NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

The Energy-Time Diagram

IEEE 762, Annex C, Figure C-1

Module 03 - GADS Data Reporting Workshops

RELIABILITY | ACCOUNTABILITY



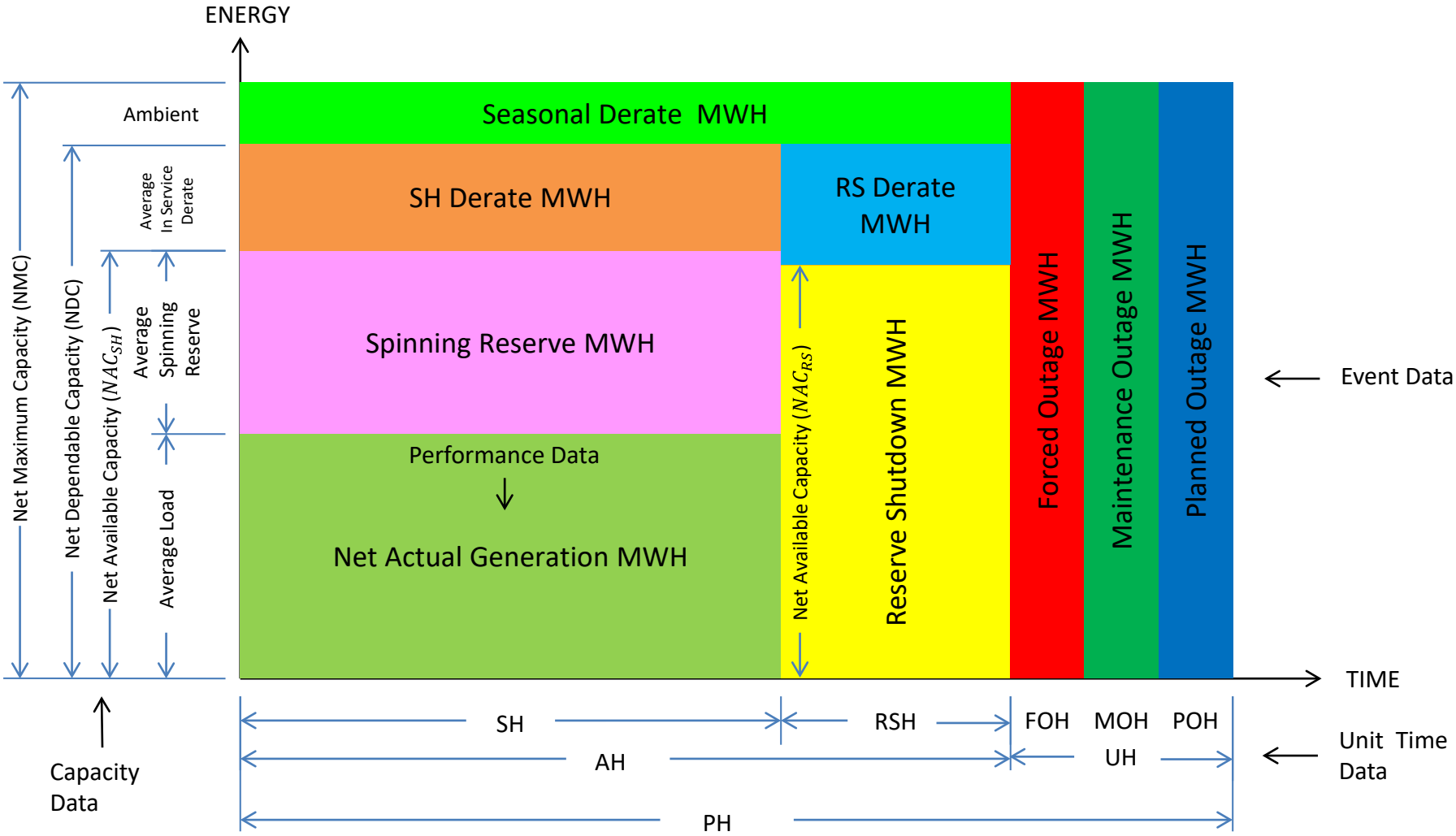

Can The Unit Make NMC?

- GADS asks just one question: Can the unit make Net Maximum Capacity (NMC) – 100% full load?
- If the unit cannot make NMC, you, as a GADS data reporter, will explain why by using events to describe and track the problem(s) with the unit that prevent it from making NMC
- GADS is based on IEEE 762, which in turn, is based on a mathematical model of a generating unit
  - The model shows the relationship between event and performance data
  - The model is called the Energy-Time Diagram

Converting Events Into Energy

- The purpose of the Energy-Time diagram is to convert events into energy, in Mega-Watt Hours (MWH), and plot them as rectangles on a chart of energy versus time where
  - MWH = Event Duration x NMC
- For full outage events
  - Event Duration = length of event in hours
    - Example: A 100 MW unit is on forced outage for 10 hours so the Event Duration = 10 hours and the MWH = 10 hours x 100 MW = 1000 MWH
- For partial outage (derate) events
  - Event duration = equivalent length of the event as a full outage in hours
    - Example: A 100 MW unit experiences a 10 MW derate for 10 hours so the Event Duration = (10 MW x 10 hours)/100 MW = 1 hour and the MWH = 1 hour x 100 MW = 100 MWH

The Energy-Time Diagram



The Energy-Time Relationship

- As you have just seen the Energy-Time diagram plots the performance and event data against capacity and unit time data
- The relationship between performance and event data is shown below

Maximum Energy = Net Generation Energy + Event Energy

or

Potential Energy = Actual Energy + Lost Energy

- The remainder of this course will focus on covering the details of collecting and reporting the performance and event data

Problem

- Problem: Unit D is a nuclear unit with a NMC = 1000 MW which is usually base loaded at full power all the time
- Question: What is the Maximum Energy in June that can be produced by this unit?
  A. 720,000 MWH
  B. 744,000 MWH
  C. 672,000 MWH
  D. 696,000 MWH
  E. 700,000 MWH
- Answer: A. 720,000 MWH
- Explanation: Maximum Energy = PH x NMC = 30 x 24 x 1000 = 720 x 1000 = 720,000 MWH

Learning Objectives

- The objectives of the remainder of this workshop are as follows:
  - Learn about design data
    - Required and voluntary design data fields
  - Learn about event data
    - How to describe the state of the unit with events
  - Learn about performance data
    - Installed capacity, generation, fuels, startups, and unit time information
  - Learn about the different rules in the DRI for
    - Collecting the data
    - Formatting the data into files for submission to GADS
  - Learn about factors and rates
  - Learn about the GADS process
  - Learn about webE-GADS and how to submit your data to GADS

Questions and Answers