Call for Abstracts

Nova Scotia Offshore Wind R&D Conference

Hybrid Renewable Energy Systems Voltage Stability Enhancement Using Data Driven Machine Learning Approach

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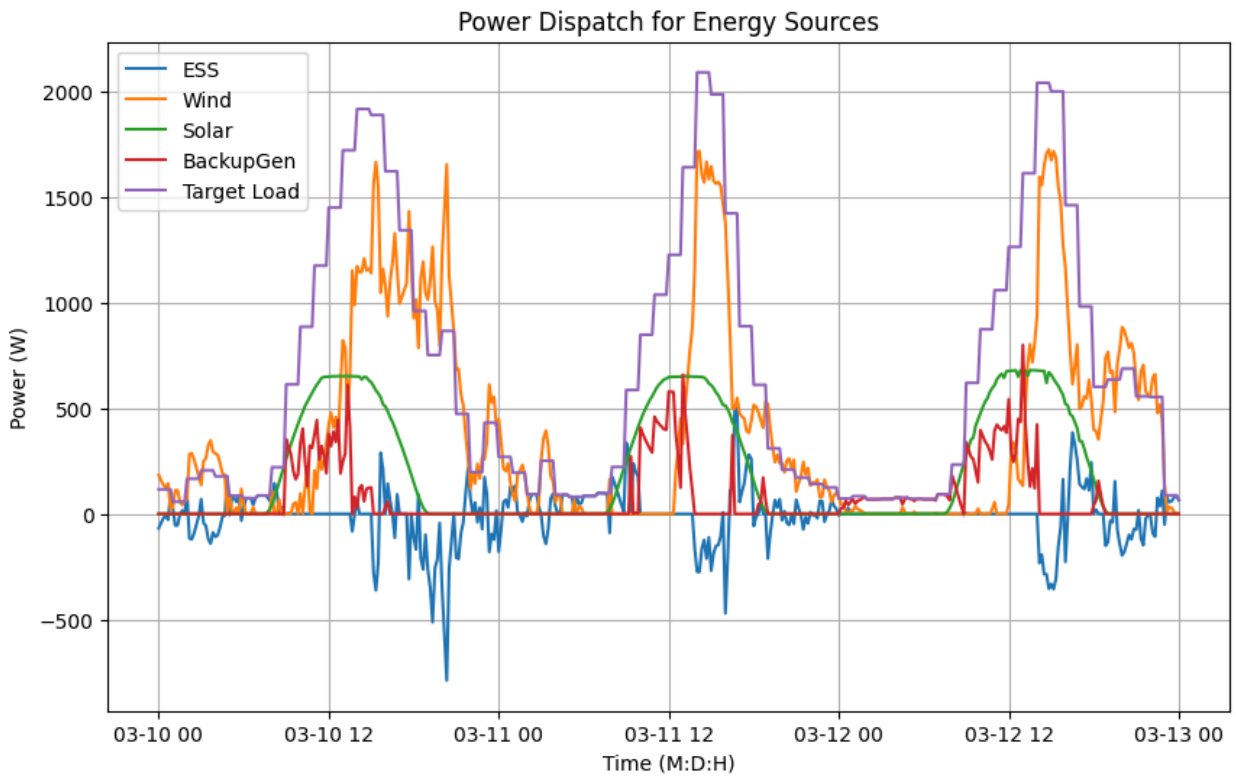
KEYWORDS

Renewable energy systems, hybrid energy sys-tems, power forecasting, machine learning.

ABSTRACT

One of the main technical challenges with using renewable energy sources is their inability to produce power on demand. This paper investigates an approach of using deep learning forecasting techniques to create an hourly dispatch schedule for a hybrid energy system (HES) using real world open source data. HES combine different energy sources and energy storage systems (ESS) into a single energy producing unit which can be scheduled to produce a consistent and predictable amount of power. This paper compares deep neural networks (DNN) and long-short term memory (LSTM) models for forecasting power output for photovoltaic (PV) and wind energy systems. A theoretical HES system is modelled using Python for power systems analysis (PyPSA) to test the proposed method of setting hourly power dispatch targets based on the forecasted power generation. The energy dispatch is created by solving an optimization problem to minimize operating cost. The proposed framework for HES forecasting and power dispatch could be used to integrate more renewable energy systems into a power network by creating stable and predictable power generation units for use in a distributed generation (DG) system.


Power Dispatch for Energy Sources
ESS
Wind
Solar
BackupGen
Target Load
Power (W)
2000
1500
1000
500
0
−500
03-10 00
03-10 12
03-11 00
03-11 12
03-12 00
03-12 12
03-13 00
Time (M:D:H)