

Michigan State University
College of Engineering; Dept. of Electrical and Computer Eng.
ECE 480 Capstone Design Course Project Charter

Sponsoring Company/ Organization: [Consumers Energy](#)

Contact Information:

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Background Information:

Business Case:

- Explain why is this an attractive opportunity for your company to pursue now.
 - [Consumers would like to continue being involved in Capstone projects in an effort to expose students to the utility industry and potentially a future employer. This opportunity benefits our company by having a fresh outlook from outside of the company.](#)
- Describe the discontinuity creating the competitive opening in the marketplace that makes this project timely. (Competitive action, Legislation, Regulation, etc.)
 - [Consumers Energy's Grid Modernization department focuses on technology, field communications, grid devices and advanced applications. With the deployment of the AMI Smart meters, Consumers Energy is receiving ~3million events/day of data and we need to know what value this data has. We would like to see students take action on the data we collect, by filtering out the noise and creating visualizations.](#)
- Explain how this product / service will be positioned as a commodity (low cost to serve) or a differentiated (value priced) offering. Why? [Through the usage of AMI Smart meters data such as events, patterns etc., Consumers Energy would benefit in countless ways by the analyzing of logical assumption data including reduction in cost and time, and quickly visualizing problems.](#)
- Outline the competitive barriers to marketplace entry the Design Team needs to take into consideration.
- What is the hypothesized basis of for a sustainable competitive advantage?
 - [Patents, Trade Secret, Low cost, privileged relationships?](#)

Project Intellectual Property Considerations:

- Will the student Design Team be required to sign a Non-Disclosure Agreement?
[Yes](#)
- Will the Design Team be able to post their work on the course web site?
[Potentially](#)

- Will the student Design Team be working with technology contained in pending patents not yet granted? **Potentially**
- Can the electronic design be shown, but the embedded software protected? **Yes**

Opportunity Statement:

- What **clearly defined Customer Problem** you hope to solve with this project?
 - Consumers Energy is looking for students to help us investigate AMI Smart Meter data utilization within our business. We are looking for the project to investigate various types of data from the smart meters and creating visualization, filter out the noise, assess failing, and service quality. At this time Consumers Energy can use Smart Meters as another sensor, but has no effective and meaningful way of analyzing and creating importance of all the data, as well as, knowing what to do with all of it.
 - Is this problem solvable in a 13 week working semester with students? **Yes**
 - Does the design challenge need to be run across two back-to-back semesters? **No**
- Does this problem exist now, or in the future? **Now**
 - How long will the window of opportunity be open to alternative solutions? **1-2 years**
 - What will drive the window of opportunity closed in the future?
- Who is the customer?
 - Who makes the buying decision? **Students**
 - Who will the ECE 480 Design Team deliver their project to at the end of the semester? **Students will present findings to Consumers Energy Upper Management at one of our Jackson, MI locations (TBD) before Design Day.**
 - Describe the benefit to the end Customer for this project. **Consumers Energy is interested in utilizing our AMI Smart Meters in various ways. The ability given by the students of analyzation and utilization of AMI Smart Meter data, Consumers Energy and our customers would benefit tremendously.**

Deliverables:

- Describe what is to be delivered at the end of the semester.
 - Proof-of-Concept design? (Bread-boards, wires connecting sub-systems, etc., ugly looking – but functional, development software non-user-friendly interface)
 - Working prototype? (PC boards, cabling between sub-systems, refined software and user friendly interface) **Visualization of our AMI Smart Meter data, as well as, other Grid devices and system assets, and measurements tied to GIS.**
 - Sub-system ready to fit into the overall system?

- Final solution ready for end use deployment?

Goals:

- Describe what success will look like at the end of the semester. [Success will be based on the accuracy of data analysis/layout and visualization pertaining to AMI Smart meters, grid devices/system assets and GIS data.](#)
- **Goals should be SMART**
 - **Specific** – Exactly what is to be delivered?
 - **Measurable** – Describe the measurement system that will determine the degree of success.
 - **Attainable** – Can a student team, with little to no industrial experience complete this project in 13 weeks to your satisfaction?
 - **Relevant** – Limited to this design challenge.
 - **Time Bound** – 13 week working semester (Students loose a week getting organized and a week preparing for Design Week presentations.)

Scope:

- Clearly define what is IN and OUT of Scope for the Design Team. What are the clearly defined boundaries to prevent the project form getting too large and complicated?
- Clearly list chipsets, software, equipment, test set-ups, working systems, etc. that will be supplied to the Design Team to facilitate their efforts and keep project cost reasonable. [AMI Smart Meter data, LVD SCADA data, and GIS data](#)

Constraints:

- List all constraints on the project team.
 - Examples include: Equipment the team must interface with, past Capstone Designs the team must build upon previous results, chip sets / software team must use in the design, etc. [Format to deliver large data sets](#)

Project Team: (Completed once semester begins)

Name	Responsibility

Faculty Advisor: (Assigned by ECE Dept . based on project requirements)
