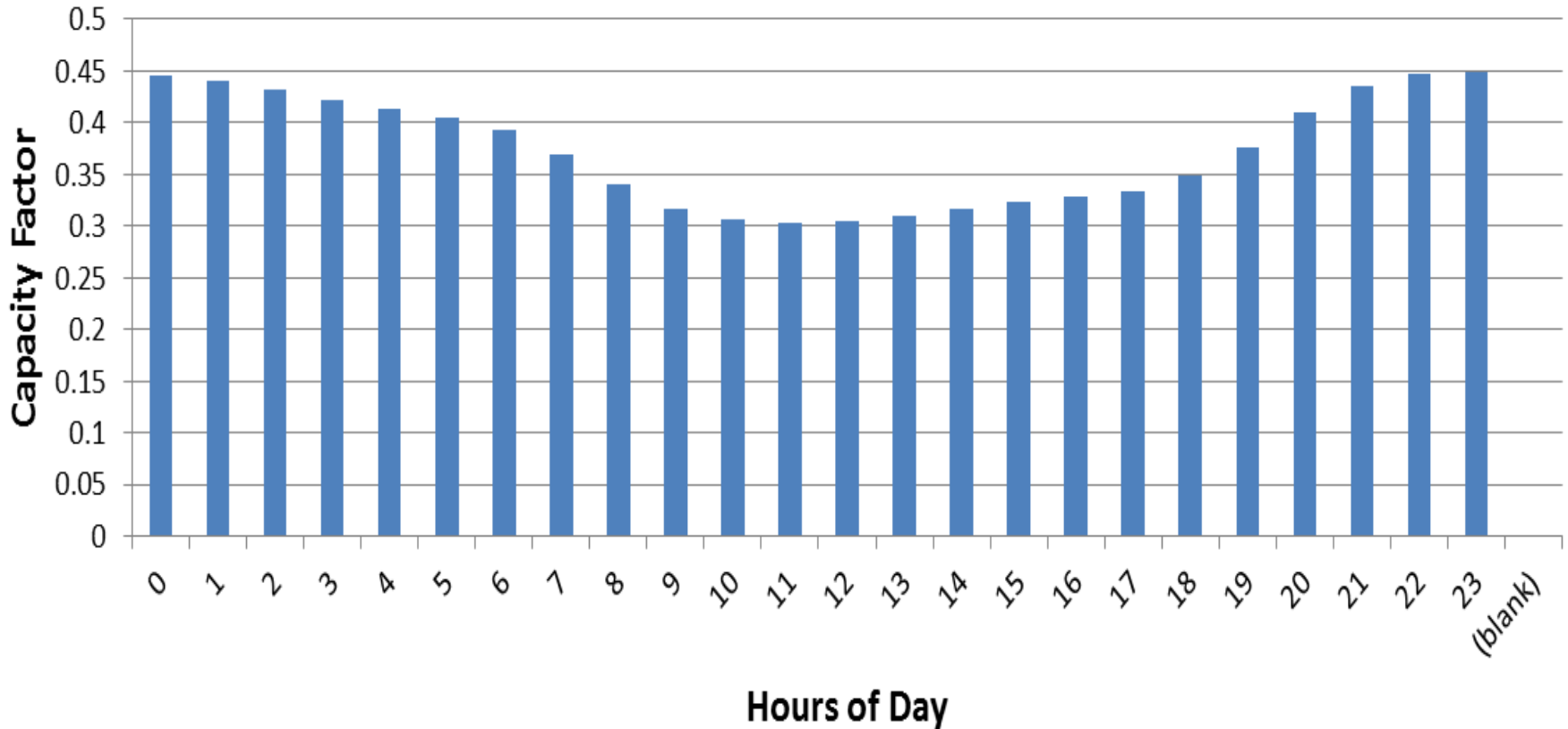
- **Hourly averages**
  - Based on 5 minute data
  - January 2010 through June 2013
- **Capacity Factor 3-Year Average: 37.5%**
  - Does not include potential output lost due to curtailments

# SPP Operations Data



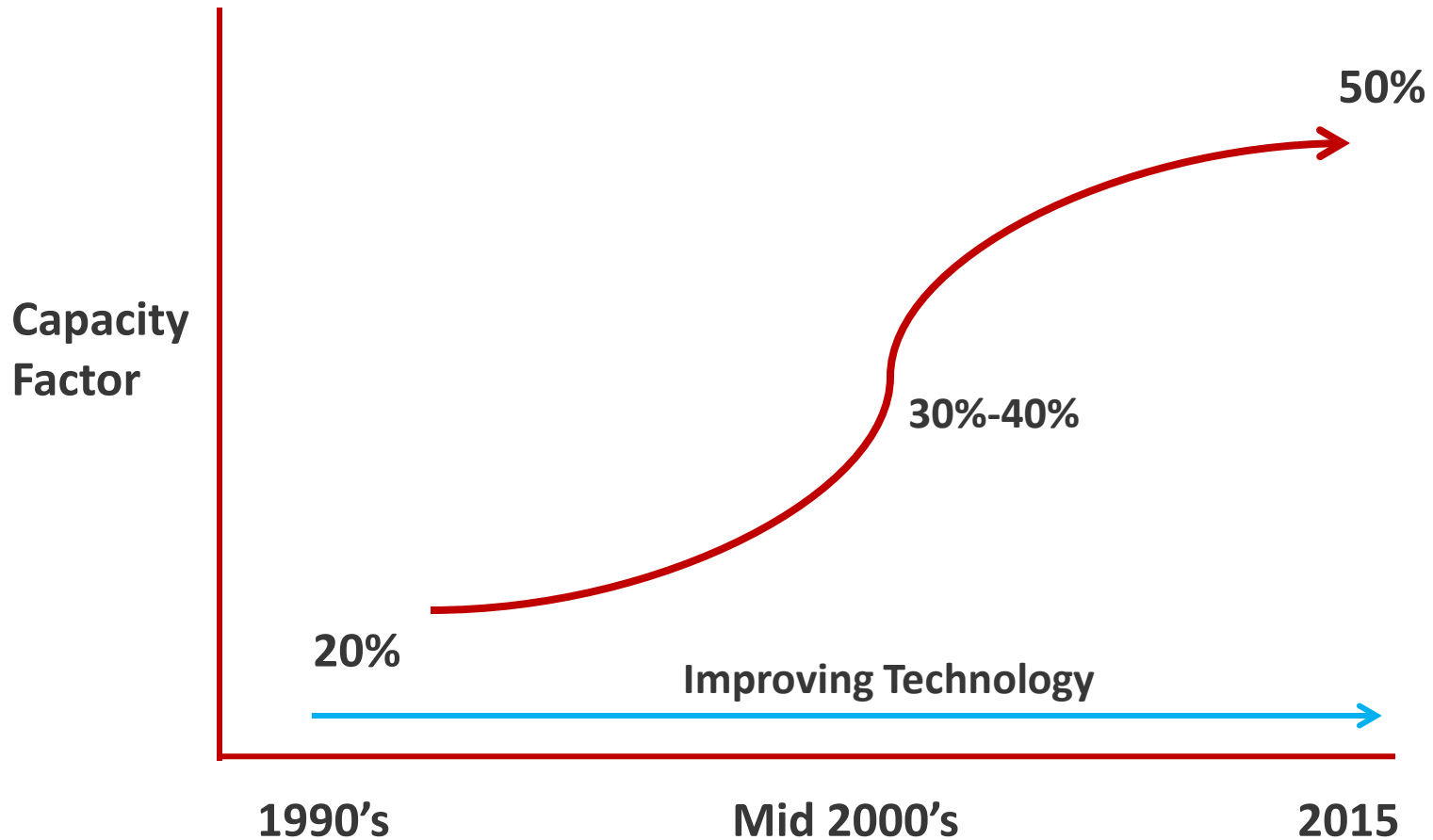
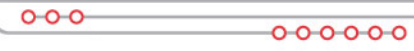
Average of Capacity Factor

## Average Capacity Factor by Hour



Hour Beginning ▾

# Industry Standards



55¢/kWh

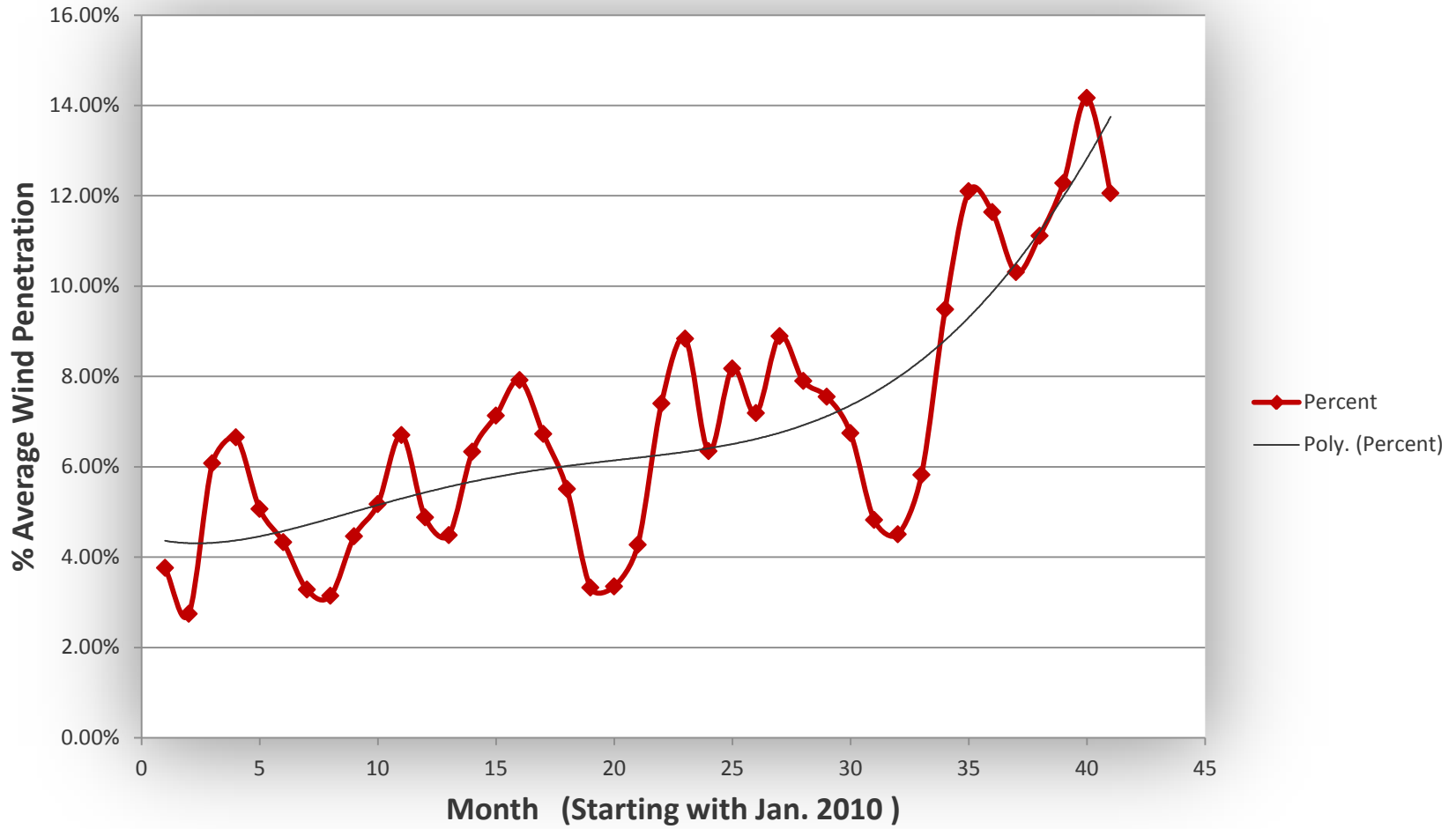
6¢ /kWh

# Decision Point – Wind Capacity Factor

- **Utilize Higher Capacity Factor for New Wind?**
  - % Increase of current factors
    - Based on NREL wind profiles by geographic site
- **Utilize Higher Capacity Factor for Existing Wind?**
  - Assume technology will be replaced within 10 years
  - Target all or older farms?

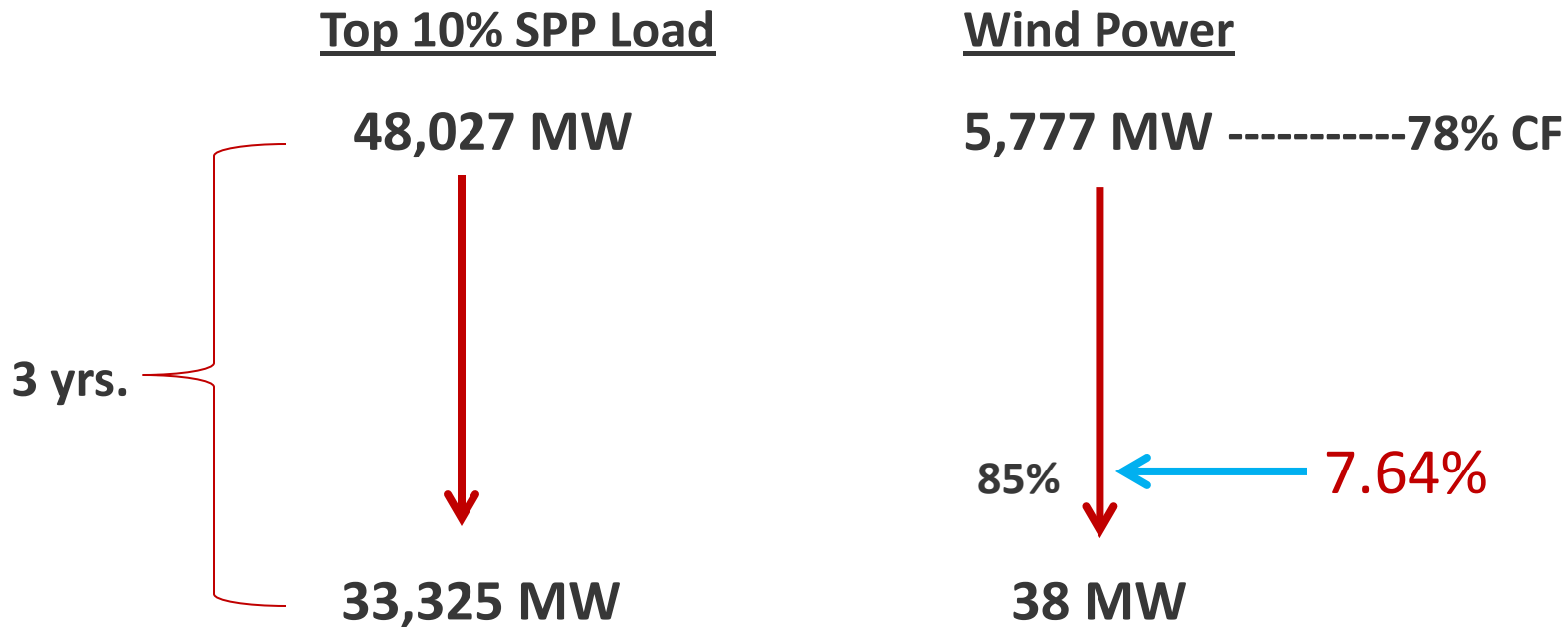
# SPP Wind Penetration

## Wind Penetration Output as % of Generation



# Wind Accreditation Calculation

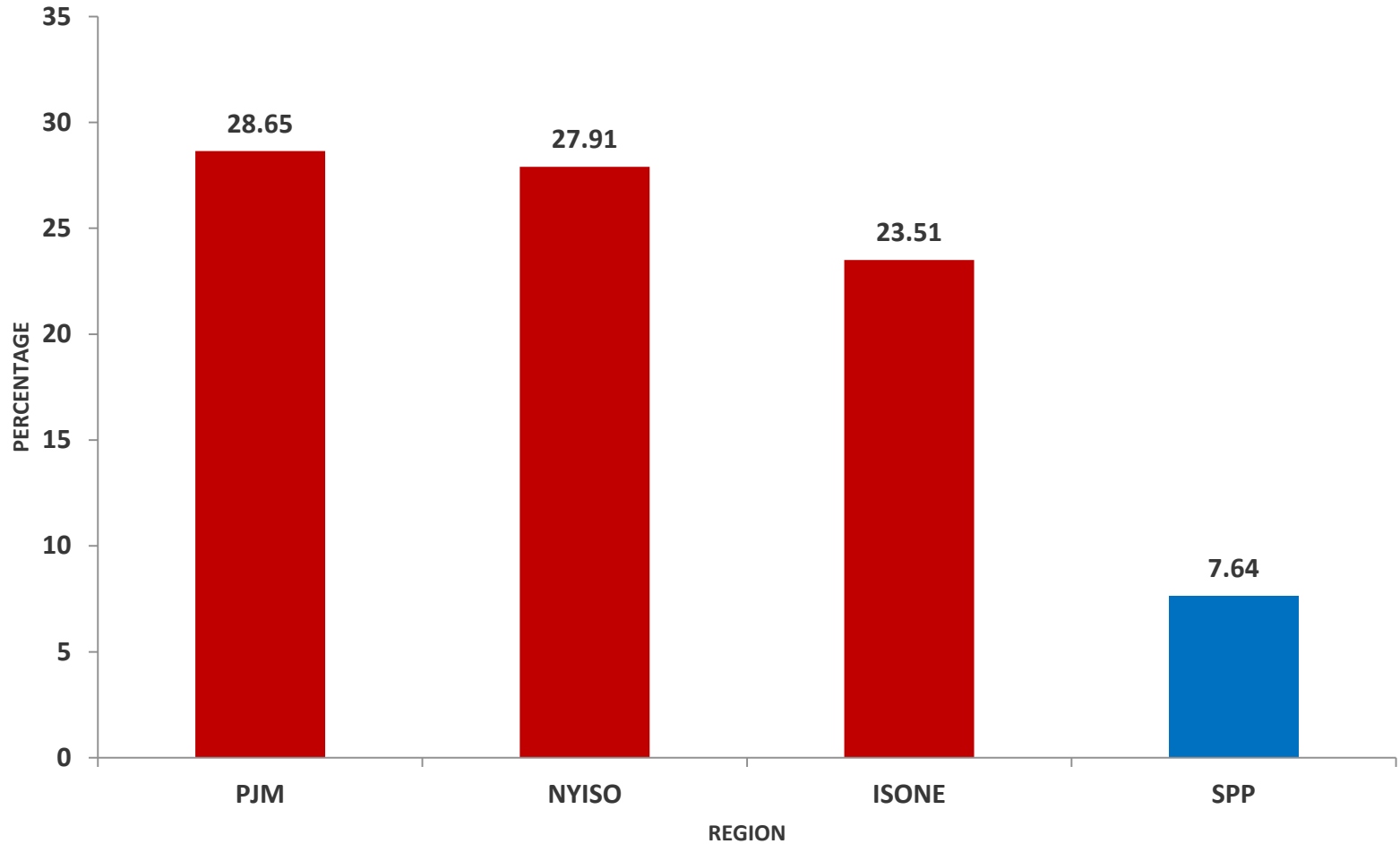
- SPP Method: 10/85





# Wind Accreditation Calculation

SPP WIND ACCREDITATION VARYING THE METHODOLOGY



# Decision Point – Wind Accreditation

- Utilize Higher Wind Accreditation?
  - Using SPP footprint wide data
  - Adopt new methodology?

# DC TIES

## TRES AMIGAS

# DC Ties - Overview

- **BOD recommended to study the Tres Amigas and Clean Line Plains & Eastern as a sensitivity analysis**
  - **Analyze full export and full import capacity**
  - **Model economics trades with ERCOT and WECC areas**

# DC Ties - Overview

- **Ventyx recommended three options for zonal ERCOT and WECC data.**
- **Option 1 (Recommended): Simulation Ready Standard Zonal data for ERCOT and WECC. This option has data that is ready to input in model for simulation runs. Annual Price: \$17,000**
- **Option 2: Reference Case reports for ERCOT and WECC. This option has the entire market analysis along with the prices. Annual Price: \$27,000**

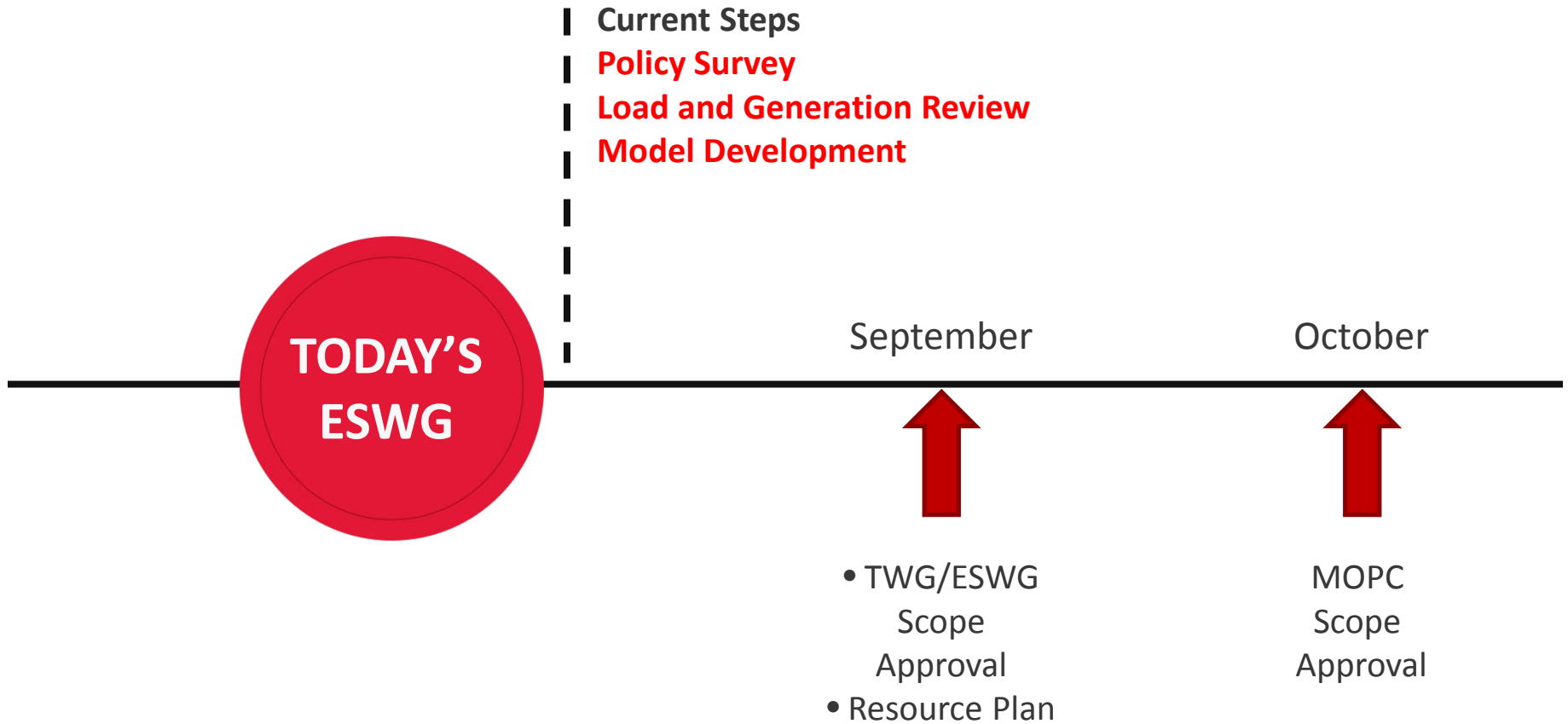
# DC Ties - Overview

- **Option 3: Zonal power prices for ERCOT and WECC for one year which includes hrly, mthly, and annual. This option is simply a basic data set in spreadsheet format. Annual Price: \$10,000**

# DC Ties - Overview

	Standard Data includes	Reference Case Data adds
Natural Gas Price Forecasts	Current basis, NYMEX Henry Hub Futures	Forecasted basis and Henry Hub for 25 years, with scenarios
Coal Price Forecasts	5-year forecast (as appears in EV Fuels)	25-year forecast
Oil Price Forecasts	Current prices	25-year forecast
SO2 and NOx Price Forecasts	Next vintage year traded values	25-year CATR/Transport Rule forecast
CO2 Price Forecasts	RGGI traded values, BC & Alberta tax	California AB32 forecast, with federal legislation scenario
Environmental Retrofits	Existing, Under Construction, Planned	Forecasted to meet future requirements, with scenarios
Unit Retirements	Existing, Planned & Age- Based	Forecasted based on economics, with scenarios
Transmission Expansion	Existing, Under Construction, Planned	Forecasted (generic additions), with scenarios
New Unit Additions	Existing, Under Construction, Planned	Forecasted (generic additions), with scenarios

# Next Steps





# 2015 ITP10 Scope

August 20<sup>th</sup>, 2013



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# Overview

- **Today**
  - **Start discussion regarding:**
    - **Consolidation Methodology**
      - Consolidation of Projects
      - Consolidation of Needs
    - **Project Staging Process**
- **Next Steps:**
  - **Looking for a Resolution on September 5<sup>th</sup>**

# Consolidation Methodology - Historical

- **2010 ITP20**
  - No specific weighting used
  - Consolidated plan most resembles the plan from high wind & carbon constraint future
- **2012 ITP10**
  - Policy projects: Included if appears in either future
  - Economic projects: Included if  $B/C > 1.0$  in Future 1
  - Reliability projects:
    - Included if the overload exceeded 100% in one future and exceeded 95% in the other future, OR,
    - Included if the voltage violation occurred in both futures,

# Consolidation Methodology - Historical

- 2013 ITP20

Portfolio	Weighting	Threshold	Project X	Project Y
Future 1	50%		✓	✗
Future 2	15%		✗	✓
Future 3	10%		✓	✓
Future 4	15%		✗	✓
Future 5	10%		✓	✗
Total	100%		70%	40%
Consolidated		60%	✓	✗

# Consolidation Methodology – Options

## 1. Consolidation of Projects

- Develop portfolio per future
- Portfolio weighting methodology

## 2. Consolidation of Needs - **Recommended**

- Determine, up front, the needs we want to plan for across all futures
- Based on engineering criteria
- Save time in project development and analysis
- Quality of project selection

# Consolidation Methodology – Option 1

- **Criteria for Consolidation of Projects**
  - In any one future
  - In 2 of 3 futures
  - In all 3 futures
  - In BAU or both Future 2 and 3

# Portfolio Consolidation – Option 2

- **Criteria for Consolidation of Needs**
  - For policy, reliability, and economic separately
  - **Reliability Needs**
    - Thermal/Voltage violation in 1 of 3 futures and above a set threshold in one other future
    - Thermal/Voltage violation in 1 of 3 futures and above a set threshold in both other futures - **Recommended**
    - Thermal/Voltage violation in 2 of 3 futures and above a set threshold in other future

# Portfolio Consolidation – Option 2

- **Criteria for Consolidation of Needs**
  - **Economic Needs\***
    - Economic need in 1 of 3 futures and above a set threshold in each other future
    - Economic need in any 2 futures
    - Economic need in 2 of 3 futures and above a set threshold in the other future - **Recommended**

\* Economic Need (2013 ITP20): Top 15 congested flowgates.

Annual Congestion = (Avg. Shadow Price) x (# of hours congested)



# Consolidation Methodology – Option 2

- **Criteria for Consolidation of Needs**
  - **Policy Needs\***
    - Need in any one future
    - Need in 2 of 3 futures - **Recommended**

\* Policy Need: Curtailment of renewable energy below requirements outlined in approved Renewable Energy (Policy) Survey.

# Project Staging - History

- **2010 ITP20 and 2013 ITP20**
  - All projects staged for year 20
- **2012 ITP10 Reliability Projects**
  - Staged only if 100% in both futures
    - Simple interpolation between 5 and 10 year models (Future 1)
- **2012 ITP10 Economic Projects**
  - B/C ratios interpolated between 5 & 10 years out to identify when it exceeds 1.0 in Future 1
- **2012 ITP10 Policy Project**
  - Staged to have policy project in-service in time to meet renewable requirements