(IJITR) INTERNATIONAL JOURNAL OF INNOVATIVE TECHNOLOGY AND RESEARCH
Volume No.5, Issue No.1, December – January 2017, 5502-5504.

Formalizing A Mathematical Scheme For Renewable Source Hubs

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Abstract: **Inside a typical green house, the next groups of one's consuming components could be identified: 1) extra lighting 2) climate controls of temperature, humidity, and CO2 levels through cooling and heating systems and three) natural and compelled air ventilation and circulation. The aim would be to minimize total energy costs and demand charges while thinking about important parameters of greenhouses particularly, inside humidity and temperature, CO2 concentration, and lighting levels ought to be stored within acceptable ranges. Humidity in the green house must be controlled to supply an appropriate atmosphere for plant growth and also to prevent yeast illnesses. Within the situation of mugginess, which often occurs in winter nights, the plants stop transpiration, and condensation in the roof and plant leaves could cause yeast illnesses. Intense discharge (HID) lamps for example metal halide and pressure sodium lamps are generally used with regards to offering artificial lighting in greenhouses. Promptly from the lighting system, and also the minimum duration and also the minimum lighting of cloudy weather to show around the extra lighting systems are incorporated to make sure that the plants make use of the artificial lighting more proficiently.**

Keywords: **Energy Hubs; Energy Management Systems (EMS); Greenhouses; Mathematical Modeling; Optimization; Smart Grids;**

I. INTRODUCTION

Using the integration of knowledge technology and advanced metering infrastructure (AMI) into smart grids, both utilities and customers can get access to two-way communication infrastructures, control devices, and visual interfaces that permit them to send, retrieve, visualize, process, and/or control their energy needs. The majority of the existing DSM programs within this sector are centered on energy-efficiency programs in farms to lessen total energy consumption by using more energy-efficient technologies and also the decrease in energy losses [1] [2]. This paper presents a singular hierarchical control approach and new mathematical optimization types of greenhouses, which may be readily integrated into energy hub management systems (EHMSs) poor smart grids to optimize the whole process of their energy systems. The opportunity of DSM and DR participation in greenhouses is a lot greater than farms due to the nature of activities that occur during these places. An in depth mathematical type of greenhouses is developed and presented, thinking about their operational needs and suitable for the perfect and real-time scheduling of those hubs' electricity, gas, as well as heat equipment [3]. The suggested models could be readily integrated into energy management systems (EMS) and implemented like a supervisory real-time control in existing green house controllers, thus empowering greenhouses to effectively manage their overall energy demand, production, and storage in real-time. Therefore, the suggested model incorporates weather forecasts, electricity cost information, and also the finish-user preferences to optimally operate existing control systems in greenhouses. The presented simulation results demonstrated the potency of the suggested model to lessen total energy costs while keeping needed operational constraints of the green house, even just in the existence of uncertainties [4].

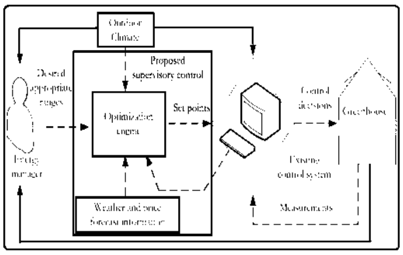

Fig.1.Proposed system architecture

II. IMPLEMENTATION

Operational constraints of physical devices for example maximum window opening, flow rate of fans, rate of fogging systems, and temperature of warm water tubes are restricting features which have to be considered during these control systems. Presently, most control algorithms in ACS focus on logical On-Off and proportional integral-derivative

(PID)-based controllers. Results of uncertainty in electricity cost and weather forecast on optimal operation from the storage facilities are studied through Monte Carlo simulations. The presented simulation results show the potency of the suggested model to lessen total energy costs while keeping needed operational constraints [5]. Greenhouses will often have weather stations that offer exterior and internal info on temperature, relative humidity, radiation, and wind speed for use for his or her real-time heating and cooling. The suggested framework maintains the green house climate within proper conditions to offer the best plant growth, and controls important parameters for example green house temperature, relative humidity, lighting levels, and CO2 concentrations while reducing total energy costs. The optimization model looks ahead over time and updates the perfect outputs every hour, as the feedback controller continuously monitors the parameters in check and tracks the prospective set points instantly. A hierarchical control approach was suggested for optimal operation of greenhouses poor smart grids, including novel mathematical models for that optimal operation scheduling of greenhouse' electricity, gas, as well as heat systems. Thus, optimization models were formulated to optimally operate extra lighting, CO2 generation, air flow and ventilation, and cooling and heating systems in existing greenhouses control systems [6]. Day-ahead forecasts from the electricity and gas prices and peak-demand expenditure is also accustomed to calculate the expected energy costs of greenhouses. In greenhouses, artificial lighting, CO2 production, and heating and cooling systems consume considerable energy thus, a mathematical type of greenhouses suitable for their optimal operation is suggested, in order that it could be implemented like a supervisory control in existing green house control systems. Intense discharge (HID) lamps for example metal halide and pressure sodium lamps are generally used with regards to offering artificial lighting in greenhouses. Optimal operational decisions and resulting trajectories generated through the suggested model for any winter day are presented [7]. For any winter day, the height demand can't be considerably reduced because of the have to operate the extra lighting system however, the model reduces total costs by operating the devices during lower energy cost periods, For wind speed, random values are generated utilizing a Weibull distribution using the scale and shape parameters acquired from actual hourly data for every season for Ontario. Random solar irradiation inputs are generated using uniform distribution with reasonable minimum and maximum values for every hour each day for every season for Ontario.

III. CONCLUSION

The developed models incorporated weather forecasts, electricity cost information, and also the finish-user preferences to reduce total energy costs and peak demand charges while thinking about important parameters of greenhouses heating and cooling. Optimal operational decisions and resulting trajectories generated through the suggested model for any winter day are presented. For wind speed, random values are generated utilizing a Weibull distribution using the scale and shape parameters acquired from actual hourly data for every season for Ontario. The majority of the existing DSM programs within this sector are centered on energy-efficiency programs in farms to lessen total energy consumption by using more energy-efficient technologies and also the decrease in energy losses. The presented simulation results show the potency of the suggested model to lessen total energy costs while keeping needed operational constraints. The suggested framework maintains the green house climate within proper conditions to offer the best plant growth, and controls important parameters for example green house temperature, relative humidity, lighting levels, and CO2 concentrations while reducing total energy costs.

IV. REFERENCES

[1] T. G. Doeswijk, "Reducing prediction uncertainty of weather controlled systems," Ph.D. dissertation, Dept. Syst. Control, Wageningen Univ. Res. Centre, Wageningen, The Netherlands, 2007.

[2] M. Meul, F. Nevens, D. Reheul, and G. Hofman, "Energy use efficiency of specialised dairy, arable and pig farms in flanders," Agric. Ecosyst. Environ., vol. 119, nos. 1–2, pp. 135–144, Feb. 2007.

[3] N. Sigrimis, K. Arvanitis, and G. Pasgianos, "Synergism of high and low level systems for the efficient management of greenhouses," Comput. Electron. Agric., vol. 29, nos. 1–2, pp. 21–39, 2000.

[4] C. J. Taylor, P. C. Young, A. Chotai, A. R. McLeod, and A. R. Glasock, "Modelling and proportional-integral-plus control design for free air carbon dioxide enrichment systems," J. Agric. Eng. Res., vol. 75, no. 4, pp. 365–374, Apr. 2000.

[5] D. Kolokotsa, G. Saridakis, K. Dalamagkidis, S. Dolianitis, and I. Kaliakatsos, "Development of an intelligent indoor environment and energy management system for greenhouses," Energy Convers. Manage., vol. 51, no. 1, pp. 155–168, Jan. 2010.

[6] J. P. Coelho, P. B. de Moura Oliveira, and J. B. Cunha, "Greenhouse air temperature predictive control using the particle swarm optimization algorithm," Comput. Electron. Agric., vol. 49, no. 3, pp. 330–344, Dec. 2005.

[7] F. Rahimi and A. Ipakchi, "Demand response as a market resource under the smart grid paradigm," IEEE Trans. Smart Grid, vol. 1, no. 1, pp. 82–88, Jun. 2010.

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