Game theoretic exercise with Smart grid implications

Setup

- 2 consumers of electrical power from the grid: c1 and c2
- Each may consume either c1(h), c2(h) reps. of energy each hour
- Hours are indexed $h \in 0,..,23$
- c1 needs 5 units from between 02 and 10 o'clock
- c2 needs 10 units between 05 an 20 o'clock
- Energy prize/unit P_u is set per hour and increases linearly with total demand for that hour.
- The cost of each user is his/her total daily electricity bill.
- What is the set of strategies for each player.
- Find the combined (optimal) strategy, which minimizes total cost (summed for both users).
- Find a Nash equilibrium.
- Does the optimal strategy coincide with the NE ?

(hint: Lagrange multipliers)