2 Bioenergy Feedstocks in the West for 2015 (KSU and US Forest Service)

Biomass feedstocks are as diverse as the biosphere that produces them. Resource assessment and supply analyses are important factors in determining energy inputs and outputs, environmental impacts, and most importantly, the economic feasibility of biomass-related production and utilization scenarios. Quantitative assessment and cost of delivery associated with each individual and applicable biomass resource within a set distance of a conversion facility is critical to optimizing and maximizing the energy returns, environmental enhancement, and economic feasibility.

The objectives of the resource assessment portion of project were to:

1) provide estimates of quantities of various biomass resources throughout the WGA region on a county or city basis for use as feedstocks for liquid fuel (transportation) production,
2) use these estimated quantities to generate potential supply curves,
3) calculate the effect of biomass and crop production on water use and carbon dioxide emissions, and
4) provide quantities and supply curve data for an integrated GIS analysis.

Exhibit 1 presents all biomass resources evaluated in this project.

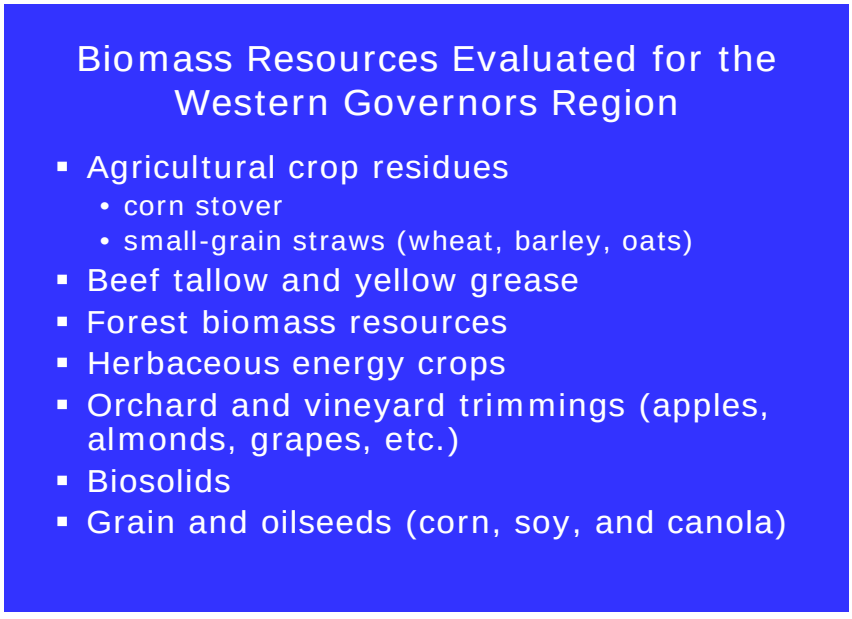

Exhibit 1. Biomass resources considered for the WGA region.

Agricultural Residues: Corn stover and winter and spring wheat straw are the main agricultural crop residues in the Western United States that posses potential for use as feedstocks for alternate liquid fuel production. Barley and oat straw are also generated in select areas within the western United States. For each of these feedstocks, available quantities were estimated such that the amount removed does not allow soil erosion rates to exceed individual soil type prescribed NRCS tolerable soil loss limits.

Beef tallow and yellow grease: Beef tallow is a by-product of our meat production and processing system and represents a potential biodiesel feedstock that, due to its highly centralized generation in slaughter/processing facilities, may have energy, environmental, and economic advantages over conventional fossil sources. Yellow grease (e.g. restaurant greases) are a secondary, but very accessible and pertinent source of biodiesel feedstocks. An estimate of this resource made based on consumption and population statistics.

Forest Biomass Resources: Estimates of forest biomass supply were developed for several sources by first identifying sustainability principles to guide their use. Specific guidelines are noted for each source discussed. In general terms sustainability means today's management actions will not degrade the ecological functioning of a natural system. Biomass supply estimates were made for the following sources: 1) thinning of timberland to reduce high fire hazard, 2) logging residue left behind after anticipated logging operations for conventional products, 3) treatment of Pinyon Juniper woodland, 4) general thinning of private timberland to improve forest health, 5) precommercial thinning on National Forest land in western counties in Oregon and Washington, and 6) unused mill residue from sawmills, plywood mills and pulp mills.

Herbaceous energy crops: The WGA region is diverse from a geographic and climatic standpoint with large variations in precipitation, soil type and field topography, and elevation with precipitation being the major factor influencing crop production. Estimates of quantities (dry tons per acre) of native grass species which mirror dedicated herbaceous energy crops that could potentially be produced within the WGA region produced on individual soil types within each county in the WGA region was obtained from a national USDA database that contained production statistics, relevant precipitation, and field topology data and reflects possible production levels under "non-managed" conditions (e.g., no fertilizer and/or chemical applications or optimal field preparation that could potentially increase production).

Orchard and vineyard prunings: Residues (trimmings, dead wood, etc.) are generated from the growth and cultivation of vegetable and fruit crops produced in the WGA region. Production statistics and average annual quantity of residue by each crop for each crop were obtained from the 2002 Census of Agriculture and UC Davis. Supply curves were not generated due to a lack of economic and engineering data concerning residue pick-up and transport to the field edge.

Biosolids: Biosolids are the nutrient-rich organic portion that results from treatment of sewage in wastewater facilities and could be utilized as a low or negative value bioenergy feedstock. Values (tonnages) for biosolids generation (dry basis) were estimated were estimated by using a combination of design flow, average national biosolids generation rate, and an average energy conversion rate.

Commodity crops: Soy, canola, and other applicable oilseed crops and fats (e.g., cottonseed, edible and inedible tallow) that can be used to produce ethanol and biodiesel in the WGA region. Potential acreages, prices, and production of corn, soybeans, and canola that might potentially occur in all WGA region counties in 2015 was estimated using planted acres and yield data for corn, soybeans, and canola from USDA and projections of acreages and yields provided by the Food and Agricultural Policy Research Institute (FAPRI).

Exhibit 2 presents aggregated information of estimated total supply of some of the biomass resources described above for the whole WGA region.

Aggregated Biomass Quantities for the WGA Region by Resource Category

	million tons per year	million gallons per year
Agricultural crop residues (million ODT) * $40 per dry ton, edge-of-field	43.1*	
Beef tallow	0.833	222.2
Yellow grease	0.199	53.0
Forest biomass resources (million ODT) ** high case - considers supply uncertainties	20.7 to 27.8**	
Herbaceous energy crops (native grasses)	41.3	
Orchard and vineyard trimmings	2.706	
Biosolids	2.495	
Corn for grain and select oilseeds	wide variability exists due to export demand, legislation, and biofuel demand	

Exhibit 2. Estimated quantities of biomass resources within the WGA region.