Methodology for Projecting Household Electricity Bills

This document describes the methodology developed by the Georgia Institute of Technology's Climate and Energy Policy Lab to estimate the impact of clean power pathways on the utility bills of households. For an overview of the larger project, see the School of Public Policy working paper on "Low-Carbon Electricity Pathways for the U.S. and the South: An Assessment of Costs and Options" that can be downloaded here.

GT-NEMS (Georgia Tech - National Energy Modeling System) provides the data necessary for estimating household utility bills for the nine U.S. Census divisions. It also estimates residential energy consumption and prices by fuel type for smaller geographic units – the 22 North American Reliability Corporation (NERC) regions shown in Figure 1. While the GT-NEMS code incorporates population estimates for these regions in its macroeconomic model, it does not provide these population estimates as outputs. It also does not generate per capita utility bill estimates at the resolution of the 22 NERC regions. As a result, additional work by users of GT-NEMS is required to estimate utility bills on a per capita or per household basis at the scale of these NERC regions. Our supplemental spreadsheet approach is described in detail in the report's Appendix C.

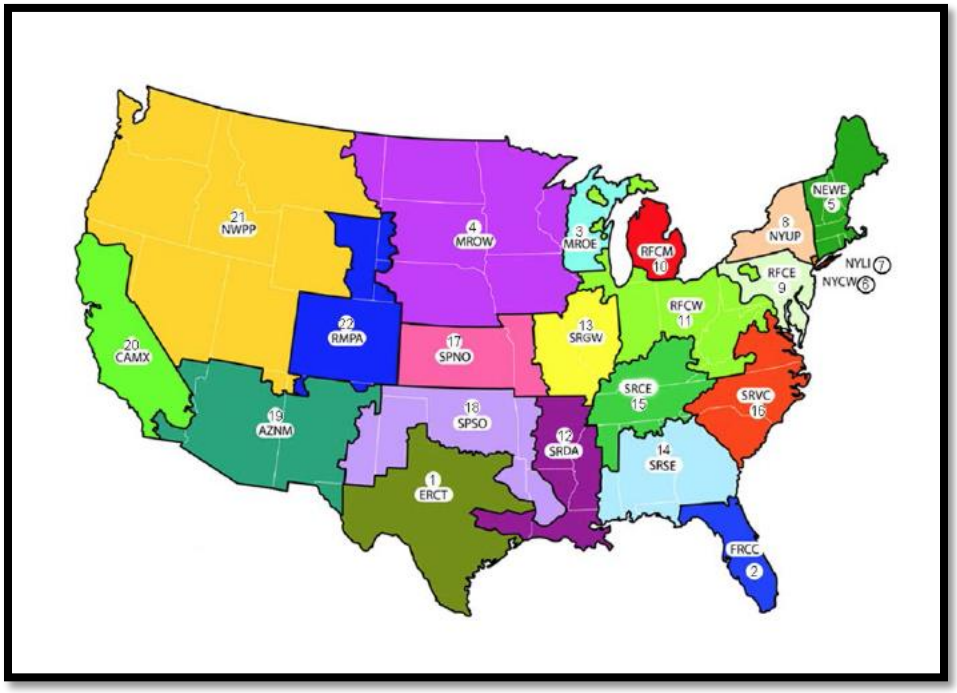

Figure 1. The Electricity Market Module's NERC Regions

While not a perfect method for downscaling to states, the 22 NERC regions can inform state statistics. The 22 NERC regions were developed and implemented by the Energy Information Administration in the Electricity Market Module (EMM) module of the

Annual Energy Outlook 2011. They correspond to the North American Reliability Corporation regions in place in 2011. In some cases they are divided into sub-regions (EIA, 2015).

Some of the 22 regions correspond approximately to state territories, such as FRCC (Florida), ERCT (Texas), and CAMX (California). Others are aggregations of states, such as NEWE (New England), or are parts of states that can be aggregated (New York). Still others cut across state boundaries, reflecting the territories overseen by power coordinating entities or power marketing authorities such as the Northeast Power Coordinating Council and the Southeast Reliability Corporation. In some cases these are divided into the subregions served by entities such as utility holding companies. For example, the Georgia-Alabama NERC region is served by the Southern Company and is abbreviated SERC-Southeast or SRSE. Because of the influence these holding companies and power marketing authorities have over power planning, they provide useful insights into energy rates, consumption, and bills at the state level.

Four data transformations are necessary to forecast household utility bills for these 22 geographic regions, using the modeling results of GT-NEMS. The first step is to identify the counties that comprise each NERC region. Second, identify the baseline population of each region based on county populations. Third, identify the population growth rate of each region in order to estimate its population in each year between 2010 and 2040. Finally, the average household size of each region must be estimated so that the number of households in each region can be estimated for 2010 to 2040.

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