

Additional Information:

Transportation

Transportation Network

Microsoft© MapPoint® 2006 (<http://www.microsoft.com/MapPoint/en-us/default.aspx> Accessed January 5, 2009) was used in BioSAT to provide the shortest travel time routes and distances between ZCTAs. Road networks in MapPoint® are a combination of the Geographic Data Technology, Inc. (GDT) and Navteq data. GDT data were used for rural areas and small to medium size cities. Navteq data were used for major metropolitan areas.

The GDT data are based on “Tele Atlas Dynamap Streets” which are designed for address level geocoding (<http://www.teleatlas.com/index.htm> Accessed January 12 2009). When an address level geocode is not available, the GDT data set uses cascading accuracy at the ZIP+4, ZIP+2, and ZIP Code centroid to return the highest level of geocode for the address. ZIP code boundary data are based on the Dynamap/5-Digit ZIP code Boundary data from Tele Atlas North America. It is designed to identify the boundaries of United States Postal Service ZIP Codes. Navteq maps provide a highly accurate representation of the detailed road network including up to 260 attributes like turn restrictions, physical barriers and gates, one-way streets, restricted access, and relative road heights (<http://www.navteq.com/about/whatis.html> Accessed January 12 2009).

Trucking Cost

The BioSAT Trucking Cost Model was adapted from Mark Berwick and Mohammad Farooq’s *Truck Costing Model of Transportation Managers*.ⁱ The following adjustments to the algorithm were made:

Fuel Miles per Gallon

- Average speed adjustment removed: The BioSAT Trucking Cost Model is used for short hauls where the average miles per hour will not exceed 55mph.

Labor Hours

- Additional labor time added: The BioSAT Trucking Cost Model calculates the total trip time which includes loading, unloading and dwell time, not only travel time.

Tire Cost

- Average weight per tire adjustment removed: Miles per tire values based on average weight per tire for full truckload hauls, making the weight per tire adjustment for miles per tire unnecessary.

Tax

- State sales tax removed: State sales tax is already accounted for in the average purchase price of both tractor and trailer, making sales tax adjustment unnecessary.
- Federal taxes accounted for: Annual Federal Excise Tax and Heavy Highway Use taxes added.

License Fee

- Federal fees accounted for: Annual Unified Carrier Registration Fee added.

Management and Overhead Cost

- Management and overhead costs as rate: Management and overhead costs calculated as a percentage of fixed costs instead of a fixed value.

These adjustments and the limitations, the default input values and the assumptions detailed below were validated by seven transportation and/or logistics companiesⁱⁱ, four agriculture and/or forest product producers and distributorsⁱⁱⁱ, one trade organization^{iv}, and one government organization^v.

The BioSAT Trucking Cost Model has limitations. The model calculates the operating cost for a single round trip haul of 11 hours or less for an owner-operated, non-specialized tractor-trailer truck hauling class 50 cargo. Though every reasonable effort has been made to do so, all taxes and fees may not be represented.

Three types of trailers are included in the BioSAT Trucking Cost Model. Depending on the product type hauled, dry-van, flatbed, log or short-log trailer default values are used to calculate cost. More trailers will be included in the future as needed.

BioSAT.net Assumptions and Methods

Woody biomass is assumed to be hauled *green* (not yet dried). Because green wood is about half water by weight, trucking costs from the model are doubled to estimate the trucking costs on a dry ton basis for BioSAT.net.

Four of the BioSAT Trucking Cost Model input values are periodically updated so the output costs represent a real-time value. The input regional average diesel fuel price^{vi} is updated bimonthly. The inputs state average hourly wage for commercial heavy vehicle drivers^{vii}, heavy highway use tax^{viii}, and federal excise tax^{ix} are updated annually.

Assumptions in the model are designed to represent a typical tractor-trailer on a typical haul within the limitations described above. Trailer payload is assumed to be 25 tons. The trailer is assumed to be empty 50% of the time (the trip to pick up the cargo) and loaded 50% of the time (the trip to drop off the cargo). The interest rate is assumed to be eight percent. The annual license fee is assumed to be \$1,718. The number of tractors and trailers in the fleet is assumed to be 20. The annual miles traveled by the tractor-trailer are assumed to be 100,000 miles. The overhead cost rate is assumed to be four percent. The annual insurance premium is assumed to be \$9,000. All input values and assumptions can be adjusted by the user if desired.

References

ⁱ Berwick, Mark and Mohammad Farooq. "Truck Costing Model for Transportation Managers." Upper Great Plains Transportation Institute North Dakota State University, 2003

ⁱⁱ Pemberton Truck Lines, Skyline Transportation, Mason Dixon, Flatbed Source, Carlen Transport, GFI Transport, and Gene A. Matt Trucking

ⁱⁱⁱ Patterson Chip Company, GCS Logging, May Logging, and one wood-user who asked for anonymity

^{iv} Southern U.S. Trade Association

^v Tennessee Department of Agriculture

^{vi} Weekly Retail On-Highway Diesel Prices. Energy Information Administration

^{vii} Occupational Employment Statistics. Bureau of Labor Statistics

^{viii} Federal Tax Return Form 2290. United States Internal Revenue Service

^{ix} Federal Tax Return Form 720. United States Internal Revenue Service