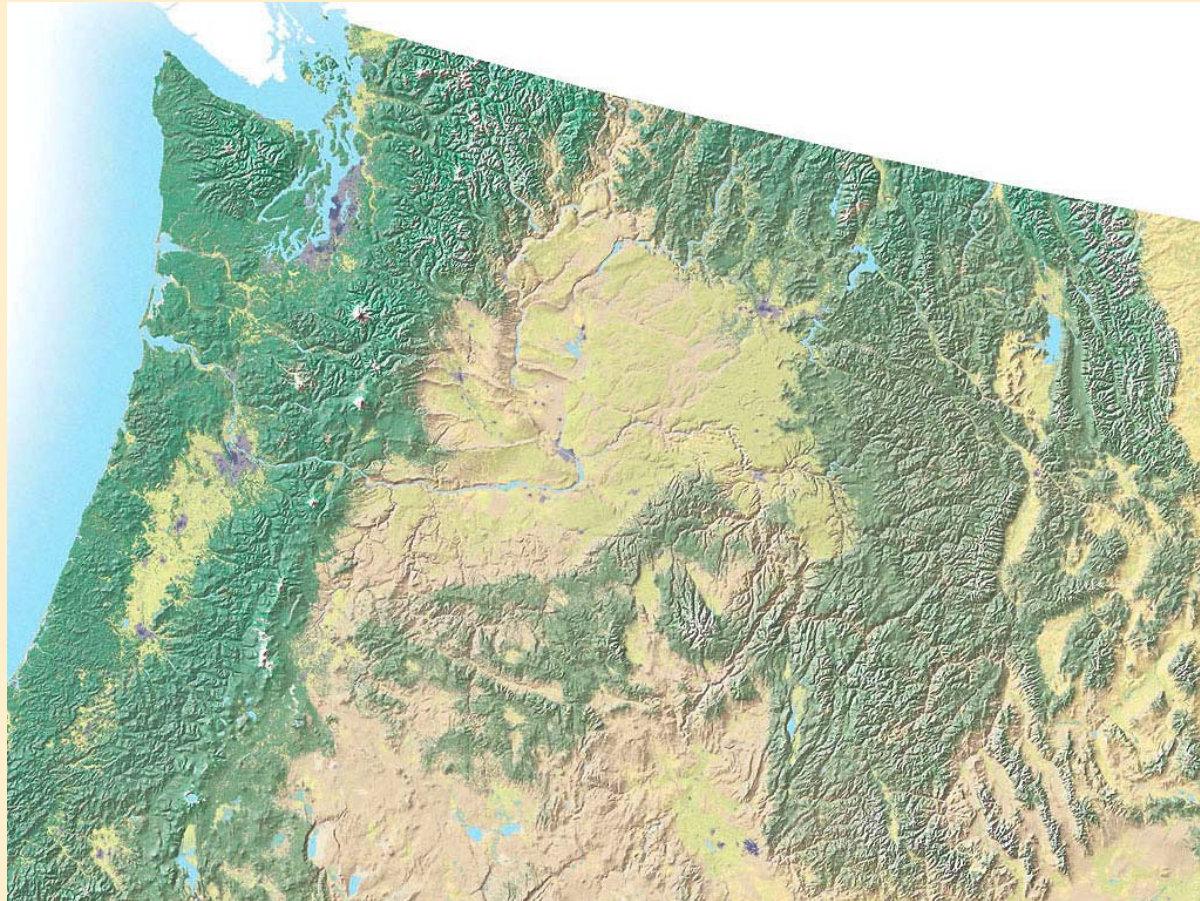


Introduction to the Pacific Northwest Electric Power System



Jeff King

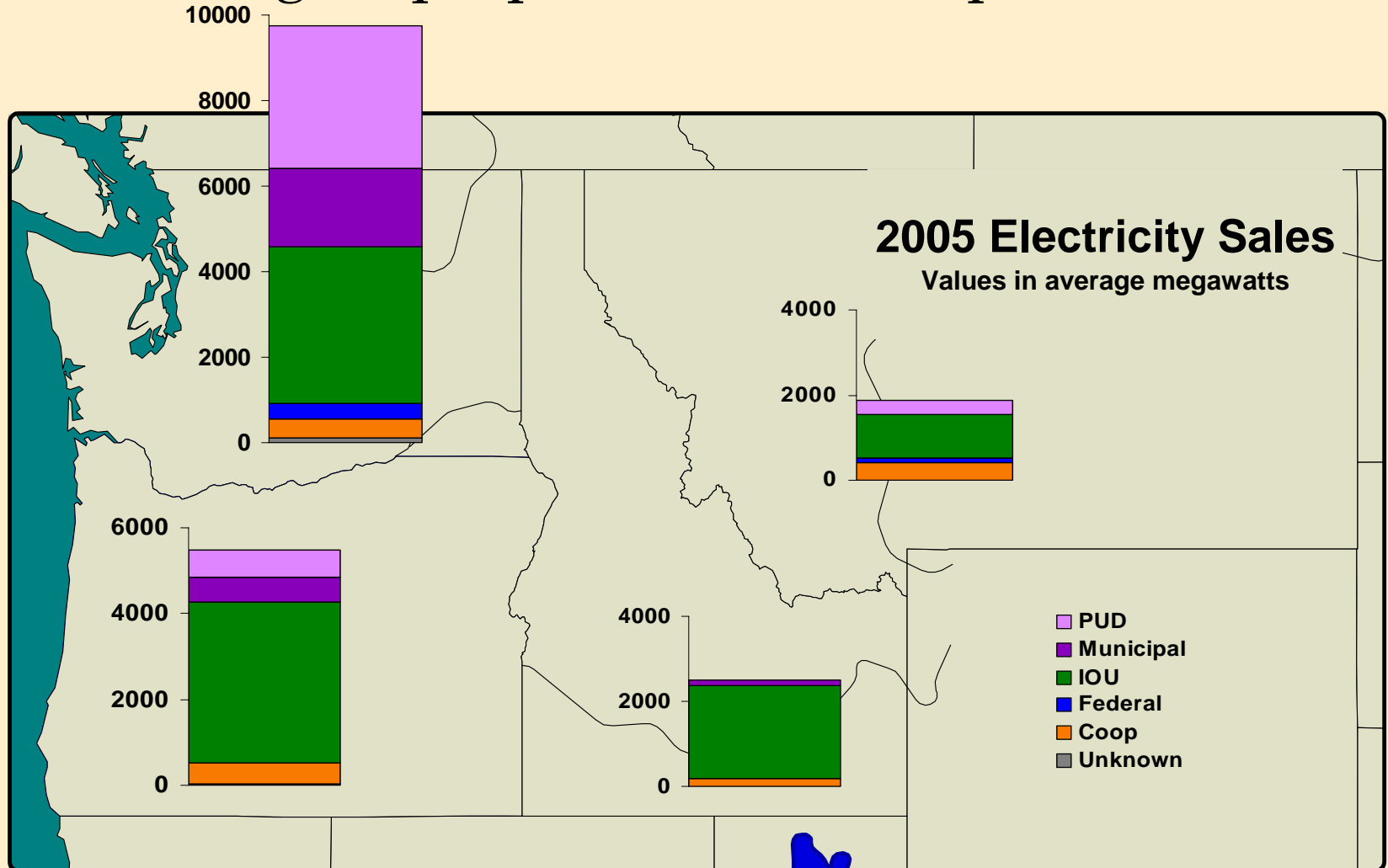
**Northwest Power and
Conservation Council**

**Washington Climate
Advisory Team**

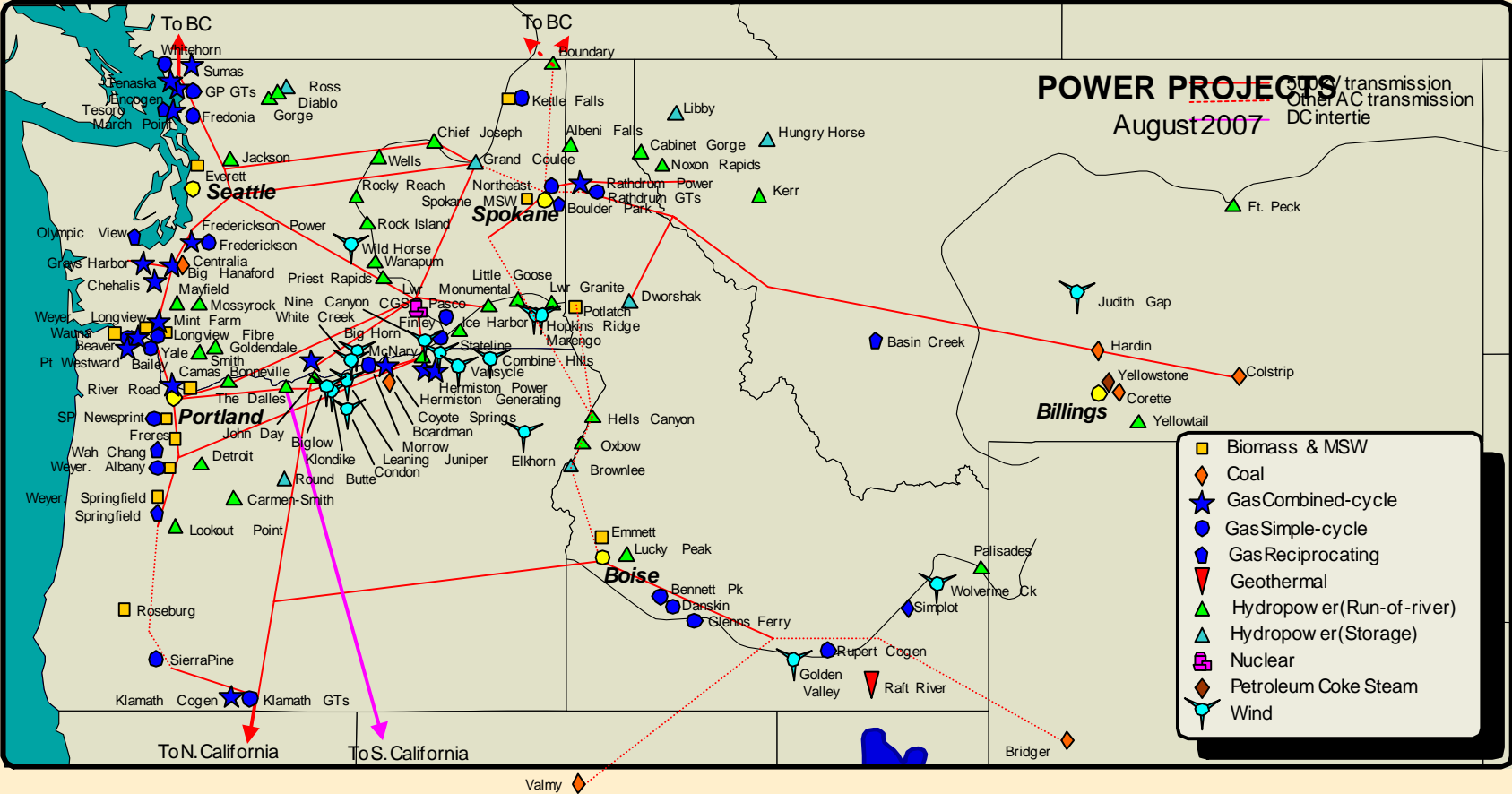
**Market-based Mechanisms
Ad Hoc Committee**

**August 24, 2007
Webinar**

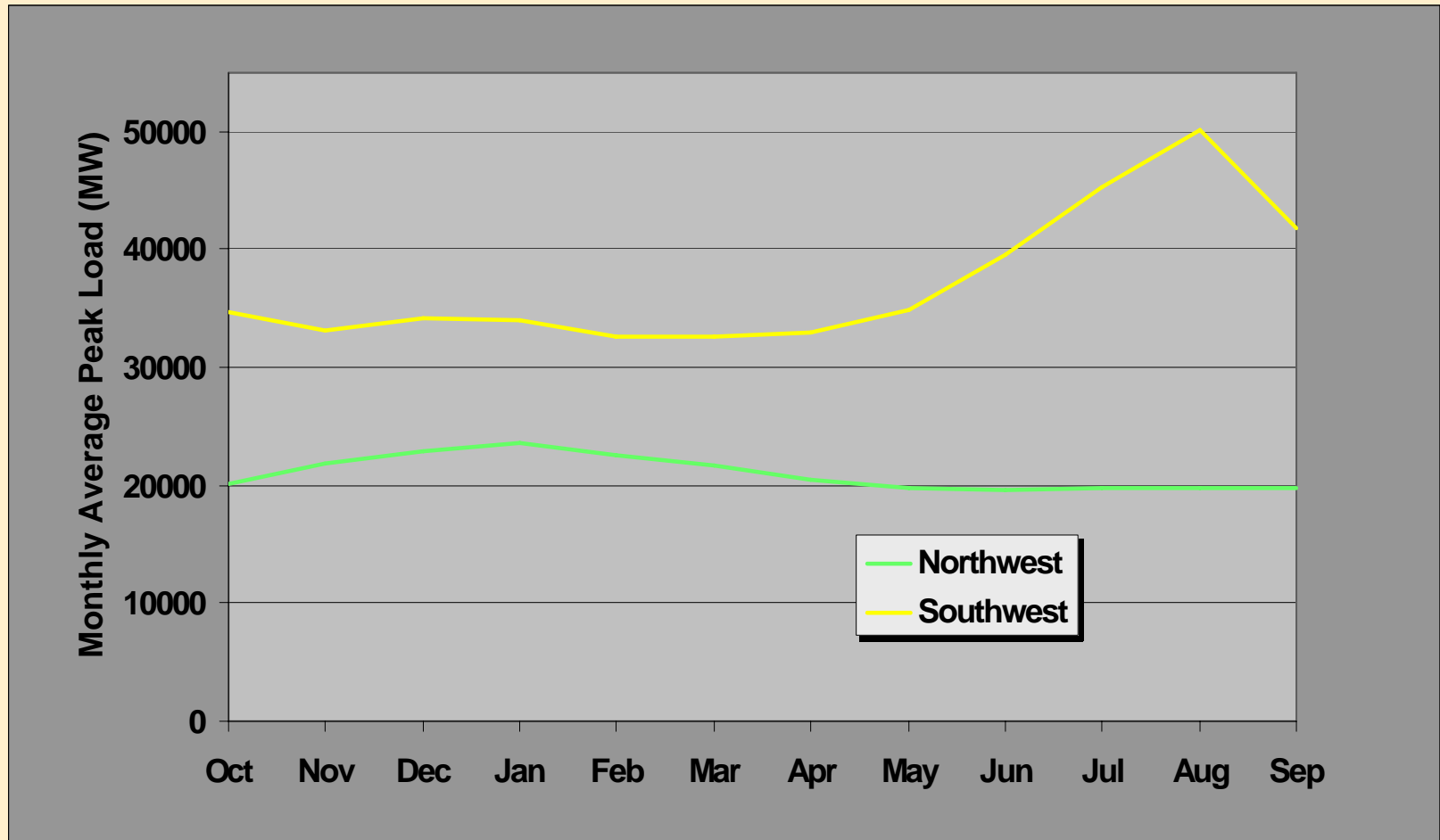
Washington accounts for half of regional sales and the largest proportion of COU providers



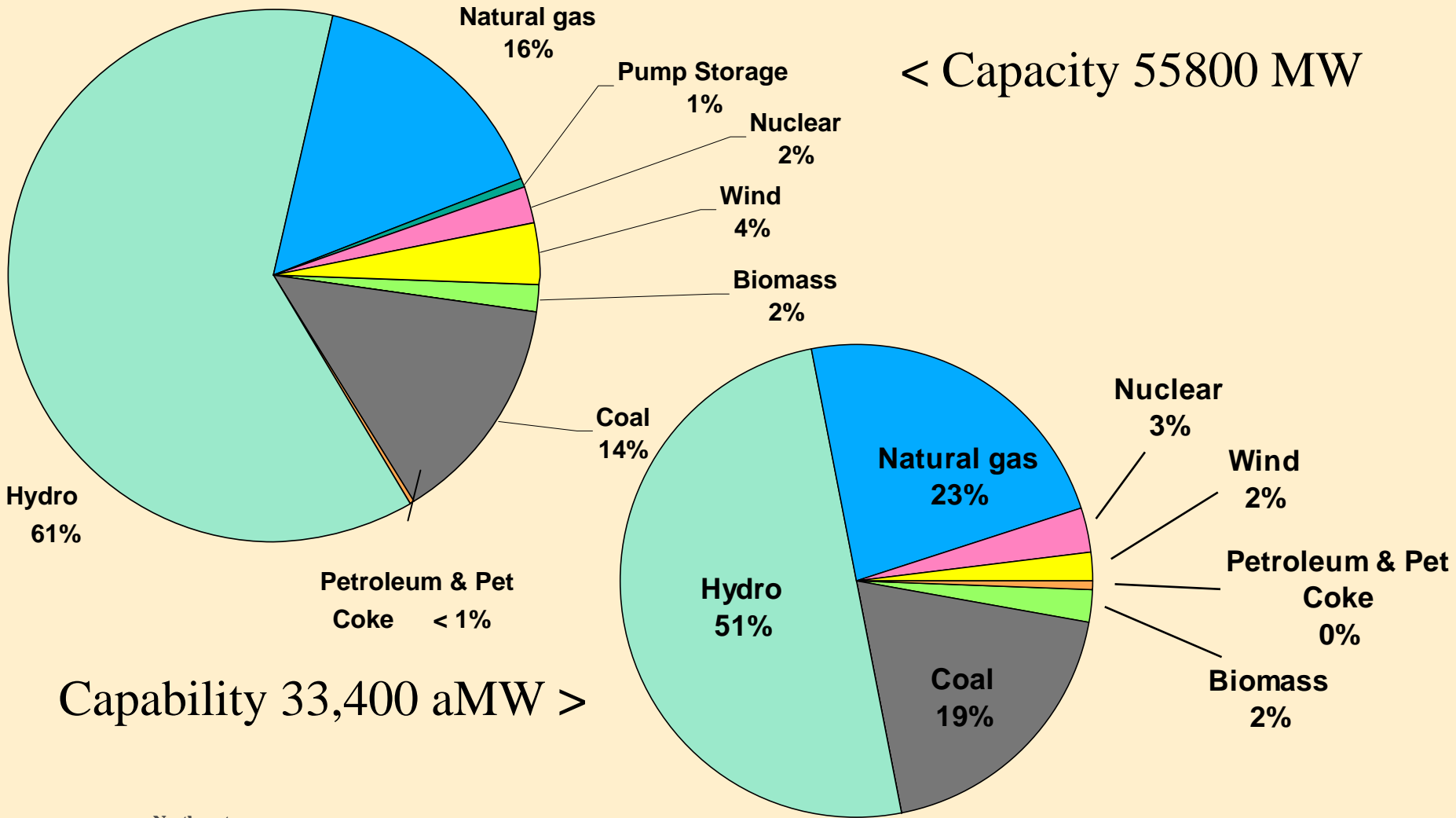
The Northwest electric power system



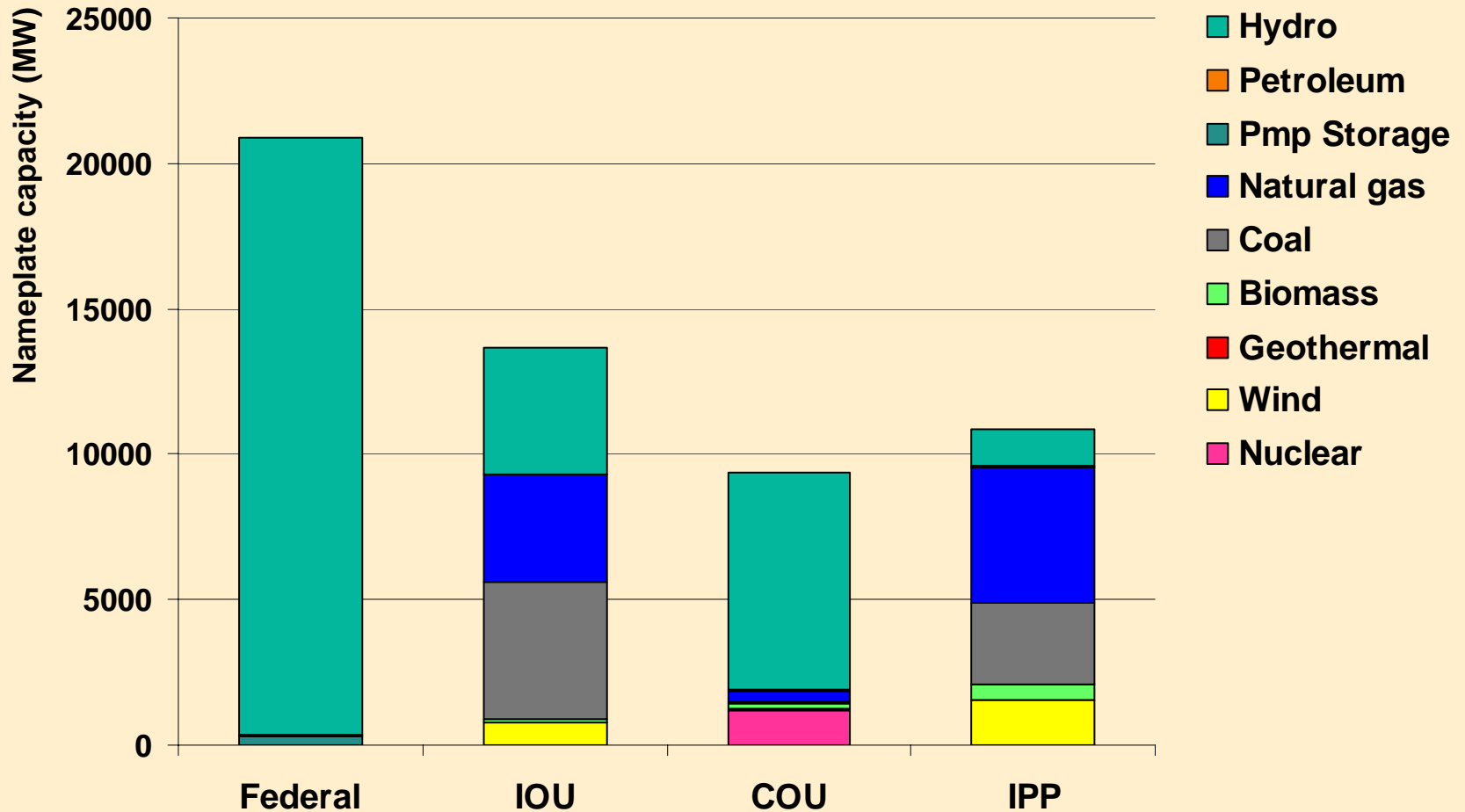
Complementary Northwest and Southwest loads drove construction of the interties



Northwest generating resource mix

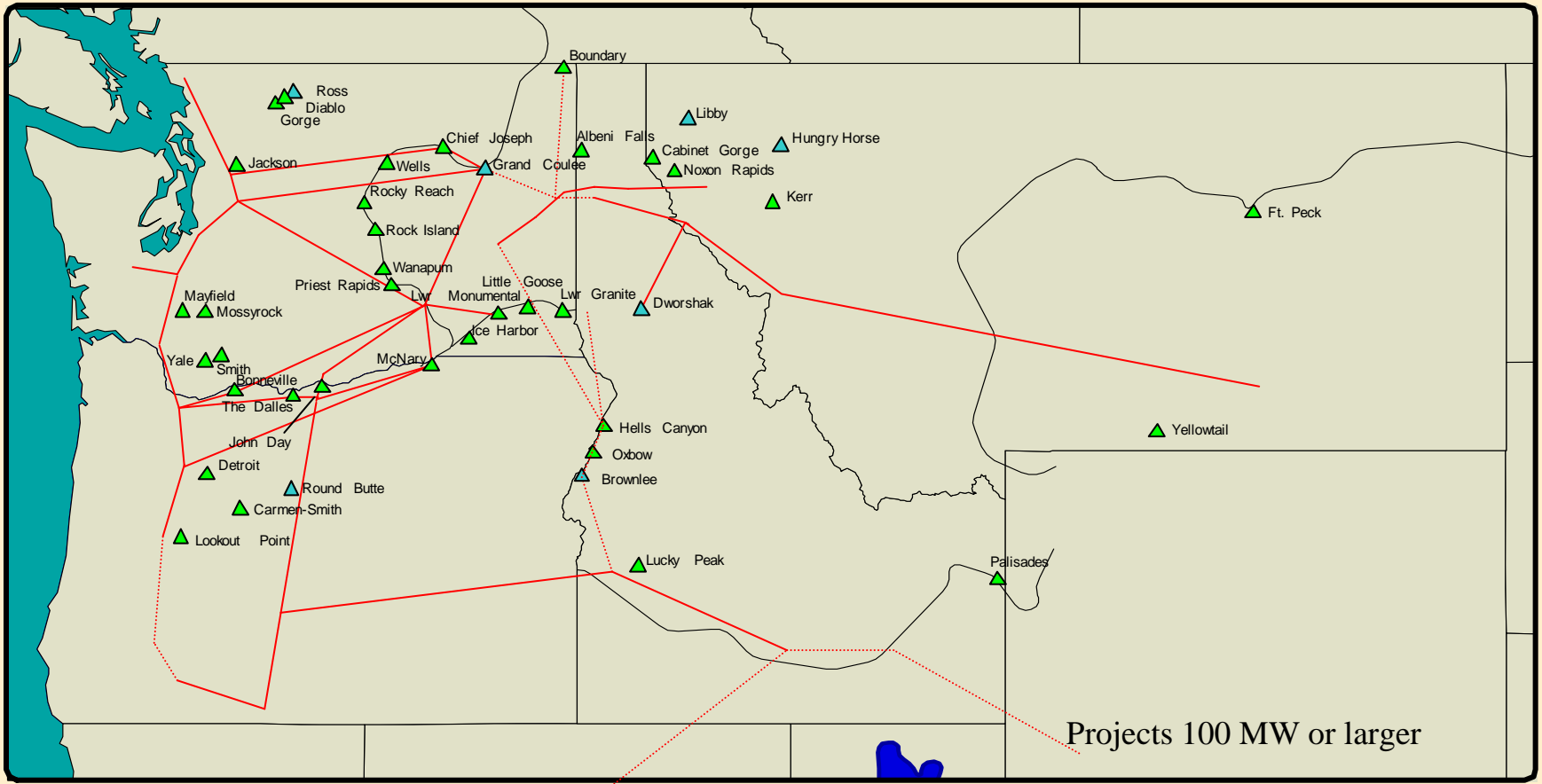


Generating asset ownership

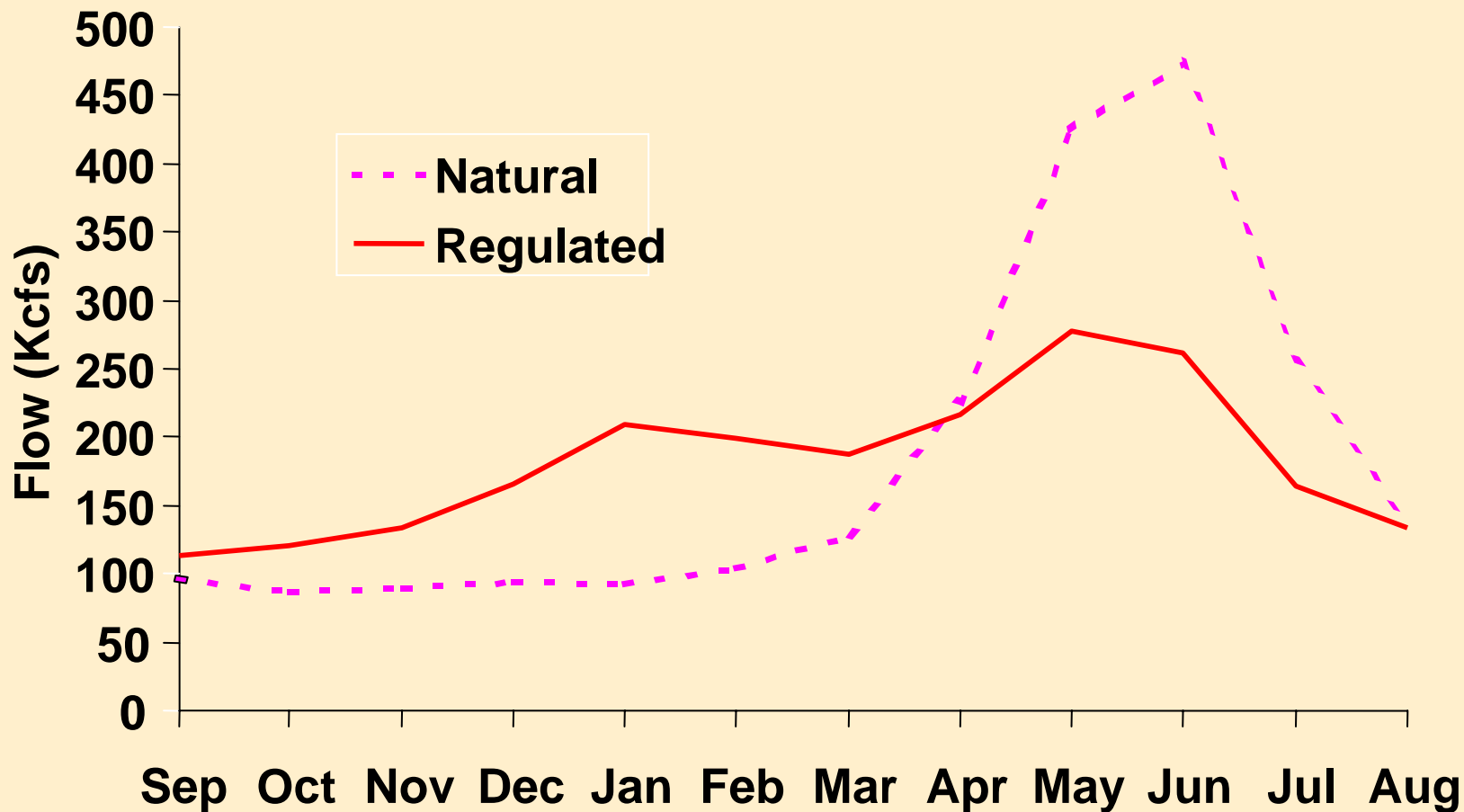


The nuclear resource (Columbia Generating Station) and a small amount of wind and biomass is marketed by Bonneville as part of Federal Base System

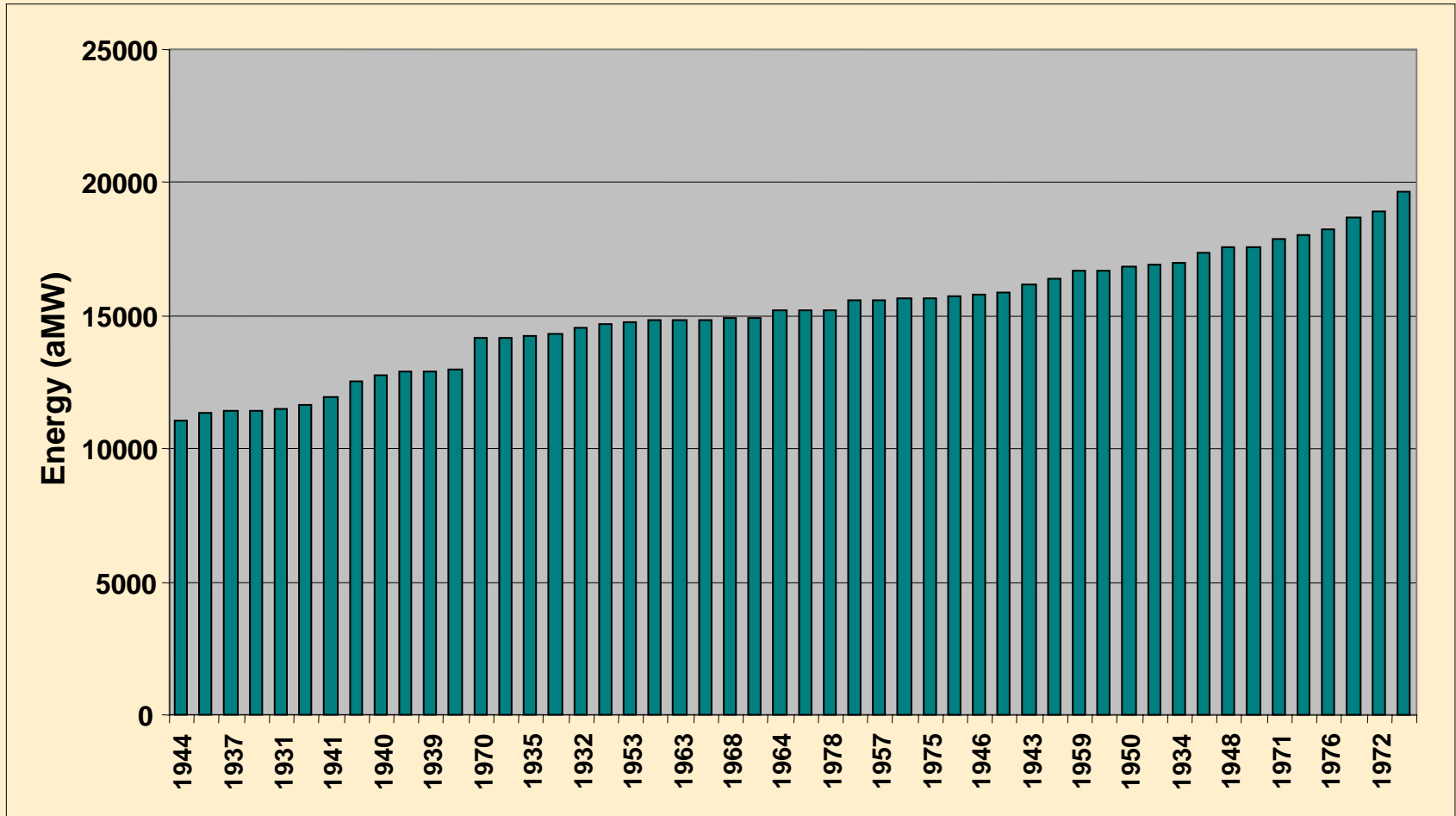
The hydropower system – upstream storage; downstream generation



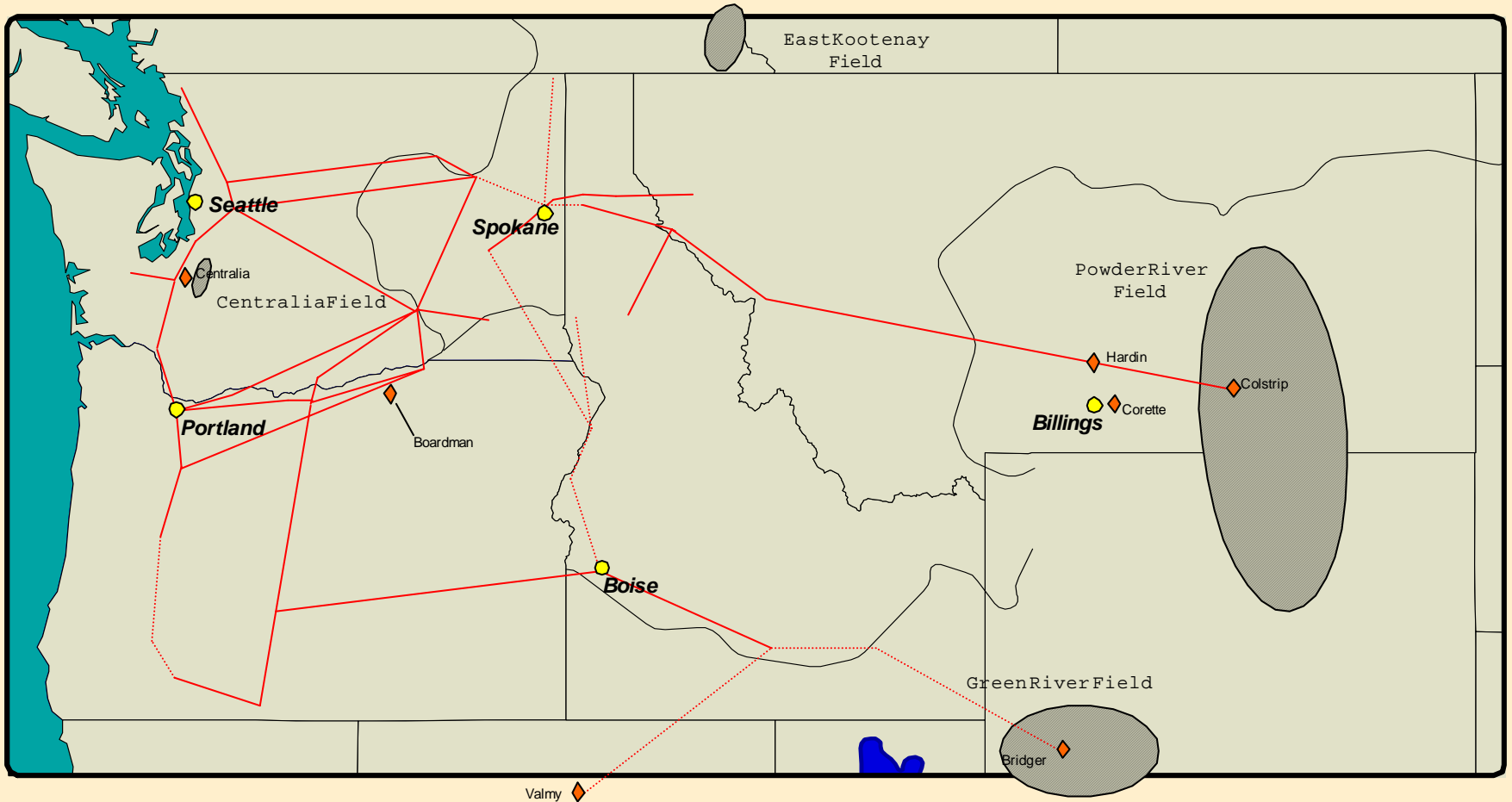
Storage projects regulate river flows to align generation with load



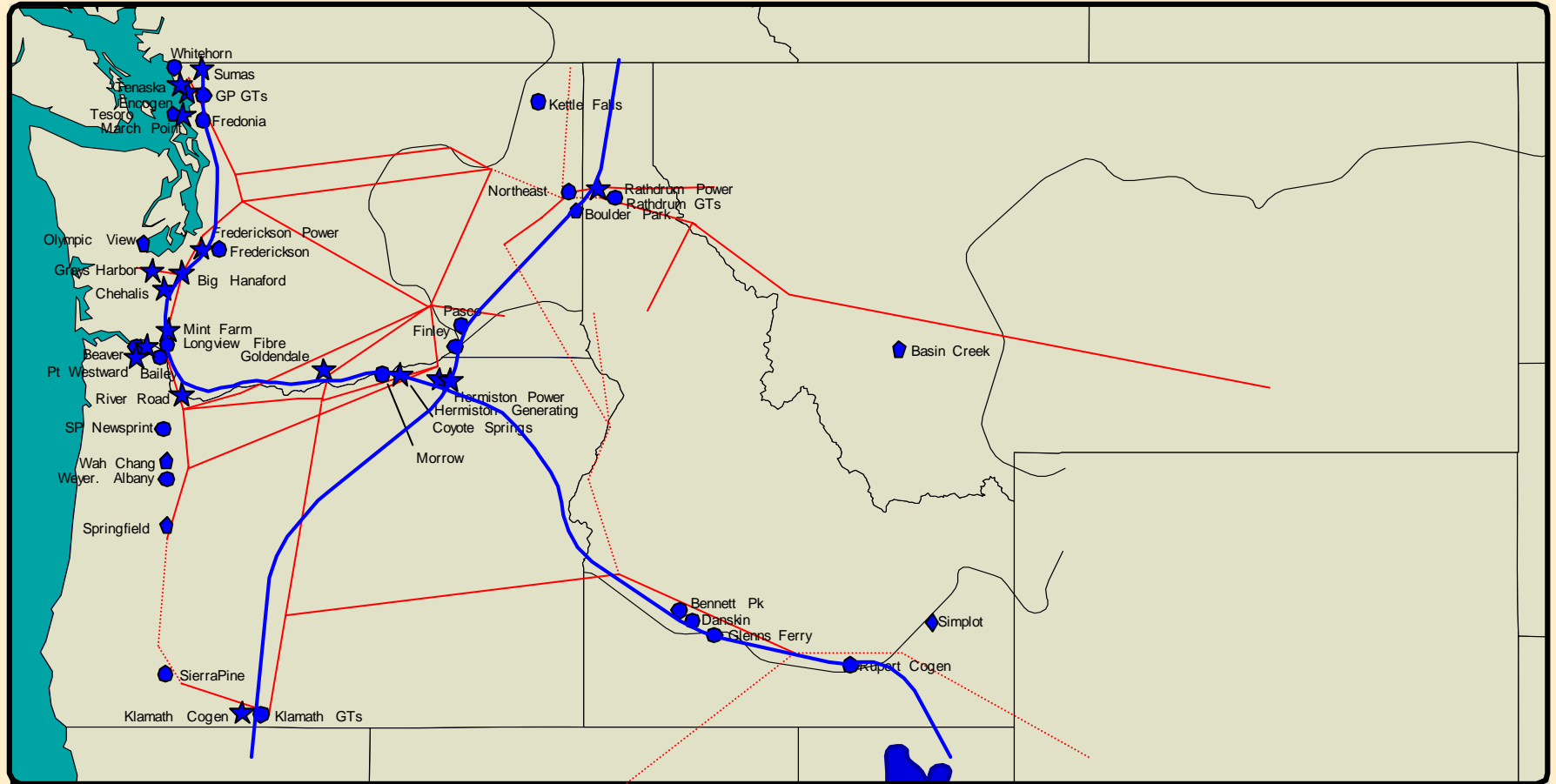
Annual hydro output can range from 11,000 to 20,000 average megawatts



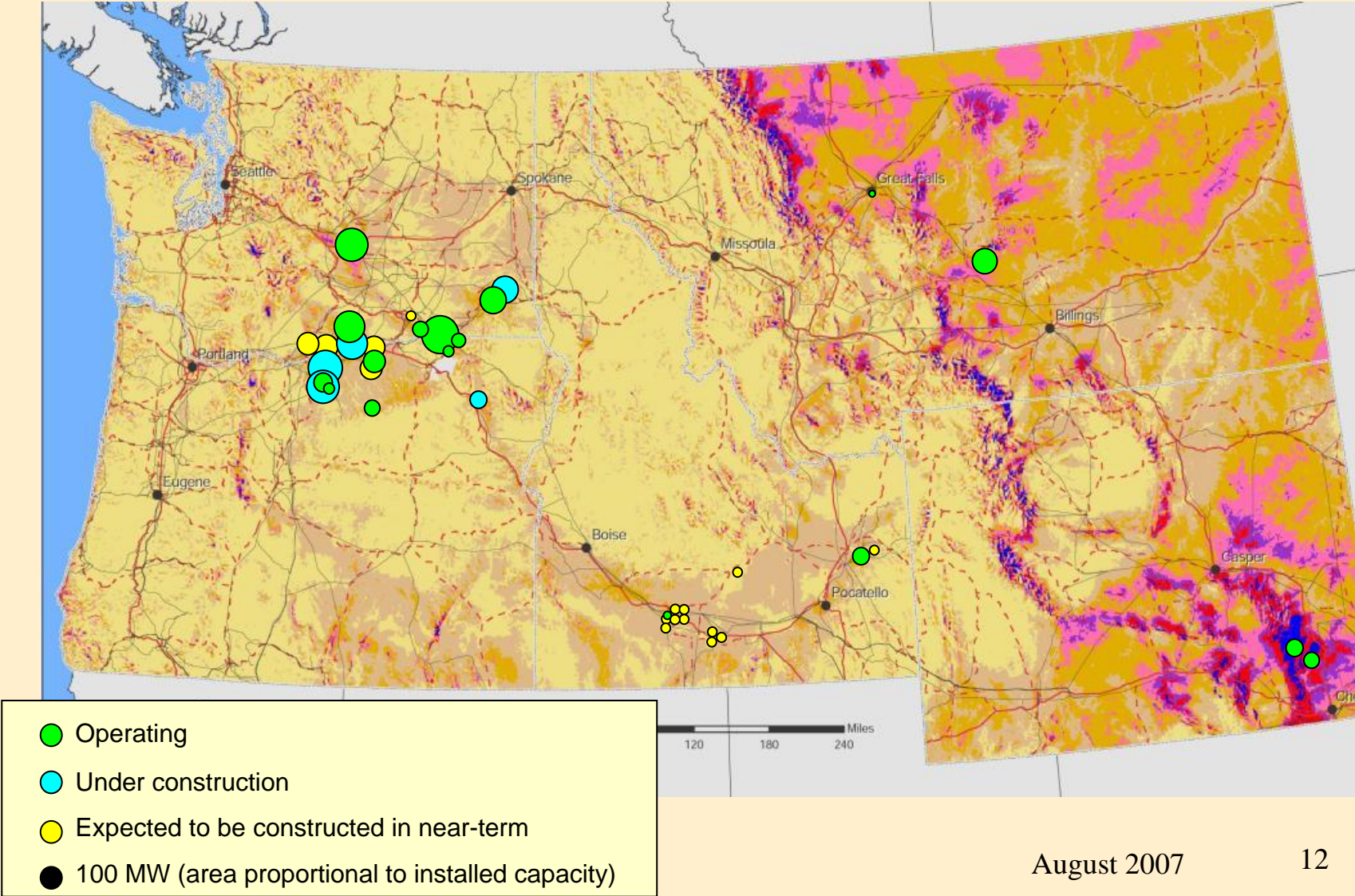
Most coal for Northwest plants originates from Montana and Wyoming



Natural gas is sourced from western Canada and the Rockies

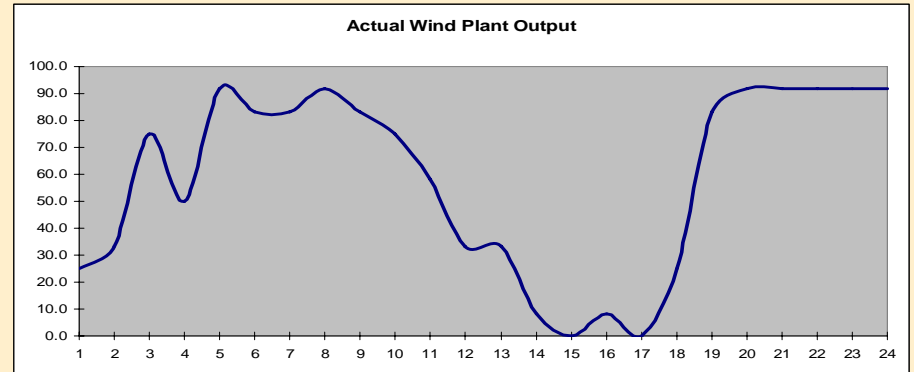


Wind power resources and projects

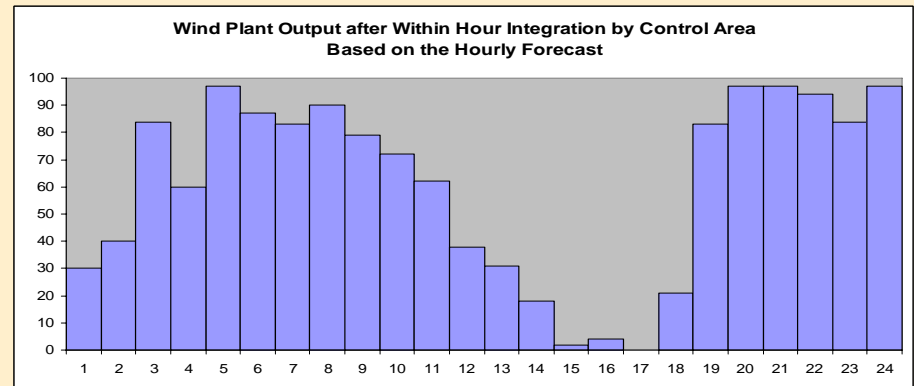


Wind integration process

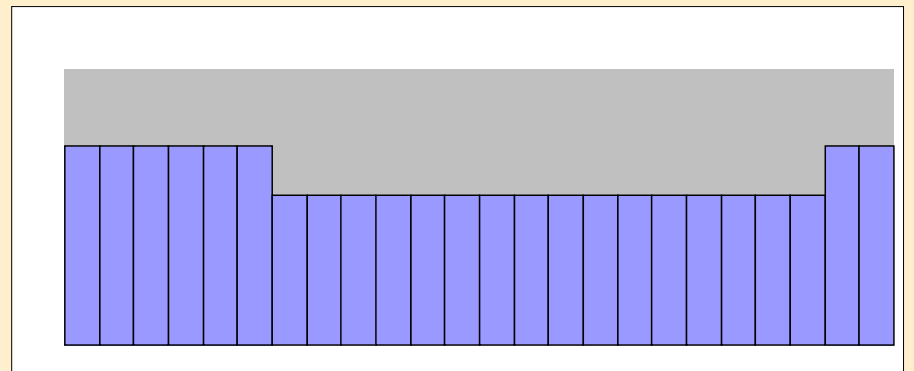
Raw wind plant output >



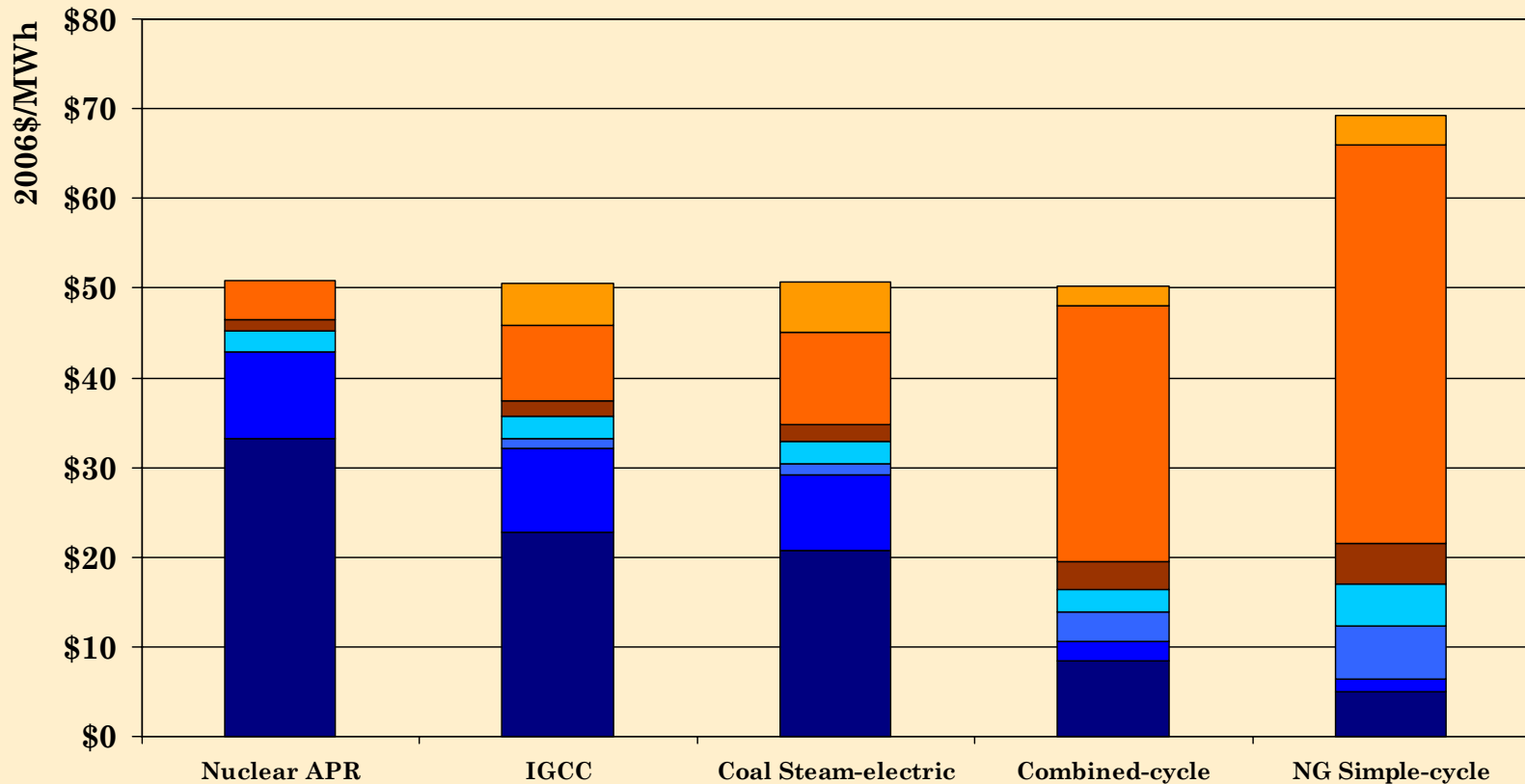
Output following within-hour regulation (<10 min) & load-following (10 – 60 min) >



Output following hour-to-hour storage and shaping >

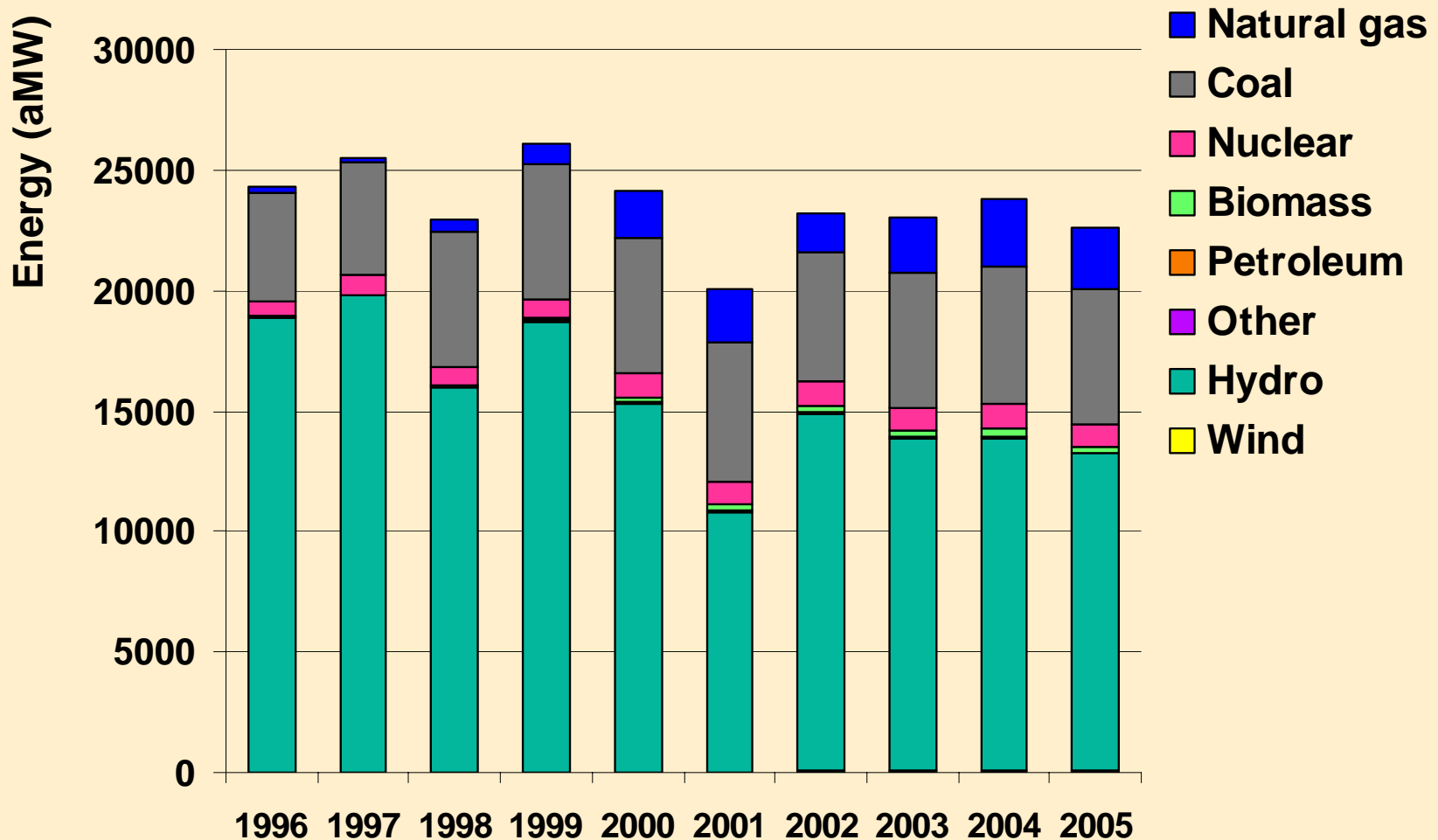


Operation of dispatchable plants is a function of variable cost

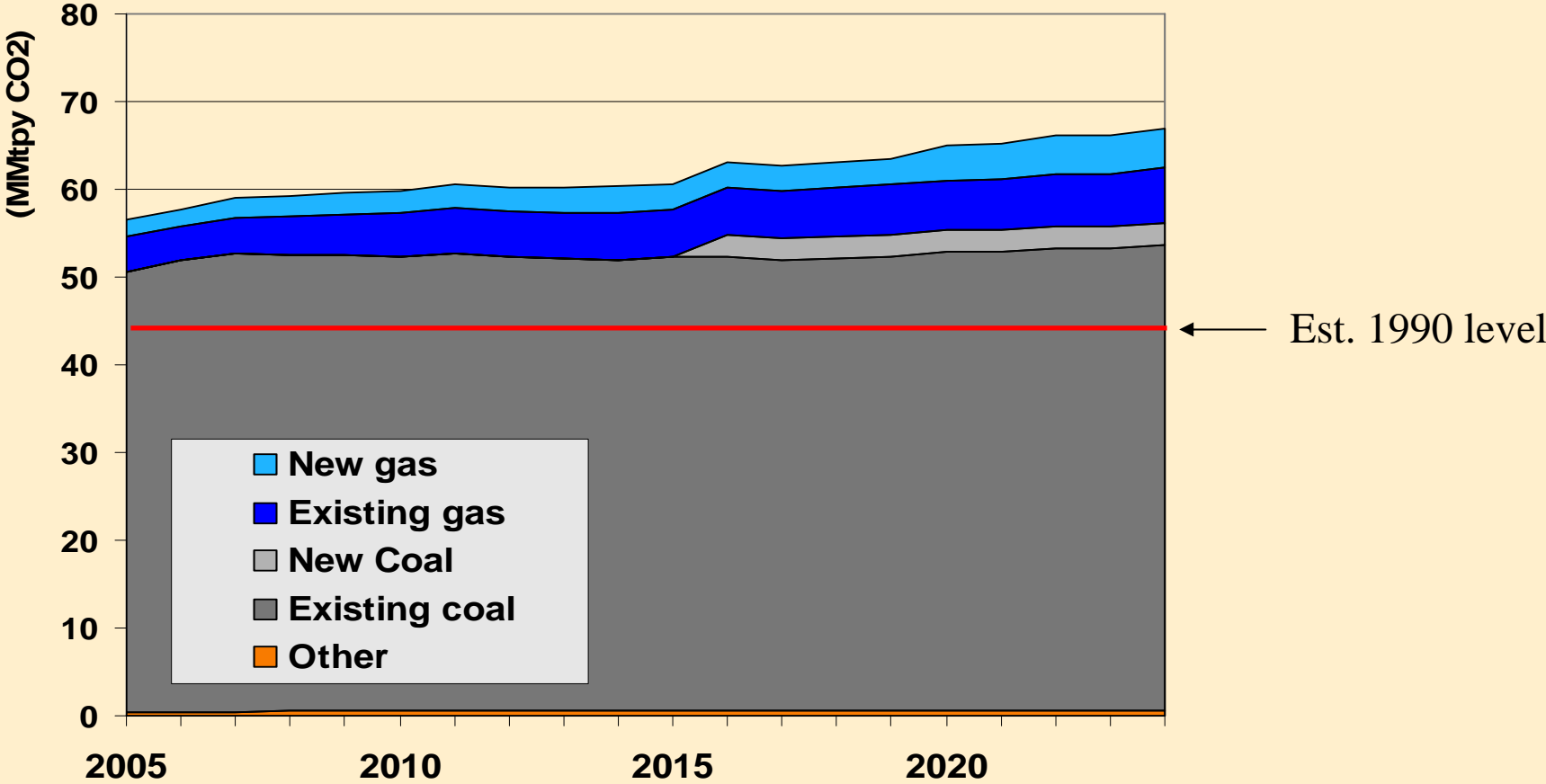


Plants with largest variable costs (oranges) are first to be curtailed

Actual generation is function of hydropower conditions and economics



Conflict between economics of plant dispatch and sources of CO2



Roles of the major resources



Conservation – Load reduction

Wind – Intermittent non-dispatchable energy supply

Nuclear – Baseload capacity and energy supply

Coal – Baseload capacity and energy supply

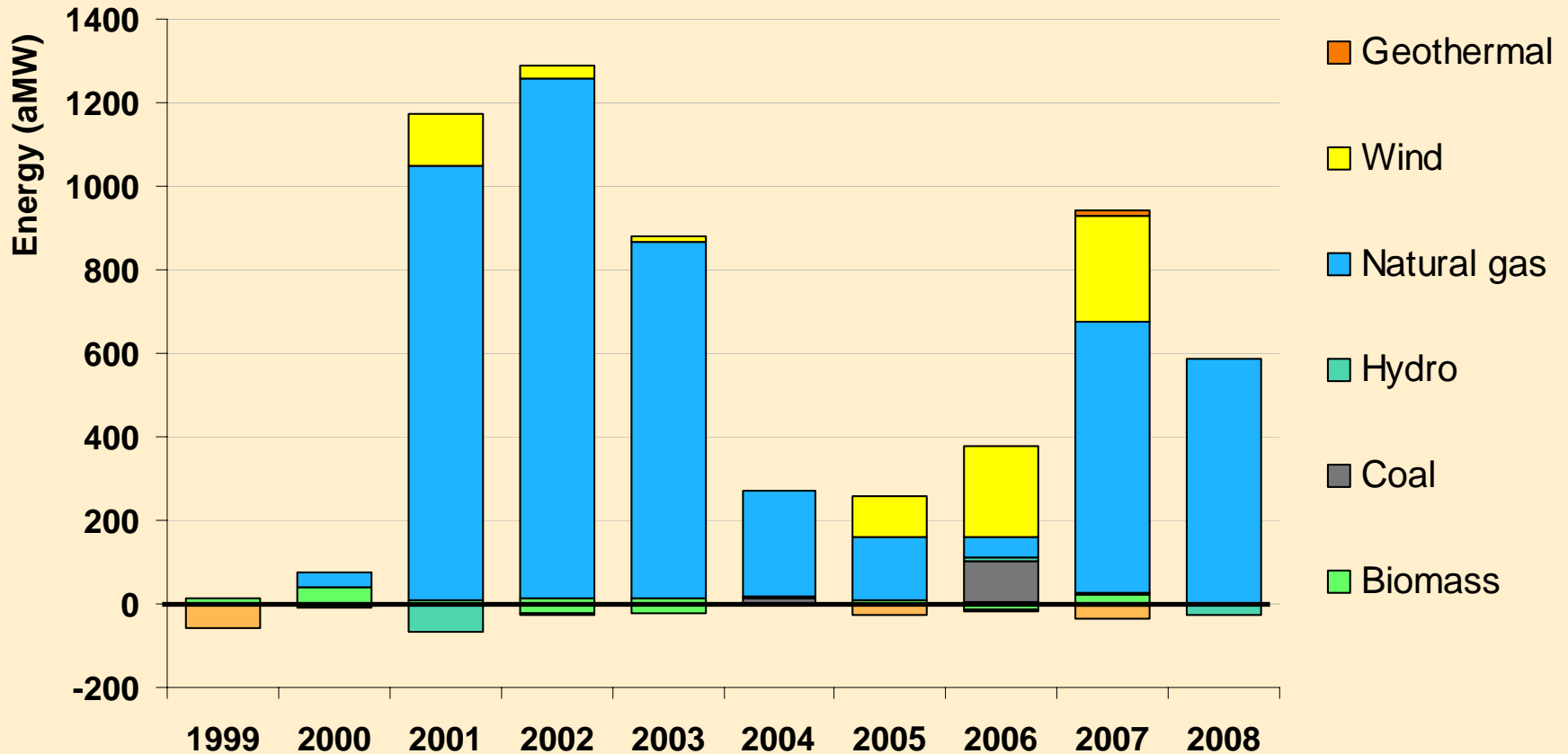
Natural Gas Combined-cycle – Intermediate capacity and energy supply, supplemental peaking capacity, load following

Natural Gas Simple-cycle and Recips – Peaking capacity

Hydro – Capacity and energy supply, frequency regulation & wind integration, load following and storage

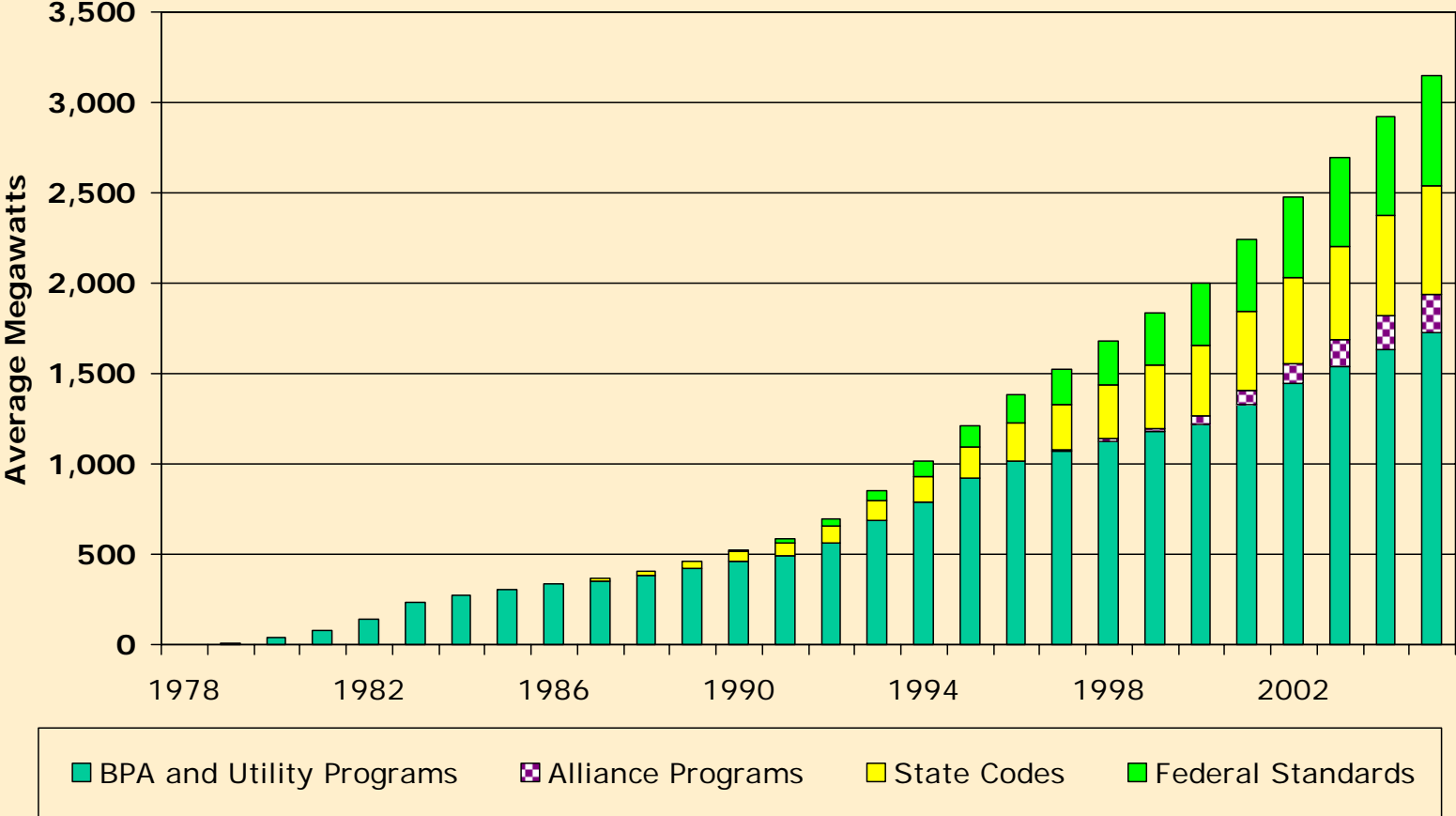


Current development cycle is dominated by natural gas and wind power

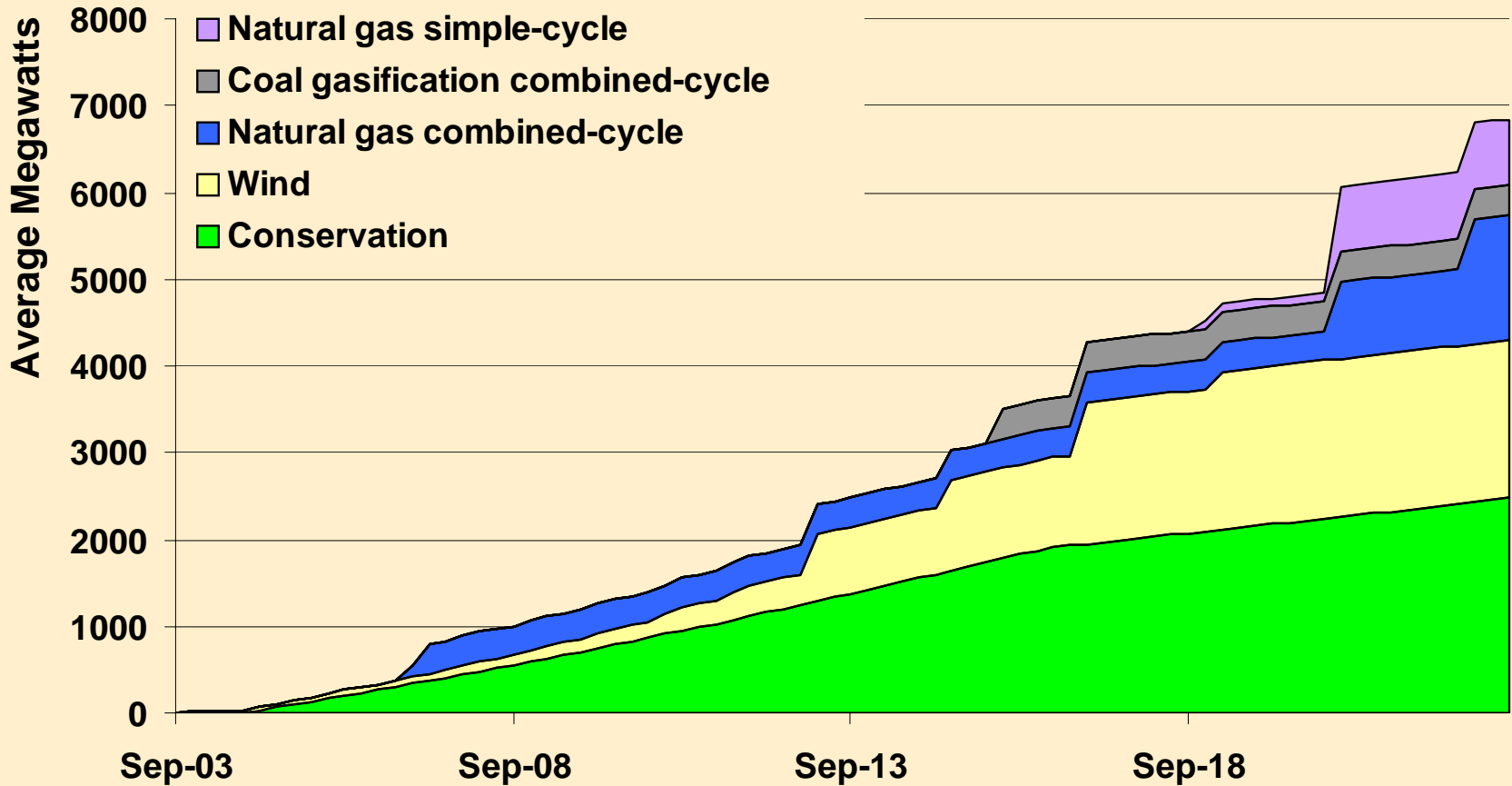


Average water and maximum thermal plant availability.

Northwest conservation achievements 1978 – 2005



Looking to the future, the Council's recommended resource additions



For more information:

Northwest Power and Conservation Council
851 SW Sixth Avenue
Portland, OR 97204

503-222-5151

800-452-5161

www.nwcouncil.org

