

# **Northwest Power & Conservation Council**

## **SYMPOSIUM ON PACIFIC NW POWER MARKETS**

### **Natural Gas-Fired Generation Development**

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## Natural Gas-Fired Project Development

1. Regional Needs – Energy to Peaking & Reliability
2. Technologies – Combustion Turbines & Engines
3. Potential Sites – Location, Location, Location
4. To be continued...

## Regional Power Supply

“... concludes that the likelihood of a shortfall in 2017 has increased to 6.6 percent. This means that the region will have to acquire additional resources in order to maintain an adequate power supply...”

“... is not a substitute for a comprehensive resource acquisition plan.”

“... does not fully reflect constraints and needs of individual utilities.”

“... an emerging concern is the lack of access for some utilities to market supplies due to insufficient transmission or other factors.”

- Pacific NW Power Supply Adequacy Assessment for 2017 dated November 21, 2012 -

# Basic Taxonomy for Power System Analysis

- Energy: power generated or conserved across a period of time to serve system demands for electricity
- Peaking Capacity: capability of power generating and demand-management resources to satisfy maximum system demands for electricity at a specific point in time
- Flexibility: ability to continuously and reliably match generating and demand-side resources to system demands for electricity

- Source: NW Power & Conservation Council – Power System Capacity Primer – February 13, 2013 -

# Typical Uses of Northwest Generating Resources

## Energy – Capacity – Flexibility

Resource Type	Can be Dispatched	Energy	Capacity	Flexibility
Hydro	Yes	Yes	Yes	Yes
Coal	Yes	Yes	No	No
Natural Gas - Combined Cycle	Yes	Yes	Yes	Yes
Natural Gas - Peaking (Simple Cycle, Reciprocating)	Yes	No	Yes *	Yes
Nuclear	Yes	Yes	No	No
Wind	No	Yes	No	No
Solar – Photovoltaic	No	Yes	No	No
Solar – Thermal	Yes (limited)	Yes	Yes (limited)	No
Storage (e.g., battery)	Yes	No	Yes	Yes
Energy Efficiency	No	Yes *	No*	No *
Demand Response Interruptible Load (e.g., air conditioners)	Yes (shut off only)	No	Yes	No
Demand Response Dispatchable Load (e.g., water heaters)	Yes	No	Yes	Yes

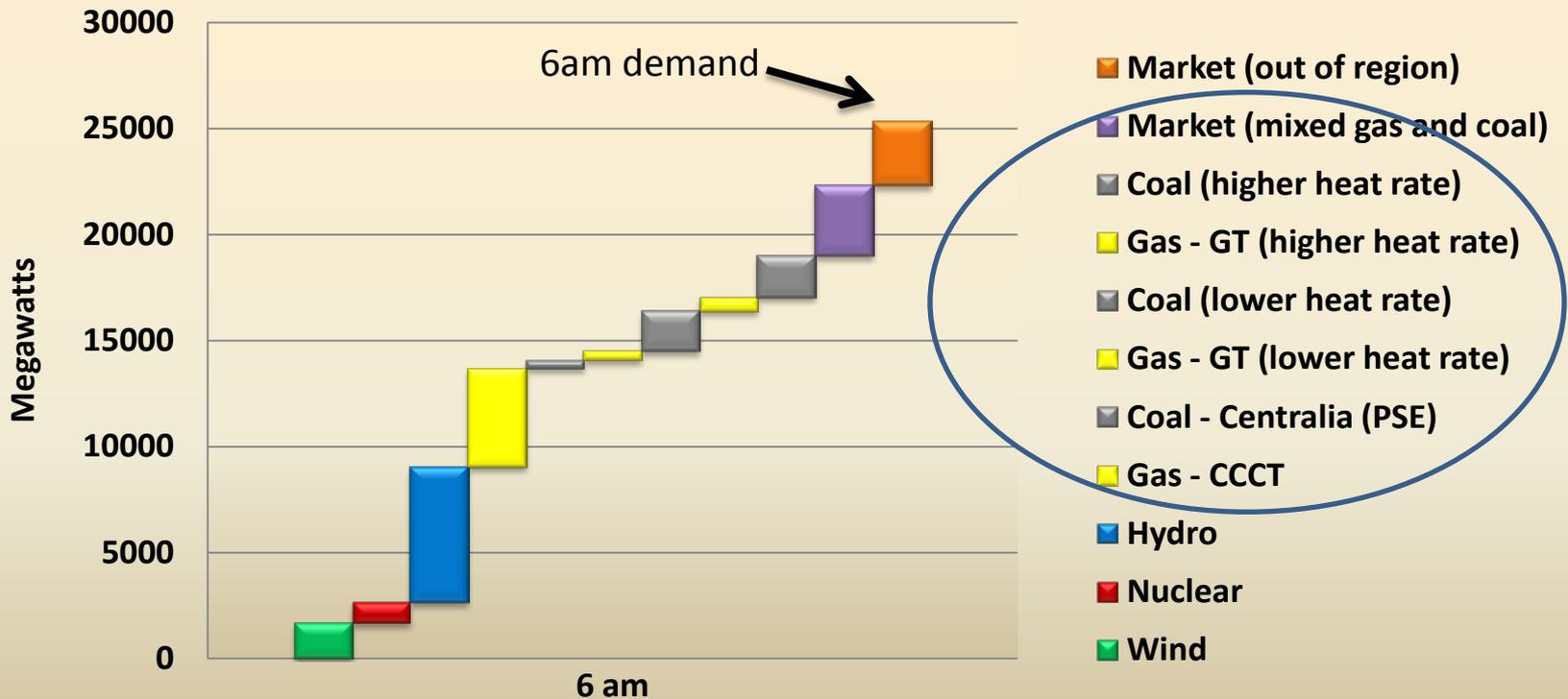
- Source: NW Power & Conservation Council – Primer on Resources - April 10, 2013 -

# Simulated Dispatch Order

## (6am January weekday)

\* Shift to **Natural Gas Generation**

Simulated Order of Resource Dispatch (January)



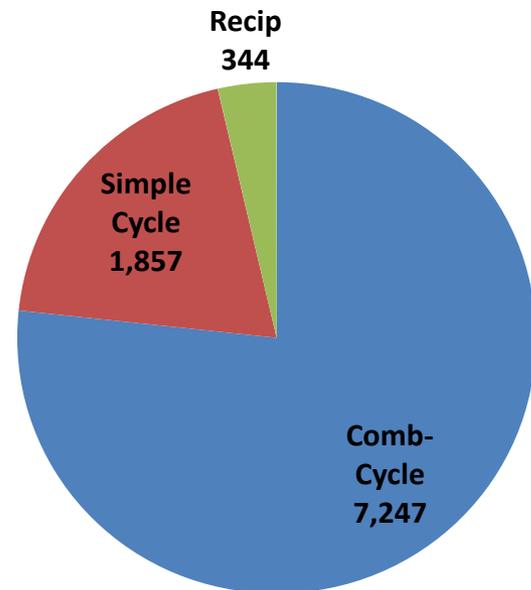
- Source: NW Power & Conservation Council – Primer on Resources - April 10, 2013 -

# Major Types of Natural Gas-Fired Generating Facilities

\* Focus on **Peaking Capacity** and **Flexibility**

- Single-cycle combustion turbine (SCCT)
- Combined-cycle combustion turbine (CCCT)
- Reciprocating engine

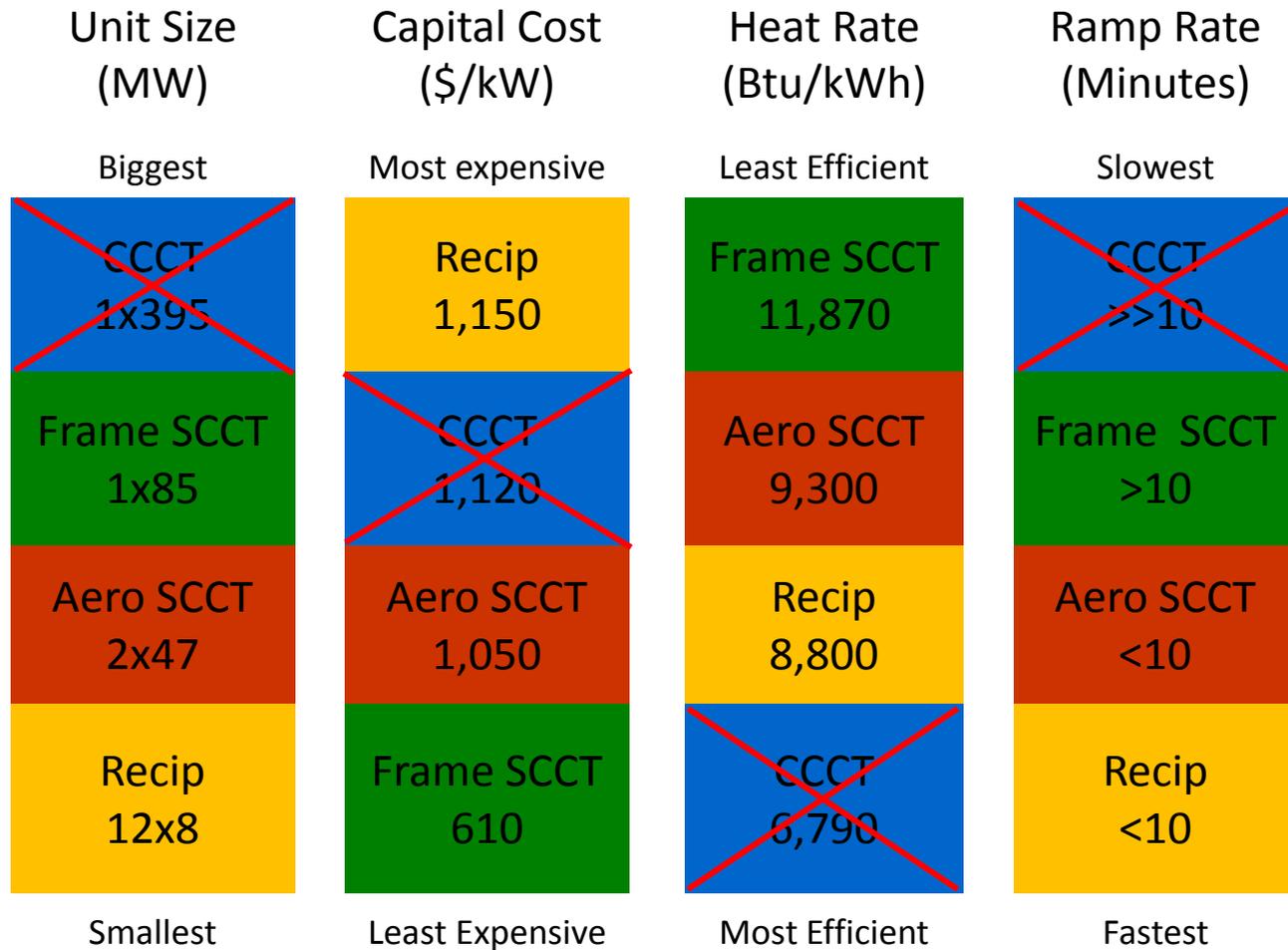
Installed Capacity in the Region in megawatts as of 2012



- Source: NW Power & Conservation Council – Primer on Resources - April 10, 2013 -

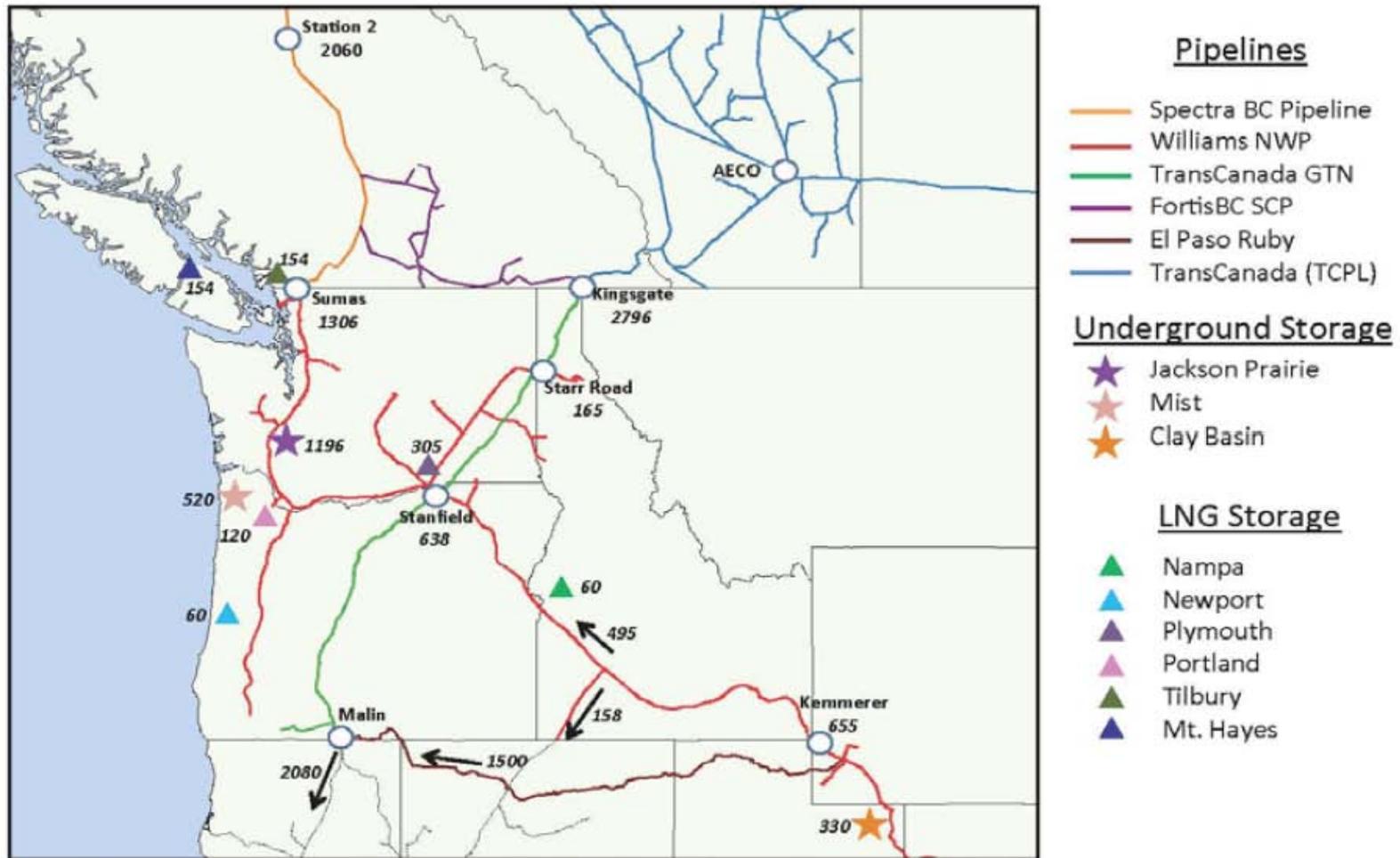
# Gas-Fired Power Plant Characteristics

## 6<sup>th</sup> Power Plan



- Source: NW Power & Conservation Council – Primer on Resources - April 10, 2013 -

# Map of NW Pipelines, Storage, Delivery Hubs - Location, Location, Location



Source: NWGA 2012 Outlook. Numbers indicate delivery or takeaway capacity in thousands of dekatherms/day.

- Source: PNUCC/NWGA – Natural Gas – Electricity Primer – August 2012 -

# POWER GENERATION MAP



## Natural Gas Generation Asset Driven Development

- Pipeline Access
- Grid Interconnection (Transmission)
- Nearer Load Centers
- Dispatch, Peaking & Flexibility (combined?)
- Permitting & Environmental
- Land/Site Availability
- O&M Factors
- Financial & Risk

## “Value-Added Factors”

- Source: NW Power & Conservation Council – Website Map for Natural Gas Generation -

## **Natural Gas-Fired Project Development** **“Moving Forward”**

1. Understand Needs – Now Peaking & Reliability
2. Match Technologies – Combustion Turbines & Engines
3. Identify Sites – Location, Location, Location
4. Develop Projects – Market Drivers?
5. Provide Value – to the Region...

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