

University of Illinois  
Facilities & Services  
1501 S. Oak Street  
Champaign, Illinois 61820

**SCOPE STATEMENT ROUTING SHEET**

Date: August 29, 2011

Project Name: Abbott Power Plant – Utilities Production & Distribution Master Plan

Budget: \$1,285,000

Funding Commitments: Energy Services – Activity, Storeroom, and Service Funds

Location: 1117 S. Oak St. Champaign IL 61820

**SUBJECT:** Scope Statement Abbott Power Plant – Utilities Production & Distribution Master Plan

**ROUTE TO:**

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Attachments

**Abbott Power Plant – Utilities Production & Distribution Master Plan**

August 2011

This Project Scope Statement was prepared using all available information as of the above date and approved by:

*Tec* *gmm* *John J. Coe* *9/7/11*  
Director of Planning, Facilities & Services, Date

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Director of Utilities & Energy Services, Date

*P. K. Khanna* *9/30/11*  
Associate Chancellor, Date

*John A. Dempsey* *9/15/11*  
Executive Director of Facilities & Services, Date

## Project Scope Statement

**Date:** May 5, 2011

**Updated:** August 29, 2011

**Project Name:** Abbott Power Plant – Utilities Production & Distribution Master Plan

**Project Number:** U11045

### Scope of Work:

The Abbott Power Plant – Utilities Production & Distribution Master Plan will involve the development of a comprehensive utility master plan for the utility production and distribution systems for the University of Illinois at Urbana-Champaign campus. Following are items to be included in the scope of work for this master planning effort.

1. Existing Infrastructure Analysis
  - a. Production Facilities
    - i. This will include a thorough analysis and condition assessment of the existing energy production facilities including Abbott Power Plant and the Chilled Water Plants on campus. The analysis will include a review and update of any previous condition assessments completed for the facilities and a code and life safety analysis for each facility. The infrastructure analysis should include a fitness for service report on existing equipment and piping systems within the energy production facilities. Frequency of future inspections shall be clearly identified.
  - b. Energy distribution systems
    - i. Electrical – perform an analysis of the existing electrical distribution system on campus. Utilize information obtained from the 2011 138Kv electrical service study completed by Stanley Consultants. Provide a current condition assessment of this system including a review and update of any previous condition assessments completed for these facilities and a code and life safety analysis.
    - ii. Steam – perform an analysis of the existing steam distribution piping and tunnel system throughout campus. Utilize information obtained from the 2010 Black & Veatch study and from the 2011 Stanley Consultants Walkable Steam Tunnel Ventilation Master Plan report and update as appropriate for inclusion in the Utilities Production and Distribution Master Plan. Perform a condition assessment using non-destructive inspection techniques, of a representative sample of campus steam and condensate piping.
    - iii. Chilled Water – perform an analysis of the existing chilled water distribution system throughout campus.
    - iv. Natural Gas – perform an analysis of the existing UIUC natural gas piping distribution system throughout campus, including the transmission pipeline that exists between Savoy, IL and Monticello, IL.
    - v. Fuel Oil – perform an analysis of the existing fuel oil distribution system throughout campus.
    - vi. Compressed Air – perform an analysis of the existing compressed air distribution system throughout campus.
    - vii. Water – perform an analysis of the existing process water system as it relates to energy production facilities. This analysis should include make-up and effluent water as a result of energy production and is not intended to include domestic water piping.
  - c. Infrastructure Risk Management and Reliability

- i. Complete a continuity of business analysis. Identify stakeholders. What measures must be taken to assure uninterrupted service to end users. What are the risks associated with continued operation in the present configuration?
        - ii. Perform an energy source risk analysis. Identify the risks associated with various forms or alternative energy fuel sources that may be available for use on this campus.
          - 1. Include a review of the goals set forth in the Illinois Climate Action Plan (iCAP) and what impact these goals have on risk.
        - iii. Perform an energy price risk analysis. Evaluate past and projected trends for the cost of each energy source identified for potential use. What impact will these cost projections have on risk?
        - iv. Compare UIUC to applicable industry standards for energy providers. How do existing conditions measure up to industry standards for utility providers? What impact does this have on risk to the University?
        - v. Examine the impact regulatory agencies may have on the use current infrastructure to provide energy. What impact will regulatory agencies have on currently used and proposed alternative energy sources? What impact will regulatory agencies have on the goals of iCAP?
        - vi. Future development. Explore the feasibility of a Central Emergency Power Production and Distribution system to serve the campus.
      - d. Utility Business Model Analysis
        - i. Evaluate the current personnel and their qualifications to what will be needed to support the recommendations of this study.
        - ii. What levels of training will be necessary for personnel to remain competent? What new levels of expertise will be required to support the recommendations of this study?
        - iii. Evaluate the configuration that would allow the University to cease production and begin to purchase energy to meet demands.
        - iv. Consider the impact on operations for a scenario where Abbott Power Plant becomes an independent energy provider.
        - v. Evaluate a 3<sup>rd</sup> party out source operation of utility production and distribution systems.
        - vi. Develop a budgeting and financing model required to support the recommendations of this study.
        - vii. Develop a Capital Improvement Financing model for major capital projects required to support the recommendations of this study.
2. Energy Systems Load Analysis (steam, electricity, chilled water, water, gas)
  - a. Methodology – This study shall consider campus growth for the next 35 years. It will reflect the commitments of iCAP and at the same time observe the growth depicted in the Campus Master Plan.
  - b. The base case will consider a zero growth scenario.
  - c. A medium growth scenario will be based on 75,000 GSF/year growth rate.
  - d. A high load growth scenario will be based on 150,000 GSF/year growth rate.
  - e. Perform a sensitivity analysis based on the above projected growth rates. Identify 'tipping points'. When must new assets be constructed to meet projected energy demand?
  - f. Evaluate the construction of new data centers. Identify the impact one or more new data centers will have on the planning for energy production and distribution.
3. Energy Supply/Distribution Options Analysis
  - a. Stakeholder Participation
    - i. Work with University representatives to identify all stakeholders.
    - ii. Consultant will conduct 3 open forum public meetings
    - iii. Consultant will develop and monitor a website to share information and receive public input via website. Input to be documented and presented for discussion with the Planning Team at monthly meetings.

- b. Unconventional Coal Options – Evaluate options including but not limited to those identified
- c. Local Solid Fuel Options
  - i. Refuse derived fuel
  - ii. Urban wood waste fuel
  - iii. Energy crop fuel
  - iv. Forestry biomass fuel
  - v. Liquid biomass-derived fuel
  - vi. Biomass of opportunity fuel
  - vii. Algae as a fuel source
- d. Natural Gas Options
  - i. Present options for a redundant supply of natural gas as backup for the existing natural gas transmission line routed to Monticello, IL.
  - ii. Consider potential gasification plant – possibly located along the right of way for the existing natural gas transmission line.
  - iii. Consider micro turbines at individual buildings or macro turbine at the Plant
    - 1. Consider the implications of increased natural gas use at campus buildings and the configuration of the distribution infrastructure to meet those needs
    - 2. Consider micro turbine options including Packaged Cogeneration Units (PCU)
    - 3. Consider cost, factoring in the replacement of distribution piping
    - 4. Consider impact of a macro turbine on the existing plant infrastructure and distribution network
  - iv. Price risk management
- e. Fuel Oil Options
  - i. Biodiesel fuel
  - ii. Price risk management
- f. Electrical Supply Options
  - i. Configuration of a second high voltage supply. Utilize 138kV study results, and develop further as required
  - ii. Wind electrical purchase contracts
  - iii. Second electrical production facility
  - iv. Photovoltaic technology
- g. Thermal/Steam Energy Supply
  - i. Second steam plant facility
    - 1. Emergency or peak use plant
    - 2. Auxiliary plant for heating only
    - 3. New main plant (Abbott relegated to backup)
    - 4. Connections strategically placed within the distribution system for temporary or emergency steam boilers
  - ii. Distributed thermal storage (heating)
  - iii. Central thermal storage (heating)
  - iv. Distributed geo-thermal heat pump energy recovery (cooling and heating)
  - v. Steam to hot water conversion, including the necessary changes to optimize production and campus distribution infrastructure
  - vi. Investigate potential opportunities to utilize low grade heat from Abbott Power Plant, Chilled Water Plants and other sources.
- h. Centralized Hot Water Distribution System
  - i. Evaluate the potential for a Central Hot Water Distribution system utilizes heat pumps
- i. Process Water – Make-up and Effluent associated with Energy Production
  - i. Assess demand for various alternatives
  - ii. Identify associated cost with escalation

- j. At a minimum, identify 3 scenarios to meet goals identified by iCAP. What alternative fuels should be used to replace coal and what are the impacts of these fuel sources on existing equipment, infrastructure and delivery mechanisms.
  - i. Identify cost for additional scenarios as optional
  - ii. Identify production and distribution improvements to increase efficiency
  - iii. iCAP to be updated bi-annually, 2012 is next update, consider possible input from this master plan
4. Recommended Implementation Strategy Plans – Master Plan
  - a. Identify implementation in terms of construction projects necessary to meet load requirements
  - b. Identify configuration changes and infrastructure that will be necessary, at what time, and at what cost, for any alternative energy fuel sources recommended
  - c. Provide clear schedule and timeline for project implementation
  - d. Provide opinion of probable construction cost of projects identified for planning purposes

**Schedule:**

The goal is to have the Abbott Power Plant – Utilities Production & Distribution Master Plan completed by January of 2013. The Planning team expects that the Professional Services Consultant will conduct progress meetings on a monthly basis (or as mutually agreed upon) through the course of this effort. However, the following milestones, presented in no particular order, should be viewed as minimum key points in the schedule of this project for meetings to be held with the appropriate stakeholders:

- Completion of Utility Business Model Analysis
- Completion of Existing Infrastructure and Risk Analysis
- Completion of Load Analysis Including Growth Scenarios
- Stakeholder Involvement meetings
- Completion of Alternative Energy Options Analysis
- Completion of iCAP Goal Scenario and Impacts, Systems Analysis
- Completion of Cost Estimates for Planning
- Completion of Final Draft
- Final Presentation

**Total Project Budget: \$1,285,000**

**Items Available to Professional Service Consultant:**

UIUC Facility Standards  
UI Design Standards  
Feasibility Studies Completed Recently  
Asbestos Management Reports  
VFA Reports  
Record drawings and documents of production and distribution infrastructure

**Minimum List of Deliverables:**

As required to support the items identified in the scope of work above.