



Virginia Department of Planning and Budget
Project Request Justification

2006-2008 Biennium Date: July 22, 2005

A. General Information

1. Agency name: Virginia Tech 2. Agency code: 208
3. Project title: Construct Campus Heat Plant 4. Agency priority: 2
5. Contact Person: M. Dwight Shelton, Jr.
6. Contact's telephone number: (540) 231-8775
7. Contact's e-mail address: mdsjr@vt.edu

B. Proposed Project

1. Project Cost:

| | |
|---|-------------------|
| General Fund/General Fund supported debt | 17,250,000 |
| Nongeneral fund | |
| 9 (c) revenue debt | |
| NGF supported 9 (d) revenue bonds | 11,500,000 |
| Total request | 28,750,000 |

2. Project cost changes:

NONE.

3. Description:

- This project has been on the university's plan since 2003, formerly titled Southwest Campus Heating/Cooling System. This emergency request will provide authorization and funding for a comprehensive heating facility to ensure campus utilities operate effectively and that campus operations are not compromised. The proposed solution is envisioned to include heat production (added source of heat equivalent to 100,000 pounds per hour of steam), an improved and enlarged distribution system (reconfiguration of lines to stop bottle necking and choking of the steam) and improvements within the existing Power House to increase efficiency of operations.
- The life expectancy of the proposed project is 60 years with proper maintenance.
- The scope of the project is based on two consultant studies regarding the required additional heat infrastructure to ensure adequate heat supply for the existing campus, authorized projects underway, and high priority new space projects on the six year plan.

- The proposed funding plan calls for \$17.25 million of General Fund support and \$11.5 million of nongeneral fund debt authorization. The funding proposal reflects state support for the Educational and General component of the university and nongeneral fund debt authorization for the Auxiliary enterprise component.

4. Project scope change:

NONE.

5. a. Approved Master Site Plan:

Yes No

If not, explain:

b. 2004-10 Capital Outlay Plan:

Yes No

If not, explain:

6. Equipment for a previously funded project.

NONE.

7. Supplement to a previously funded project.

Yes. This project will supplement a nongeneral fund planning project authorized in the 2004 session (project code 17120).

C. Project Justification

1. a. Existing condition:

- The existing Power House is located on the northeast quadrant of the Virginia Tech campus. The building was originally built in 1928. Several building additions were completed over the years with the last addition completed in 1998. In the past, most of the academic construction has been confined to the north campus. The availability of building space in the north campus area has declined to the point where it has become necessary to locate new facilities in the southwest quadrant. The distribution distances involved from the existing Power House to this area of campus is a challenge to the heating system.
- A study by RMF Engineering (a recognized leader in utility systems) concluded that the university's heating plant is projected to be out of firm capacity (operating beyond recommended limits) for a normally cold winter by 2007 and would be out of firm capacity for a very cold winter by late 2005 based on the schedule of new construction projects underway. To stop a collapse of the heat system once capacity becomes strained, the university would have to selectively reduce heat load or take buildings off the system that would shut down major portions of the campus until warmer weather returned. The negative impact to the university's mission would be significant.

- The campus heat source and delivery circumstances are now considered an emergency by the university's administration. The university has leased a temporary heat source for winter 2004/2005 through 2007/2008 to supplement the system until a permanent solution is complete. This temporary measure was implemented to ensure the university does not lose heat to the residence halls, classrooms, and research laboratories for the next several winters while a permanent solution is implemented. This temporary solution is not an optimal situation for the campus or the university's employees and students, and action on a more permanent solution is imperative.

Higher Education Only

b. Facility Condition Index:

FCI _____

c. Space deficit:

Yes No

2. Programmatic information:

- In 2001, the university anticipated needed improvements to the heating system with the planned growth in instructional and research programs and facilities and initiated an evaluation of its heating plant. The initial review was general in nature and indicated that improvements to the heating plant would be needed over the long term. Subsequently, a more thorough evaluation completed November 2003 by RMF Engineering (a recognized leader in utility systems) concluded that concerns with capacity and reliability of the existing heating system are more acute than originally envisioned and will occur more quickly than previously thought.
- The study by RMF shows that the heat plant's ability to supply the required capacity will drop by about 35 percent when the build-out of facilities currently under design and construction is complete. This supply drop will cause significant negative impacts for the occupants of the buildings and to the existing heat plant. The consequences include a decrease of heat at the points furthest from the current central heat plant (cold classrooms and laboratories) followed by a "choking" of the system and a regionalized failure of the system. The choking effect of the system would place excessive demand on the boilers that could cause their failure.
- With this information, the university requested state support for planning funds for the project in the 2004-2010 Six-Year Capital Plan. The planning project was appropriated with a 100 percent nongeneral fund authorization in the 2004 session because there were no General Fund resources available to support the appropriate fund split for the project. Because of the critical nature of the heat system, the university committed to start the project planning with nongeneral funds prior to availability of state resources.
- Initial investigations into potential solutions to the shortage in heat plant capacity and distribution have indicated that the current system configuration will not support the anticipated build out of the facilities currently authorized and funded. An economic analysis is currently being conducted to evaluate the life cycle costs of expanding the existing facility, expanding the distribution system, and/or constructing a new facility in the southwest portion

of campus where the steam pressure problem is most acute. The possible solutions may also include a combination of all of these methods.

- The current steam heating system is not able to handle the added steam demand of facilities currently under construction, and this condition would have resulted in disruptions to the university operations and potential loss of valuable research if the temporary solution had not been implemented. However, as pointed out in other places in this document, a permanent solution must be sought if the university is to meet its goals in the present and the future.

3. Alignment to strategic plan:

The addition of needed heating capacity will ensure that campus utilities operate effectively and that services are not compromised. Thus, this project supports Virginia Tech's strategic plan in the areas of Research and Scholarship, Graduate Education, and Undergraduate Education by providing an optimal environment in which to conduct the research and educational activities of the institution. Furthermore, the project will install sufficient heating capacity to support the planned construction of future classroom, laboratory and research facilities included in the university's master plan and 2006-2012 capital plan for the southwest section of campus.

- The university will require additional academic and research space to reach its strategic goals. Concurrently, although less obvious, the utilities infrastructure needed to support the buildings must also be strengthened. It is essential that the utility systems for the facilities are sufficient to support the academic and research programs.

D. Options Considered

Other options considered but not selected include leasing of temporary boilers or delaying the project entirely. Adding increased heating and distribution capacity is the selected option because this is the only option that will support the current growth of the campus on a permanent sustainable basis and is also the most cost effective solution based on the life cycle cost analysis.

Leasing of temporary boilers is not a good long-term solution because the Virginia Department of Environmental Quality (DEQ) will only issue the required air permit for the operation of the boiler for a three-year period until a permanent solution is obtained. The temporary boiler cannot be on campus more than 180 days in a given year as required by law. An extension request for the continued operation of the temporary boiler is unlikely to be granted by the DEQ and thus cannot be viewed as a permanent solution under the current laws and regulations.

Delaying the project is not an acceptable alternative due to concerns with the capacity and reliability of the existing heating system. The RMF study concluded that the university's heating plant is projected to be out of firm capacity (operating beyond recommended limits) for a normally cold winter by 2007 and would be out of firm capacity for a very cold winter by late 2005 based on the schedule of new construction projects underway. To stop a collapse of the heat system once capacity becomes strained, the university would have to selectively

control the heat load, and/or take buildings off the heating system that would shut down major portions of the campus until warmer weather returned.

The university considers the project as an emergency request for funding in the 2006 session. Delaying the project beyond 2006 jeopardizes the university's mission and critical operations.

E. Project Schedule Changes:

NONE.