**3g. Transportation Energy**

Transportation energy (TE) accounts for the energy required to transport the crop to the first point of sale, or to on-farm storage from which a purchaser will take ownership. On-farm storage may be more common for feed crops (corn silage and alfalfa) for integrated crop-livestock operations. Transportation can occur for any crop, but will vary by user. The main considerations are total crop transported, distance transported, and backhauling.

Note that for alfalfa, transportation may occur after each harvest.

|  |
| --- |
| **User Input Data:** |
| Fuel Type *(FT)* |
| Yield (Y) (If irrigated, use Irrigated Yield (*Yi*)) |
| Distance from field to point of sale *(DF)*(One way) (may have multiple values for alfalfa, each associated with a separate cutting/harvest) |
| Area of Field *(AF)* |
| PROPOSED CHANGE: Ask if the transportation vehicle is used for “backhauling” of material to the farm. If yes, return trip fuel consumption of truck is not included in TE. |
| **Additional Info needed:** |
| Truck capacity *(TC) (*crop specific) via Table 12 |
| BTU/gal fuel *(BF)*= based on fuel type selected (Table 1) |
| Average truck MPG when full *(MPG)* = 5.8 |
| Empty truck BTU/full load BTU multiplier *(ETFM)* = 0.8 (FTM assumption) |

**Calculation:**

**Option #1:** When no backhauling occurs:

Step 1: Calculate fuel per truckload in BTU = ((Distance/miles per gallon) \*BTU/gal)

Step 2: Calculate total volume transported in unit of yield = (yield\*area))

Step 3: Calculate number of truckloads (Step 2 / Truck capacity)

Step 4: Calculate outbound energy as (Number of Truckloads (Step 3)\* BTU per truck (Step 1)) / area = BTU/acre

Step 5: Calculate return energy as Step 4 +(Step 4 \*ETFM)

Step 6: Calculate **TE** = Step 4 + Step 5 = BTU/acre

Note: If alfalfa, and more than one harvest is specified, repeat the calculation for each yield and distance transported, and sum all to get **TE.**

**Option #2:** When backhauling:

Step 1: Calculate fuel per truckload in BTU = ((Distance/miles per gallon) \*BTU/gal)

Step 2: Calculate total volume transported in unit of yield = (yield\*area))

Step 3: Calculate number of truckloads (Step 2 / Truck capacity)

Step 4: Calculate **TE** as outbound energy only = (Number of Truckloads (Step 3)\* BTU per truck (Step 1)) / area = BTU/acre

Note: If alfalfa, and more than one harvest is specified, repeat the calculation for each yield and distance transported, and sum all to get **TE.**

**Example #1: Without Backhaul**

A grower drives 10 miles in his or her diesel-powered semi-truck from the field to the point of sale. The grower is hauling corn shelled from a 140-acre field producing 200 bu/acre. What is the energy requirement (in BTU/bu) to haul all grain from the field to the point of sale?

Transportation Energy

Fuel per truckload = (((10/5.8) x 138,490) = 238,776 BTU

Total volume transported = ((140 x 200) = 28,000 bushels

Number of Truckloads = (28,000 bu/991)) = 28.3 truckloads

Outbound energy = (28.3 truckloads\*238,776 BTU/truck ) / 140 acres = 48,267 BTU / acre

Return energy = (48,267 BTU/acre \*0.8) = 38, 613 BTU/acre

**TE** = 48,267 BTU/acre + 38, 613 BTU/acre = 86,880 BTU/acre

**TEy** = 86,880 BTU/acre / 200 bu/acre = 434 BTU/bu

**Example #2: With backhauling**

A grower drives 10 miles in his or her diesel-powered semi-truck from the field to the point of sale. The grower is hauling corn shelled from a 140-acre field producing 200 bu/acre. The grower will be using the return trip of the trucks to haul feed for animals on the farm. What is the energy requirement (in BTU/bu) to haul corn from the field to the point of sale?

Transportation Energy

Fuel per truckload = (((10/5.8) x 138,490) = 238,776 BTU

Total volume transported = ((140 x 200) = 28,000 bushels

Number of Truckloads = (28,000 bu/991)) = 28.3 truckloads

**TE** = Outbound energy = (28.3 truckloads\*238,776 BTU/truck ) / 140 acres = 48,267 BTU / acre

**TEy** = 48,267 BTU/acre / 200 bu/acre = 241 BTU/bu