

# **Microgrid economic operation considering electric vehicles integration**

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## **Motivation and Background**

With the concerns of the environmental issue, City of Toronto is committed to reduce the pollution caused by vehicles. City Council approved The Power to Live Green: Toronto's Sustainable Energy Strategy in 2009, which promotes the development of Electric vehicle(EV) technology. Utilization of EV is beneficial to environment, while the effects due to integration of EV to the microgrid needs to be considered. In this project, the microgrid economic scheduling mathematical model with and without consideration of EV are presented. This project is to use PSO algorithm to minimize the daily cost of microgrid when considering the EV.

## **Objectives**

1. The economic dispatch strategies of the microgrid with consideration of EVs.
2. Comparisons between the daily cost of the microgrid with and without EVs.
3. The influence of the integration of EVs to the microgrid.

## **Constraints**

1. Power generation limit of each plant.
2. Realistic data
3. Power balance of power system

## **Candidates methods of solution**

1. Come up with the power generation strategy. Use non-dispatchable renewable source as much as possible and then use gas power as the second source. EV could be considered as both electricity consumer and provider. As similar function with battery, integration of EV could stabilize the main power grid. Finally, when operating in the grid connected mode, microgrid exchange energy with the main power grid.
2. Build the mathematical model of components in microgrid including power sources (wind, pv, gas), battery units and vehicle to grid(V2G) modelling.
3. Construct the complete microgrid model in two scenarios (with and without EV model).
4. Apply PSO algorithm to solve the constructed ED model of microgrid with a real power system case. Analyze the results to show the feasibility of constructed model and positive influence of EVs on microgrid.