ECE473 CONTROL OF POWER SYSTEMS

Lab # 3 - Unit Commitment Interconnected Operation

This lab will continue to use the **UNITCOM** software and the system data from lab 2. Recall that in lab 2 each utility was isolated and could not trade electricity.

Assume now that the utilities can trade electricity with each other. Based on the results from lab 2, each utility should declare how their λ's vary over the day then determine if they can improve their costs by purchasing or selling at different times.

Use UNITCOM to determine the commitment schedule (which units are on or off) and then use this as input to the EDC software to get the values for utility incremental cost and total operating cost. Remember to add the start-up cost of the committed plant to the daily operating costs.

Each person then runs their own unit commitment and arrives at an economic dispatch schedule that will include inter-utility transactions following the equal benefit criteria for economy transactions (those which include spinning reserve), i.e.

$$\text{Economy Price} = \frac{\text{Seller's Cost} + \text{Buyer's Value}}{2} \quad \$/\text{MWh}$$

It is important to include the effect of "incremental creep" in both the buyer and seller's λ.

Capacity transactions (those which permit the purchaser to shut a unit down) are priced at seller's cost plus 25% i.e.

$$\text{Capacity Price} = 1.25 \text{ x Seller's Cost} \quad \$/\text{MWh}$$

Determine the total annual generating cost and hence the daily average energy cost for each utility; then determine the overall average energy cost for the whole interconnection, under these conditions. Compare this with the results from lab 2. Propose a transaction mechanism for lab 3, which ensures that no member utility is harmed by the collective requirement.