**Develop Methods to Present and Compare Performance on Energy and Water Use in Forest Service Facilities: 2016 Earth Day Hackathon**

This document incorporates the original description, and provides additional descriptions of data.

**Description of the Challenge:**

*Develop methods to present and compare performance on energy and water use in Forest Service facilities.* Using existing data from several sources, integrate the data and perform analysis to present absolute and relative performance in an easy-to-understand fashion, allowing “apples-to-apples” comparisons.

Data from several sources can be integrated and analyzed, including: monthly utility bill data (account-level); annual totals for large facilities (building-level); Energy Star Portfolio Manager data; Dept. of Energy Compliance Tracking System data; Forest Service boundaries; climate zone designations from the International Energy Conservation Code (IECC) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), and other data. (Some data gaps exist, including in water data due to the use of unmetered well water.)

**Outcome Sought:**

A prototype of a tool(s) that displays, in table and map form, performance on energy and water use, allowing meaningful comparisons of facilities and organizational units that have similar characteristics. Also, a way for regional staff to make corrections to data and quickly update the analysis. E.g., the tool would show the energy used per square foot for Ranger Districts, or selected large facilities, within each IECC/ASHRAE climate zone. No mobile functionality is sought at this time.

Some questions that the team could address:

* How does energy and water usage compare among buildings with similar categories and located in similar climate zones?
* Are there high water usage buildings in drought-prone areas, or areas with a high degree of anticipated climate change?
* Can meaningful comparisons be made at the Forest/Station level, or the Ranger District level, which is one level lower, e.g., total energy use per total square feet, or total water use per total square feet?
* Any other tools, methods, or insights helpful in targeting buildings and organizational units for reductions in usage.

**Skills Needed:**

Coding/development experience, GIS, and familiarity with facilities, engineering, or sustainability.

**Data Descriptions:**

1. **Project Description.** Provides descriptions of recommended data. (File: Read Me—USDA FS Energy\_Water Details 4-16-2016) [This document.]
2. **Covered Facilities**

* Most recent annual energy and water data for 96 “Covered Facilities,” which are generally the largest energy using buildings. Key fields are total energy use, energy intensity (measured in BTU/gross square foot), total water use, and water use intensity (in gallons/gross square foot). The Agency Designated Facility ID is the same as the Unique CN # in NRM, the Forest Service database of record for infrastructure assets. (File: USDA FS Covered Facility Footprint -4-15-2016.xlsx)
* Trends for Covered Facilities usage over multiple years. Similar to the above. (File: Covered Facil Annual Trends April 2016.xlsx)

1. **Natural Resource Manager (NRM) Buildings Module Data Dictionary.** (File: NRMBldgsModuleDataDictionary saved April 2016.docx)
2. **Forest Service buildings.**  A comprehensive report from NRM listing Forest Service buildings, titled “II WH BLD MASTER M MV.” Key fields include Unique CN #, 6-digit organization code, latitude and longitude, and Category and Sub-Category (Office, Laboratory, etc.). (File: II\_WH\_BLD\_MASTER\_M\_MV\_11-6-2015\_\_AllRecordsAllSustainabilityValues)
3. **Organization Codes.** A list of each 6-digit hierarchal organization code and its name. The first pair of digits is the Region or Station, the second pair of digits is the Forest or Lab, and the third pair of digits is the Ranger District. (File: Org Codes.xlsx)
4. **National Forest boundaries** [Do you have a link to this layer(s)? It would be ideal to include Stations]
5. **Climate Regions**. Building America Best Practices Series, Volume 7.3: Guide to Determining Climate Regions by County. Climate zones, or regions, can be used to make “apples-to-apples” comparisons, as buildings of the same type and in similar climate zones often have similar energy use profiles. This document lists counties and their climate zone designation under 2 standards. The team may want to identify a dataset, for easy data retrieval of climate zone for a particular lat/long, as NRM contains lat/long data. <http://energy.gov/sites/prod/files/2015/10/f27/ba_climate_region_guide_7.3.pdf>
6. **Drought resources**
   1. NOAA- (includes more than drought- also includes precipitation, temp, etc)
      1. <http://www.cpc.ncep.noaa.gov/products/Drought/>
   2. USDA/NOAA-
      1. <http://www.plantmaps.com/interactive-national-drought-conditions-map.php>
      2. GIS Data Download:  <http://droughtmonitor.unl.edu/MapsAndData/GISData.aspx>
7. **Utility Usage.** This FY15 data is by utility account and by organization code (1st 4 digits, or Region/Station and then Forest/Lab). It is not listed or broken out by building. The agency is working to crosswalk utility data from utility accounts to buildings, but that is not complete. (File: fy15 utility usage.xlsx)
8. **Data from Advanced Meters.** This FY15 data can be used to augment data on Covered Facilities. Data is available for some of the Covered Facilities, and also is available for some buildings that are not Covered Facilities. It is keyed to Unique CN#. (File: AdvancedMeterData-Spring2016-CoveredFacilities)
9. **Data Potentially Useful in the Future:**

* Occupancy data is not available at this time, though there are efforts to improve its specificity. However, it would be helpful if the team described a method for incorporating it, to yield, e.g., water use per Full Time Equivalent.
* Energy Star Portfolio Manager data is not available for this exercise. It would be helpful if the team described a method for incorporating it, to yield, e.g., to display Energy Star scores geospatially for benchmarked buildings. Portfolio Manager results have the advantage of being normalized based on factors such as weather and hours per week of use; thus using climate zones is believed to not be needed for this data. https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager

**Office:**USDA Forest Service, Washington Office--Engineering

**POC:** David Wiley (WO--Engineering, davidrwiley@fs.fed.us, 703-605-4512)