



TEXAS A&M UNIVERSITY

Department of Electrical  
& Computer Engineering

**Friday, March 4, 2022 | 9:10 – 10:00 a.m. Central**

Location: ETB 1020

# Techniques for Creating Synthetic Combined Electric and Natural Gas Transmission Grids

## Abstract

This presentation presents a methodology for the creation of a synthetic combined electric and natural gas transmission network, along with representative benchmark results. The systems do not contain actual, confidential network data, but are synthetic, meaning they are built to capture the behavior of a combined network that is geographically constrained. First, natural gas loads are placed in a selected area. Work already done in building synthetic electric grids aids in this process, where the natural gas-powered generators are modeled as loads in the natural gas system. Publicly available data is then used to place the remaining gas loads and the gathering plant. Next, a method is introduced to construct a pipeline network connecting the loads and gathering plant, which acts as the source. The combined electric-gas system is then solved for the nodal pressures, pipeline flow rates, and electric state variables. A 47-node gas test case with 23 loads and 46 pipelines is built and solved in combination with a 173-bus electric system, designed to aid with developing and validating analysis techniques for combined electric-gas systems.

## Yousef Abu-Khalifa

*M.S. Student at Texas A&M University*

Yousef Abu-Khalifa completed his B.S. degree in Electrical Engineering with a focus in Energy and Power at Texas A&M University in 2020. Continuing with a focus in electrical power systems, Yousef is currently getting a master's degree in Electrical Engineering and is projected to defend his thesis in the Fall 2022 semester. His primary research area is exploring methods for creating and simulating combined electric and natural gas transmission grids.