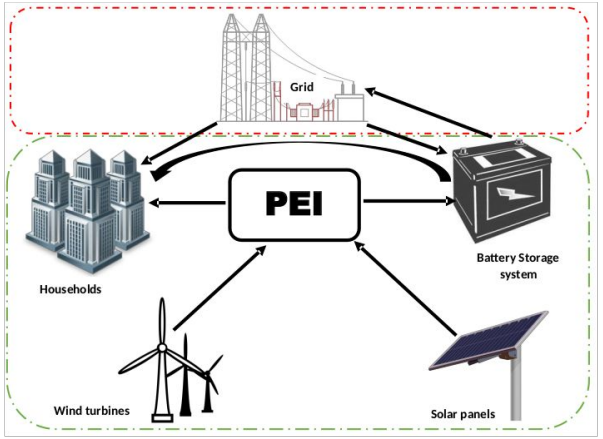
Coordinated Scheduling of Residential Appliances and Heterogeneous Energy Sources in a Smart Microgrid

Pranay Kumar Saha, Nilotpal Chakraborty, Arijit Mondal, Samrat Mondal

1. Description of the System:

- A **smart microgrid** (SMG) having grid connection, **renewables** (RES), **battery** (ESS), and **smart schedulable appliances**.
- SMG can either draw energy from the grid or sell RES energy back to the grid.
- The demands can be supported by the RES, ESS, and the grid.
- All the smart appliances need to be scheduled within a given time horizon.
- It has individual execution time and power consumption in each time-slot.



2. Objective: Minimize the overall cost to be paid by the SMG to grid while satisfying all the constraints. Mathematically expressed as:

Cost= Σ {*GridPower X unitPrice* - *SoldPower X unitSellingPrice*)}

3. Proposed works & Results:

- **MILP** formulation is done
- IBM CPLEX solver is used to solve the problem optimally
- In Table 1, compare our **heuristic** with the **optimal solutions,** as well as a situation where **no scheduling (NS)** is possible

Table 1: Comparative analysis of proposed approaches

No. of Appliances	% deviation from Optimal		Computation time (Sec)	
	Heuristic	NS	Optimal	Heuristic
10	31.65	54.85	9.18	0.02
20	20.74	37.45	75.83	0.02
30	14.41	35.18	170.42	0.02
40	11.87	33.15	8467.93	0.03

Presented by: **Harshit**