

University of Dublin



TRINITY COLLEGE

Nanogrid Yoke

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B.A. (Mod.) Integrated Computer Science

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Declaration

I hereby declare that this project is entirely my own work and that it has not been submitted as an exercise for a degree at this or any other university.

Brian McNestry, May 5 2017

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Abstract

This is the abstract

Acknowledgements

Acknowledge the various people here

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Part I

Abstract

Part II

Introduction

Part III

Background

Chapter 1

Decentralised Grid

At present in Ireland and in many other countries, the national electric grid infrastructure is controlled by a central body, namely the ESB. While there are several electricity providers in Ireland, such as Bord Gáis Energy, SSE Airtricity and Energy Ireland, each of them use the same distribution network as one another. Essentially the power is provided from each of the different providers and then routed into the same centralised hub belonging to the ESB. From there, each consumer (a household) receives the energy that they pay for accordingly at a fixed rate through that same infrastructure belonging to the ESB. This is much the same system as any other country, where there is a centralised grid.

This system has been in place for decades and lends itself very well to the situation where large companies can provide a steady supply of energy by way of electricity plants that use both renewable and non-renewable energy sources. Non-renewable energy sources, also known as fossil fuels, include resources such as coal, gas and oil. While these are finite resources, at present they can be burned at a steady rate in order to meet the demands of customers. Electricity from renewable sources can also be produced at a fairly steady rate by placing large farms in areas that are particularly well suited to the type of renewable energy being produced. For example, large wind farms are set up in windy regions far removed from residential or urban areas and solar panels can be placed in regions that typically enjoy clearer skies than other areas.

However in the future, perhaps the very near future, with the ongoing depletion of non-renewable resources, more and more people will turn to deploying solar panels and local wind farms in their locale, regardless of whether or not they are living in a particularly sunny or windy area.

Chapter 2

Smart Grid

2.1 Nanogrids

Chapter 3

REFIT Scheme

Chapter 4

Auctions

Chapter 5

Game Theory

5.1 Cooperative Game Theory

5.2 Non-Cooperative Game Theory

5.3 Cournot and Stackelberg Games

Chapter 6

Optimisation Techniques

6.1 Convex Optimisation

6.2 Hyperplane Projection

Part IV

Implementation

Chapter 7

Design

Chapter 8

Framework

Chapter 9

Processes

Part V

Conclusion

Chapter 10

Assessment

Chapter 11

Future Work and Continuations

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