MSC Teaching Guide Template

*– Using Green Mountain Power case content as dummy text*

[Please replace the greyed out text with your own content.]

**Case Overview**

The case opens in June of 2015 with the Chief Innovation Executive of Green Mountain Power (GMP), Josh Castonguay, thinking through the merits and risks of an innovative new program he proposed to GMP’s CEO. GMP is an investor-owned utility in Vermont known in the industry for its strong customer focus and mission to move toward a distributed, localized energy future.

Castonguay has until the end of the week to decide whether to recommend that GMP move forward with a new partnership with Tesla in order to offer GMP’s residential customers the newly announced Powerwall Home Battery. The goal of the partnership is to provide GMP’s customers with a reliable source of backup power at the cutting edge of the consumer-facing energy industry, while allowing GMP to aggregate and leverage behind-the-meter storage capacity to provide services to the grid. In order to create these multi-stakeholder benefits, however, GMP needs at least some level of control over how much and when customer-sited batteries are charged and discharged. This kind of hybrid control system is relatively new and untested within the utility industry, meaning GMP would venture into uncharted territory if it moves forward with the partnership.

The experimental, forward-looking nature of the proposed pilot pushes Castonguay to consider issues of operations, utility economics, early technology adoption, and disruption in a conservative industry.

**Learning Objectives**

After reading and discussing the case, students should be able to:

* Understand the utility business model, its purpose, and how it influences the adoption of distributed energy resources.
* Explain the role of capacity markets and how behind-the-meter energy storage might lower the need for resource adequacy.
* Evaluate the behind-the-meter storage value propositions for customers and utilities.
* Understand some of the importance drivers that determine the environmental impact of energy storage systems.
* Determine how an innovative pilot such as the Tesla partnership can impact utility operations, investors, and customers (both participants and non-participants).

**Suggested Audience**

This case was written for the graduate course “Renewable Electricity and the Grid” at the University of Michigan. The objective of this course is to aid professional students in the development of skills, practical tools, and a knowledge base useful for careers in the energy sector, spanning project development, utilities, research, government, and environmental nonprofits. This course builds an understanding of the technical, economic, and policy issues related to renewable electricity development and grid integration.

The case may be useful for courses involving:

* Cleantech Entrepreneurship
* Public-Private Partnerships
* Energy Project Finance
* Environmental Policy
* Green Building Design/Urban Planning
* Sustainable Energy Systems

**Previous Knowledge**

Before using this case study, students should have learned about A, B, and C (or have background in A, B, and C), and be able to do X, Y, and Z.

**Teaching Plan**

**Before class:**

Read case

Listen to podcast

Prepare answers to engaged learning exercise through use of spreadsheet model

**Prior to discussion:**

Purpose & guidance: (5 minutes)

**Day of discussion:**

Introduction: (10 minutes)

Engaged Learning Exercise: (60 minutes)

Wrap-Up Points: (5 minutes)

Epilogue: (5 minutes)

**Podcast:** Additionally, explain how the podcast relates to the case narrative—does it further unpack the issue, critique a dominant narrative, add further information or theory, or something else?

**Directions for Engaged Learning Exercise**

Quantitative Exercise 1 has five components. (1) Construct the Nazarian electricity demand curve from a willingness-to-pay table. (2) Construct your own electricity demand curve from your willingness-to-pay table. (3) Develop an algebraic expression of the demand curve using the equation for a line. (4) Compute the quantity demanded at various prices. (5) Graph the demand curve and price line; show consumer surplus and consumer expenditure on the graph; and compute these quantitatively.

Quantitative Exercise 2 has three components. (1) Based on demand schedules, construct aggregate (market) demand from individual demand curves and graph Nazarian’s demand and aggregate demand. (2) Develop the idea of off-peak demand and peak demand and work with the algebra of these linear demands. (3) Develop the idea of a fixed (inelastic) supply of electricity, and compute excess demand during the peak period and excess supply during the off-peak period given a single (flat-rate) electricity price. Graph these notions given the numerical examples.

Quantitative Exercise 3 has two components. (1) Instead of a flat-rate price, two time-of-use prices are set, one for off-peak periods and a second, higher price of peak periods. Analysis of this pricing structure is conducted using the demand curves from Exercise 2. (2) Compute the price elasticity of demand given the numbers, and consider the role it plays is demand-side management of electricity.

**Assessment**

A Qualtrics survey can be used to……..

Students will also be assessed by the engaged learning exercises…..