The UC Davis campus is served by a district cooling and steam heating system. However, 30-50% of heating energy is wasted and the system requires major upgrades to remain functional. Conversion to a hot water heating system with heat recovery chillers would: reduce operating costs; avoid unnecessary capital expenditure; decrease losses to 5-10%; save significant energy; reduce carbon and other emissions; and enable additional improvements. The conversion is necessary for UC Davis to meet its climate action goals.

We developed a financial model and investigated methods of financing the conversion, which is estimated to cost $111M to $164M in capital expenditure (compared to $98.5M to maintain the current system).

The project will likely require varied financing. Below are several financing approaches.

Public-Private Joint Venture
Joint venture between a public entity and a new private corporation. The public entity pays for services operated and provided by the joint venture, which gains access to capital while using a utility revenue model, with variable energy fee and fixed capacity charge.

Case Study: Toronto needed capital to improve its water supply, providing an opportunity to enhance its district heating and cooling system. Enwave was formed by Toronto and the Ontario Municipal Employees Retirement System. Enwave used the free cashflow of its revenue stream, its asset value, and EBITDA to value the corporation and raise capital. It undertook a $200-$250M project, reinvested margins, and was eventually purchased for $475M.

Energy Savings Performance Contracts (ESPCs)
ESPC (Energy Service Company) installs system and guarantees energy savings to the customer. Infrastructure improvements are owned by the customer and installed with little upfront cost (Kim et al. 2013).

Case Study: Energy efficiency upgrades at Oregon State University’s Hatfield Marine Science Center cost over $300,000 but provided annual energy savings of over $15,000. University paid with energy savings, which were guaranteed in ESPC by partner (Oregon Department of Energy 2004).

Energy Services Agreements (ESAs) and Managed Energy Services Agreements (MESAs)
Project developer arranges for installation by an ESCO and coordinates capital investment. The developer owns, operates, and maintains equipment during the term of the ESA. Customer pays for energy savings as a service. In a MESA, a project developer owns the energy efficiency equipment and serves as liaison between the customer and the utility. MESAs can have varying arrangements for how energy savings can accrue to the customer.

Developers are incentivized to maximize energy savings (Kim et al. 2013).

Case Study: Drexel University upgraded fume hood controls and replaced a central chiller plant through MESA with SCIenergy, Mitsui USA, the Pennsylvania State Treasury, Blue Hill Partners and others. Project cost $6.5 million and allows upgrades to be paid through savings on university utility bills (SCIenergy 2016).

Student Fees and Revolving Loan Funds
Student fees are a powerful source of funds that empowers students to fund major, campus-wide, projects and fund revolving loan funds where a portion of savings from projects are reinvested into the fund (Campus InPower 2009).

References