

Supplemental Criteria Definitions

RESOURCE SELECTION CRITERIA to Identify Candidate Study Areas for WREZ

The following documents reflect the criteria that will be used to develop maps showing the availability of renewable energy resources across the entire Western Interconnection. These maps will be overlaid with one another to identify and characterize candidate study areas. The purpose of creating candidate study areas is to focus the WREZ analysis on those parts of the Western Interconnection with renewable energy resources that are large enough and concentrated enough to economically justify extra-high voltage (EHV) transmission lines that will likely cross state boundaries and require regional coordination. The WREZ project does not supersede or negate state renewable energy initiatives, but is intended to provide a foundation for interstate collaboration on commercial delivery of renewable energy. Resources outside the proposed zones will be identified in this study, but they will not be considered in the supply curve analysis as they are developable as in-state resources and do not depend on regional collaboration.

In the following pages, for each of the resources that will be analyzed in the WREZ process (with the exception of geothermal), please find a “criteria table” defining the criteria that will be used to identify and map renewable energy resources and choose candidate study areas. When appropriate, supplemental documents and maps that serve to more narrowly define the selection criteria are included.

Definition of Biomass Resources for WREZ

The main data set that will be used to define biomass power capacity in WREZ areas is from research performed by NREL. Definitions for the major categories of biomass considered in the NREL analysis is used as the starting point for the specific areas that will be considered for WREZ applications. Additional resources identified by the stakeholders will supplement this analysis and are included below.

Greater detail for each category will be included if available from the developers of the data sets.

Agricultural residues are defined as the residues from production of the following crops

- Corn
- Wheat
- Soybeans
- Cotton
- Sorghum
- Barley
- Oats
- Rice
- Rye
- Canola
- Beans
- Peas
- Peanuts
- Potatoes
- Safflower
- Sunflower
- Sugarcane
- Flaxseed

Provided that appropriate data can be obtained, orchard and vineyard residues will be included from state agricultural data and the USDA. Vegetable crop residues (very limited resource in the West) and liquid food processing waste (such as cheese whey, and beverage residues due to their high moisture content) will be excluded, consistent with KSU analysis. Solid food processing waste, such as nut shells, stone fruit pits, cotton gin waste, and rice hulls, will be included.

Forest residues are defined as logging residues and other removals. These include material already utilized as well as material that is disposed as waste. Logging residues are the unused portions of trees cut by logging (tops and branches) and left to be burned or decay in the woods. Other removals include trees removed as a part of thinning projects, land clearings, and forest health uses that are not directly associated with round wood product harvests.

Additional forest resources that will be included consist of pine beetle infested and killed wood in areas such as British Columbia, Colorado, and Arizona. Information on these resources will be obtained as necessary from the BC Ministry of Natural Resources and the USFS. In addition, the removal of pinon pine and juniper from grasslands will

also be included if data is available. Finally, green waste sites located in forest communities on USFS land will also be included if significant and if data is available.

Primary mill residues include wood materials and bark generated at manufacturing plants (primary wood-using mills) when round wood products are processed into primary wood products. Among the materials included in this category are the following

- Slabs
- Edgings
- Trimmings
- Sawdust
- Veneer clippings and cores
- Paper pulp screenings.

Secondary mill residues include wood scraps and sawdust generated by the following types of businesses

- Pallet companies
- Woodworking companies
- Truss manufacturers
- Wood container/pallet manufacturers
- Lumber, plywood, millwork and wood panel wholesale companies.

Urban wood waste includes the following three categories:

- 1) Wood disposed of in municipal solid waste (MSW) and handled by MSW haulers such as household yard waste, clean construction debris, household remodeling scrap, municipal and utility tree trimmings, and wooden shipping containers (other than pallets) disposed of by retail and grocery stores. This includes clean wood residues and green waste that is sorted out of a raw MSW stream. It does not include plastics and tires.
- 2) Wood waste from the tree service industry, which is generally in the form of mulch (75%) and firewood (25%) from tree trimming activities
- 3) Wood waste from the construction and demolition industries such as clean construction debris, wood cleared from land before construction, and wood mixed in with other types of debris generated during demolition.

Virgin recycled paper fibers are not included. Industrial wastes are included if the waste stream contains any clean wood that is separated from MSW.

Items Not Included

Based on stakeholder discussions and previous Black & Veatch research, the following potential sources will be excluded from consideration. Footnotes will be made in the report regarding potential.

- MSW (location in urban centers not conducive to REZ sites and not included in most state RPS definitions)
- Dedicated energy crops (these are currently limited and of an undeterminable size. They may be considered in the future)
- Manure (moisture content too high, limited resource, and lack of need for interstate transmission due to small generation potential per site)
- Vegetable crops (moisture content too high; resource is limited)
- Liquid food processing wastes (moisture content is too high)

Availability of Biomass for Power Generation

Once the gross amount of biomass available is reduced to take into account material necessary for soil quality, animal consumption, terrain accessibility, and collection inefficiencies, an amount of material that is “technically” available is derived. A “technical” estimate is made in recent work performed by both NREL and the CEC. This needs to be further broken down into how this technically available biomass may be utilized in the broad WREZ resource area. According to the EIA, the main categories for biomass utilization are the following:

- Industrial Usage (~60%, including co-gen)
- Power (~18%)
- Residential and Commercial Use (~19%)
- Transportation Fuels (~3%)

The main purpose of industrial, residential, and commercial use is for heat and not power. 80 percent of the industrial usage is for heat. This is a simple, inexpensive way to use available residues. The growth of any of these sectors could expand demand for biomass. As an example, the Renewable Fuel Standard dictates that 16 billion gallons of cellulosic ethanol be used by 2022. Using a 75 gallon/BDT conversion factor and representative production by Petroleum Area Defense District (PADD) demand, this would mean that 44 million BDTs of biomass would be required just to meet cellulosic ethanol demand in the Western US. Depending on the data source used, this could consume 50 percent or more of the technically available biomass potential.

Allocating the power generation from biomass in the industrial sector to power only, 30 percent of the biomass utilized today goes to the production of power. In discussions with stakeholders as part of the RETI process, Black & Veatch used an estimate that one-third of the available biomass, consistent with the amounts used today, could be utilized for power. While some areas of utilization may increase (such as transportation fuels), others may have limited growth (such as residential use). This estimate is also supported by NREL and other state resource agencies due to competing demand. Maintaining a one-third estimate for biomass utilization to power takes into account potential utilization in other sectors due to policy mandates, GHG reduction strategies, and increases in the cost of alternate fuels.

Co-firing of biomass with coal to generate power is considered a competing application for biomass utilization. It is expected that demand in this sector will increase, further reducing the amount available for stand-alone power facilities. This estimate is meant as a broad reduction of the total potential in the west recognizing competing activities for this resource. Since it is unknown what future utilization will be and outside the scope of the WREZ process to identify locale-specific applications, it is recognized that the actual potential will vary throughout the WREZ study area. This comment will be included in the report.

Definition of Canadian Hydroelectric Resources Analyzed in the WREZ Process

Hydro resources in Canada will be defined differently than those in the US. The definition promulgated for US hydro is based on language in US Federal Renewable Energy Production Tax Credit legislation. This legislation is not applicable to Canadian hydro resources.

In addition, Canadian hydro will receive different treatment in the REZ identification process. Unlike hydro resources in the US, Canadian hydro resources are clustered in such a way that they may be used to define a REZ, whereas US hydro resources will only supplement REZs if resources occur within the boundaries of a REZ.

In Canada, all hydroelectric resources will be considered as long as they meet the British Columbia provincial definition of clean or renewable electricity sources. Data on facilities that meet these criteria will be provided by representatives from the Canadian hydropower community.

Definition of US Hydroelectric Resources Analyzed in the WREZ Process

The proposed definition for hydro in WREZ for the US incorporates language from the proposed SB3335 and existing IRS code for the Production Tax Credit (PTC). The purpose of this definition is not to define what is renewable, but what resource will be reviewed for purposes of inclusion in a WREZ. In the simplest form, hydro, for purposes of the WREZ project is retrofitting existing diversions and impoundments with no change in water deliveries. To clarify:

1. Incremental hydropower
2. New hydropower at existing non-powered dams
3. Irrigation power
4. New hydropower at existing diversions or other impoundments

Given the distributed nature of hydro, it is unlikely that hydro will be of sufficient scale to warrant creation of a renewable energy zone and will have little impact on transmission siting issues. However, there may be hydro projects within a study area that can enhance and stabilize proposed renewable energy generation. For those projects within a study area, the hydro projects will be screened for land use, environmental and economic potential when projects fall into a Candidate Study Area.

The final report will detail all exclusions and note that the resource is not defined as 'non-renewable'. Furthermore, hydro projects/resources that fall outside of the zones, the resource potential and benefits will be identified.

The definition below will be used for US hydro resources. It is based on proposed and existing legislation in the US Federal Renewable Energy Production Tax Credit. This language has been negotiated between National Hydro Association and numerous environmental NGOs.

- 1) Incremental hydropower –
 - a. Incremental production from an existing hydropower production facility that is attributable to efficiency improvements or additions of capacity determined by using the same water flow information used to determine an historic average annual hydropower production baseline for such facility.
- 2) New hydropower developed at existing non-powered dams
 - a. The hydroelectric project is operated so that the water surface elevation at any given location and time that would have occurred in the absence of the hydroelectric project is maintained, subject to any license requirements imposed under applicable law that change the water surface elevation for the purpose of improving water quality of the affected waterway.
 - b. The hydroelectric project installed on a non-hydroelectric dam or other impoundment that is licensed or permitted by the Federal Energy Regulatory Commission, the Bureau of Reclamation, or other agency as specified by Federal legislation or applicable agency rule making, and meets all other applicable environmental, licensing and regulatory requirements.
 - c. The non-hydroelectric dam was placed in service for flood control, navigation or water supply purposes and did not produce hydroelectric power.
- 3) New irrigation hydropower –

- a. Free flowing water in an irrigation system, canal or other man-made channel, including projects that utilize non-mechanical structures to accelerate the flow of water for electric power production purposes.
- 4) New hydropower at other existing diversions and impoundments:
 - a. New hydropower at existing diversions and impoundments, not identified above, that has little or no incremental environmental impact (e.g., municipal water systems, pressure reducing valves, or other energy dissipating features).