Woody Biomass Fuel/Feedstock Assessment – Key Factors to Consider

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Fuel/Feedstock Characteristics

A variety of value-added bioenergy related end uses have evolved over time. The conversion technology employed will determine targeted feedstock characteristics

Key Physical Characteristics include:

- Heating Value (btu/dry pound)
- Moisture Content (% moisture)
- Sizing (typically 3” minus)
- Ash Content (% non-combustibles)
- Chemical Make-Up (sulphur, potasium, lignin)

Confirm Types of Fuel/Feedstock That Meet Project Specifications

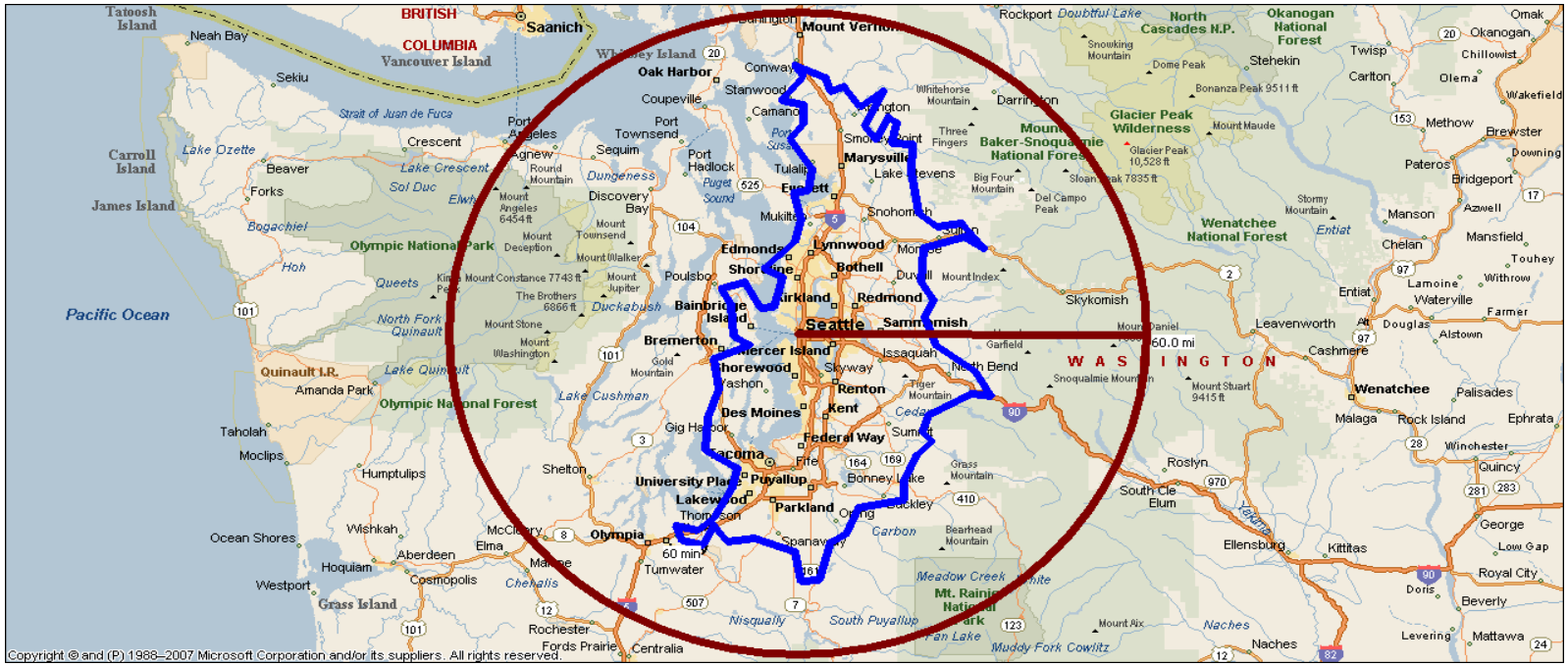
- Forest
  - Forest operations (timber harvest residuals, fuels reduction)
  - Forest manufacturing byproducts (sawdust, bark, shavings)
- Agricultural
  - Byproducts (orchard removals, prunings, shells)
  - Dedicated crops (poplar, willow, eucalyptus, switchgrass)
- Urban
  - Tree trimmings, general wood waste
  - Clean construction & demolition wood

Target Study Area

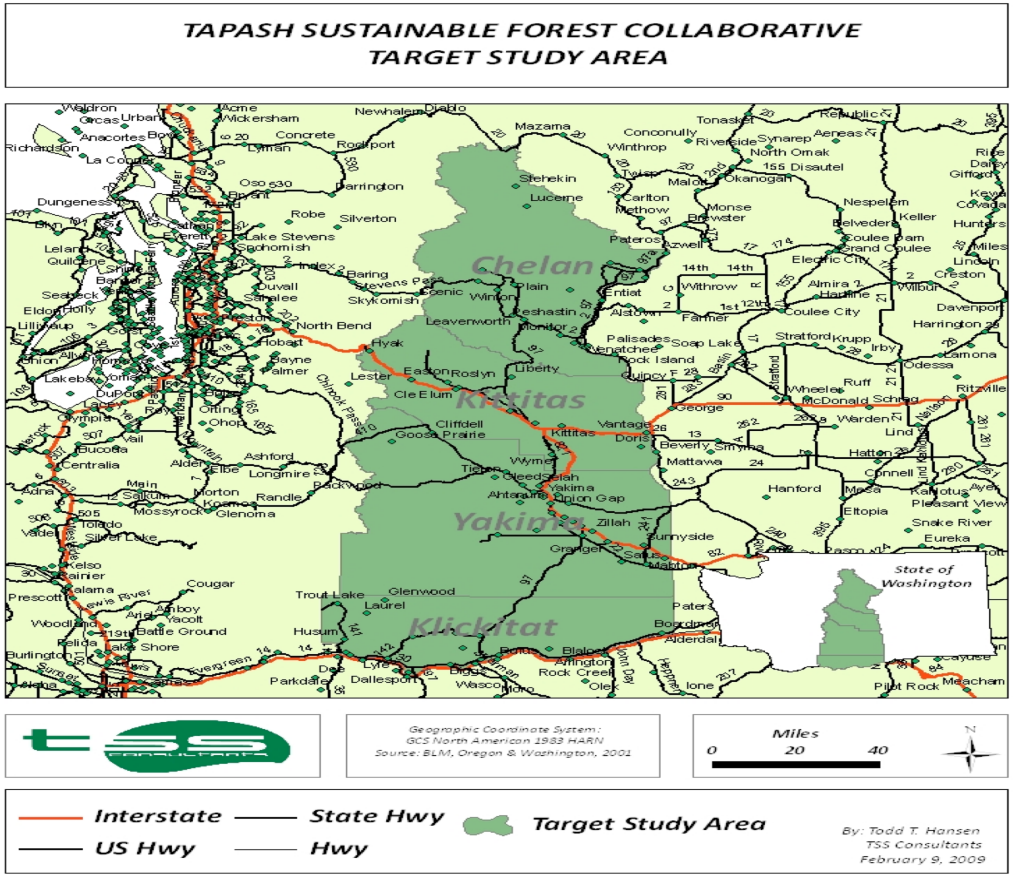
- Define feedstock availability – Target Study Area based on economic haul distances required to source fuel/feedstock.
- Typical radial distances from the targeted site are 30, 50, 75, or 100 miles.

Target Study Area

60-mile radius (red) – 1 hour drive time (blue)



Target Study Area



Assessment Filters

Three filters used to confirm availability of fuel/feedstock resource:

- Potential – Gross estimate.
- Technical – More refined based on physical recovery and resource policy factors.
- Economic – Very refined using current competition/demand, potential competition, community support and actual costs to harvest, collect, process and transport

Forest Operations Biomass Recovery Consideration Examples

Mechanized sides & topography (ground yarding)

Forest Operations Biomass Recovery Consideration Examples

Yarding top material

Forest Operations Biomass Recovery Consideration Examples

Pulp markets impacting log specifications

Forest Operations Biomass Recovery Consideration Examples

Number and distribution of landings

Forest Operations Biomass Recovery Consideration Examples

Degree of aggregation of harvest byproduct on landings

Forest Operations Biomass Recovery Consideration Examples

Landing size to accommodate biomass processing

Forest Operations Biomass Recovery Consideration Examples

Transportation infrastructure

Forest Operations Biomass Recovery Consideration Examples

Distance to market(s)

Policy and contract considerations (i.e., on-site retention)

Current Competition

- Assess current uses/competition for fuel/ feedstock.
- Examples include:
  - Other bioenergy projects.
  - Furnish for composite panel manufacturing.
  - Raw material for soil amendment/landscape cover.
  - Feedstock for densified fuel pellet facility.

Potential Competition

- Assess potential uses/competition for fuel/ feedstock.
- Examples (same as those listed on previous slide) include:
  - Other bioenergy projects.
  - Furnish for composite panel manufacturing.
  - Raw material for soil amendment/landscape cover.
  - Feedstock for densified fuel pellet facility.

Key State and Federal Policies

- List of existing policies that impact fuel/ feedstock availability and pricing. Some may only be available for defined periods or are currently being considered:
  - Federal - Biomass Crop Assistance Program
  - Federal – Stewardship Contracts (USFS/BLM)
  - Washington – Initiative 937
  - Washington – HB 2165
  - Washington – HB 2481
  - Oregon – HB 2210

Bioenergy Project Development - Deal Killer Issues to Consider

- **Fuel/Feedstock Supply**
- Community Support
- Project Economics
- Appropriate Technology
- Siting/Infrastructure & Permitting

Fuel/Feedstock Supply Assessment – Key Factors

- Meets project specifications.
- Sustainable long term supply located within close proximity (30 to 125 mile radius).
- Economically available (accounting for current/ potential competition, state/federal policies).
- Available in quantities and from diverse financially viable sources that support project financing:
  - Minimum 10 year supply, 50% - 70% under contract.
  - At least 2.5 – 3 times facility usage (fuel supply coverage ratio).

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