**3. Energy Use Metric**

The Energy Use Metric calculates all energy used in the production of one crop in one year from pre-planting activities through to the first point of sale. The exact components of energy use will vary by user based on crop and activities. Each major component is described in a separate word document.

Note that alfalfa was developed separately from the main Fieldprint Platform 2.5 and there are some significant differences. These will be noted in the following documents for reference. As we transition alfalfa from a pilot phase to an operational phase in FPP 3.0, there may be revisions to some components.

**3a. Management Energy (ME):** Energy used in operation of field equipment for crop cultivation

**3b. Application Energy (AE)** (fertilizer and crop protectants): Energy embodied in the fertilizers and crop protection products applied to the field

**3c. Manure Loading Energy (MLE):** Energy required to load manure from source onto the distribution/spreading equipment (for fields with manure applications only).

**3d. Seed Energy (SE):** Energy embodied in seed production

**3e. Irrigation Energy (IE):** Energy required to irrigate the crop (for irrigated crops only)

**3f. Post-Harvest Treatment Energy (PHE**): Energy required to remove moisture from harvest to reach a specified moisture content, or other post-harvest treatment required (treatment will be crop dependent)

**3g. Transportation Energy (TE):** Energy required to transport the harvest to the first point of sale (where applicable).

**Energy Use (EU) = (ME+AE+MLE+SE+IE+PTE+TE)/yield = BTU/unit of output**

The descriptions here describe each component of energy use individually in units of BTU (British Thermal Units) per acre. For the final metric, all energy used in BTUs should be summed up, and then divided by crop yield (unit of production per acre) to convert to BTU/unit of production. The individual energy components should also be divided by crop yield and provided to the user as additional data. Those calculations are denoted in the following documents by a subscript “y” on the component name (e.g. ME = BTU/acre and MEy = BTU/bu).

Note that not all components of Energy Use will be included for all crops or users. To the extent possible, we note crop specific factors in tables and text. In some instances, wheat is divided into three categories (winter, spring and spring-durum). Where only one wheat value is provided, it should be used for all three types.

In addition, the Energy Use in tillage and field operations is currently drawn from RUSLE2 outputs. As any changes are made to how tillage templates are selected or created for RUSLE2, the impacts on the Energy Use metric should be considered. Note that we do have access to the table of energy requirements for each operation type that is used by RUSLE2, and could use that separately if desired. The comments and notes that pertain to possible future revisions are highlighted in yellow, and included for reference only.

**Data Tables**

These tables are included in a separate excel workbook with a tab for each table. The Appendix table is included as a separate workbook and is not currently used but is relevant for discussions around rotation builder or alternative operation scheduling methods. Note that where possible, tables also include information relevant to the GHG Emissions metric and will be referenced in part 4, GHG Emissions Metric documentation.

Table 1: Energy (BTU) and GHG Emissions (lbs CO2e) by fuel type for farm equipment operation.

Table 2: Energy (BTU) and GHG emissions (lbs CO2e) embodied in fertilizer products (elemental, standard and custom blends)

Table 3a: Energy (BTU/acre/application) embodied in crop chemical products

Table 3b: GHG emissions (lbs CO2e/acre/application) embodied in crop chemical products

Table 4: Seeding rates per acre, options currently in the Fieldprint Platform 2.5

Table 5: Energy embodied in seed production (BTU)

Table 6: Energy Use and GHG Emissions national average values

Table 7: Irrigation Pump pressure (PMPR) for use in calculating irrigation energy

Table 8: Irrigation Pumping Depth (ft) - user data entry and mid-points for calculation

Table 9: Cotton drying energy use (BTU) based on specified moisture level.

Table 10: Drying system energy use parameters

Table 11: Pounds of water removed, by crop, based on points of moisture removed in crop drying

Table 12: Transportation energy truck capacity by crop

Table 15: Energy for establishment of alfalfa

Table 16: Energy (BTU) and GHG (lbs CO2e) associated with alfalfa harvest modes

For GHG Metric only

Table 13: Values for calculating the crop residue removal credit for nitrous oxide emissions

Table 14: Emissions associated with burning of residue, per unit of crop yield.

08/09/2015: Eric Coronel added a new method to calculate post-harvest energy (PHE) for peanuts based on methodology given to Allison Thomson by Dr. Chris Butts (USDA, ARS National Peanut Research Laboratory)