



PCDS Progress Report—  
2032 ADS PCM  
RAC Meeting

October 21, 2021

Jamie Austin, Chair  
Kevin Harris, Vice Chair  
Tyler Butikofer, Staff Liaison

# Overview

Status of the 2032 ADS	Presenter	Time
<b>Development of</b> <ul style="list-style-type: none"><li>▪ Solar</li><li>▪ BTM-PV</li><li>▪ Hydro</li><li>▪ CO<sub>2</sub></li><li>▪ Wind</li></ul>	Jamie Austin	20 min
<b>Plant Thermal Data</b> <ul style="list-style-type: none"><li>▪ Heat rate curves</li><li>▪ Generator model type</li></ul>	Tyler Butikofer	10 min
<b>ADS PCM Documentation Updates</b> <ul style="list-style-type: none"><li>▪ Approved (2032 Work Plan, process diagram, process guide, etc.)</li><li>▪ In progress (DDVM, etc.)</li><li>▪ Error checking</li></ul>	Kevin Harris	15 min
<b>Next Steps</b>	Jon Jensen	15 min
<b>APFWG Update</b> <ul style="list-style-type: none"><li>▪ Status of mapping resources</li><li>▪ Updating Path Ratings</li></ul>	Jammie Austin	5 min
	Dave Angell	15 min

# Coincident Energy Shapes

Jamie Austin, PacifiCorp

# Coincident Dispatch of the Western Interconnection

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- PCDS had approved modeling coincident energies in the 2032 ADS using hourly shapes from year 2018
  - Hourly energy shapes from a single year for loads, hydro, wind, solar, energy efficiency, distributed generation, etc. to secure a coincident dispatch of the western power system
- NREL had confirmed having wind, solar and BTM-PV data prerequisite for using year 2018

# Solar and BTM-PV Data

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- Pressures mounting; much activity, tight schedules—posting final 2032 ADS in June 2022
- Immediate concern processing solar and BTM-PV data.
  - Had help from PNNL and Steven Wallace last time, neither helping this round
- PCDS discussed options—
  - Having staff download data from NREL and use past workbooks to produce “hourly profiles”

## Concerns

- Is there a method for picking a location for BTM (e.g., population density, commercial, industrial)?
  - More than mechanics of data download using NREL SAM to create credible hourly profiles at plant level
- Choosing right pole height for calculating wind plant meteorological data can affect output
- We will be short on inverter ratio data for solar through the L&R data collection
- Other issues—associating plants and units with generators in GridView

# Involving DOE, the National Labs

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- WECC depends heavily on involvement of SMEs from the National Labs and industry in building ADS PCM database
- Dr. Guohui Yuan will help—
  - Recognized importance of WECC-ADS dataset “to further the development of solar in the U.S.”
  - Called on NREL team of experts on SAM and NSRDB help develop solar and BTM-PV data
- Focus group of SMEs will meet biweekly, joined by Guohui, to address need
  - First deliverables include project plan being developed by NREL

# Data Development and Validation

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## PCDS—WECC staff

- Need to help DOE-NREL provide resources data from L&R submissions (years 2021 and 2022), accompanied with geo-coordinates and resources mapping as available

## Validation

- Work does not end with developing hourly data. Validating plant-specific data is crucial to process
- We can help DOE and NREL researchers reach into industry actual data validate the NREL synthetic data

# Developing Hydro Data for the 2032 ADS

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- Addressing need to develop hydro data consistent with PCDS' approved "Year 2018" for modeling coincident year's energy, PCDS and PCMS heard from—
  - John Ollis, NPCC, presented on August 19, 2021
  - Anders Johnson and Peggy Racht, BPA, presented on August 8, 2021
  - Nathalie Voisin, PNNL, presented on July 7, 2020
- Evidence of changing hydropower operations to accommodate renewables and changing markets. BPA confirmed it is changing operations—implementation of EIS 2020 covering Columbia Basin Projects
- Addressing complexity of task and helping navigate and decide on optimal data for 2032 ADS, PCDS formed "Hydro Focus Group," joined by SMEs, to evaluate options and recommend an approach



# Hydro Focus Group

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## Consensus—

- Weekly datasets can be derived from monthly targets –
  - Start with monthly hydropower targets developed by BPA Hydsim and use PNNL “HydroFxr” tool to disaggregate to weekly; deemed more realistic than current GridView monthly approach during snowmelt and end of summer seasons
- Further exploration necessary to represent 2018 water conditions and implement 2020 EIS operations; need further discussion for daily fluctuations

## Other Hydro Data

- Agreed to just use Hydsim also covering head water of Columbia (the Big 15) and not worry about integrating Canadian data previously submitted by NWPCC
- Nathalie Voisin, PNNL, will develop hydro data; Kevin Harris and Nathalie will process 2018 data already collected: submitted and from public sources (e.g., BPA, SMUD, CAISO, NOAA, USGS)

# Modeling of Legislated CO<sub>2</sub>

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- Initiated conversation on how to model newly legislated Clean Energy Transformation Act (CETA). Objective—decarbonize the economy to net-zero emissions.
- Washington state (became law, in 2019):
  - 100% renewable and non-emitting by 2045
- Oregon passed House bill in 2021:
  - 100% renewable and non-emitting by 2040

# Developing Wind Data

Tyler Butikofer, WECC

# Wind Data

- Caroline Draxl (NREL): New and improved wind data for 2018

## WIND TOOLKIT 2007 - 2013

WRF v3.4.1

YSU PBL scheme

Topographic wind enhancement

2 km nest

ERA Interim boundary conditions

5 min output

Scale selective grid-nudging

## WTK-LED 2001-2021

WRF v4.1.3

MYNN PBL scheme

2 km single domain

ERA-5 boundary conditions

5 min output

Scale selective grid-nudging

Uncertainty information

# Wind Profile Status

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- Greg Brinkman (NREL) has offered to help develop the hourly wind profiles
  - Process is still under development
- Wind generation locations have been provided to NREL for testing process

# Wind Profile Creation Plan

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- 2021 work:
  - WECC will provide geo-coordinates, size, technology from 2021 L&R Resources
  - NREL will build profiles based on 2018 data
    - PCDS/WECC staff will validate
- 2022 work:
  - WECC will provide geo-coordinates, size, technology from 2022 L&R Resources
  - NREL will rebuild profiles and provide to WECC
    - PCDS/WECC will validate
- If technology and hub height information unavailable, NREL will use vintage to determine generic technology and hub height

# Plant Thermal Data

Kevin Harris, Harris PCM

# Heat Rate Curves

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- In 2020, EPA CEMS used to develop heat rate/IO curves for 492 units in WECC U.S. system (117 ST, 126 CC and 249 GTs)
  - Five data years used to develop curves (2014–2018)
- Generic assumptions (IO curve, full load HR, min loading) derived from this data for:
  - ST-Coal/Gas, CC E, CC F, CC G, CC SGT-800, CC LM6000, LMS100, LM6000, FT8, GT E & GT F



# Generator Model Types

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- New model type field identifies what a unit is and helps model it
- Helps update generic assumptions and review of simulation results
  - Market-based GT with 80% CF
- Example types: CC F, CC E, LMS100, NDS GT
- NDS: Non-dispatchable supply are not dependent on market economic for commit and dispatch
- Previously generic modeling assumptions were manually updated
- Field is also required in evaluating PCM new algorithm to automatically update assumptions in GridView

# ADS PCM Documentation Updates

Jon Jensen, WECC Staff Engineer

# ADS Documentation

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- PCDS Work Plan
- ADS Process Guide/RACI Matrix
- ADS Change Tracker/Decision Tracker
- ADS PCM performance metrics
- DDVM
- ADS release notes
- OneNote document

# PCDS Work Plan

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- Purpose: Define PCDS work process and responsibilities, specifically those related to building the 2032 ADS
- Action item: Create document
- Schedule: Approved by PCDS August 17, 2021

# ADS Process Guide/RACI Matrix

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- Purpose:
  - ADS Process Guide
    - Document ADS development process and describe foundational requirements
  - RACI Matrix
    - Identify entity responsible (R), accountable (A), consulted (C), and informed (I) for activities in developing ADS
- Action item: Create document
- Schedule: Approve in PCDS—October 19, 2021

# ADS Error Checking Criteria

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- Error checking criteria were developed in discussions with focus group in meetings during August 2021
- Draft was sent for review and comments on September 17
- Since no additional comments were received, criteria are ready for PCDS approval

# ADS Change Tracker/Decision Tracker

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- Purpose:
  - Change Tracker—document, track, and approve ADS changes
  - Decision Tracker—document ADS decisions
- Action items:
  - Develop format and process for ADS Change Tracker
  - Develop document structure that captures ADS decision items
- Schedule
  - WECC IT working on prototype Change Tracker
  - Approve in PCDS—November 17

# ADS PCM Performance Metrics

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- Purpose: Establish criteria to validate when ADS case is acceptable to use in reliability assessments
- Action item: Create protocol for ADS performance metrics
- Schedule: Approve in PCDS—October 19



# Data Development and Validation Manual

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- Purpose: Describe how to build ADS PCM
- Action item: Review structure, format, and content expectations of document for 2032 ADS
- Schedule:
  - Began creation of DDVM metrics—August 17
  - Presented to PCDS and started review—September 28
  - Approve in PCDS—November 30

# ADS Release Notes

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- Purpose: Capture content and assumptions specific to release of ADS PCM
- Action item: Develop structure, format, and content of document for 2032 ADS
- Schedule:
  - Present structure and format to PCDS and review—October 19
  - Approve structure and format in PCDS—December 7
  - Approve content in PCDS—June 2022

# OneNote Document

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- Purpose: Capture documents and content of PCDS meetings
- Action item: Develop structure, format, use, and content of document for 2032 ADS
- Schedule:
  - Present structure and content to PCDS and review—November 9
  - Finalize in PCDS—January 31, 2022

# Next Steps

**Jamie Austin, PacifiCorp**

# The Challenge

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- Recognizing complexity of developing a credible 2032 ADS is essential
  - Resources and involvement of SMEs to address a large range of needed expertise
- WECC-ADS is a valuable database
  - DOE recognizes importance for future wind and solar development
  - Yes, it warrants WECC investment to implement “Generator Unit Types”
    - This function also necessary for PCMS to validate enhanced algorithm in software
- Work does not end with developing data. Validating plant-specific data and other developed data, algorithms, and dispatch results is crucial to process
- Requires support from RAC committees, stakeholders, and WECC staff

# APFWG Update

**Dave Angell, APFWG Chair, NWPP**



## Contact:

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