Master Plan Committee Minutes - 06/27/2022

Location:

Virtually on Microsoft Teams

Participants:

Anglea Nielsen, Donna Resiser, Mari Strombom, Nick Christensen, Mary Pedersen, Santiago Di Pietro, Tom Biedscheid, Cody Frye, Blanche Hughes, Tamara Alexander, David Hansen, Jessica Kramer, Kristi Buffington, Mike Rush, Julia Innes, Tracey Abel, Devan Durand, Dave Bradford, Shelly Carroll, Terry Adams

Guests for agenda item 1: Jason Suckow, Larry Maybon, Natalie Erhart

Guests for agenda item 2: Carol Dollard, Gene Ellis

1. Foothills Campus National Wildlife Research Center (NWRC) Bioarchive Storage Facility (Approval Request) – David Hansen & Jason Suckow

A. Within Foothills Campus property line (indicated by yellow dashed line on presentation), there are a couple of federal in-holdings and long-term leases and other properties like City's water treatment plant, including:
   i. CDC
   ii. Colorado Division of Wildlife
   iii. Poudre Fire - Training Facility off of Vine Dr
   iv. NWRC- accessed off LaPorte Ave from the North

B. The approx. 42-acre area was an original planned property starting in 1990, developed in 4 phases. There are 4 different lease arrangements within the 42 acres. They are held and administered by CSURF on behalf of the Board of Governors. The multiple long-term leases associated within the boundary of the NWRC are managed in different ways and have different time allotments for the leases.

C. Entitlement for a future facility on existing approved master plan.
   i. No immediate aspiration to advance facility per acting Administrative Officer for the NWRC.
   ii. Dashed white line on presentation indicates future connector road (LaPorte to Rampart) access.

D. NWRC Requested Modification
   i. USDA request for new facility
   ii. 6,000 SF Cold storage Freezer Farm
   iii. Pre-engineered metal building
      1) Similar to recently constructed facilities on south campus in support of Facilities Management (FM) north of Johnson Family Equine Facility
   iv. Purpose – Sample storage
   v. Lease stipulates building constructed per CSU standards. FM involved with permitting and code administration.
   vi. At termination of any lease, facility would come back to Board of Governors and CSU. The most short-term lease is 17 years out, and there have been some requests to re-up the agreements.
   vii. Currently, utility services are provided by CSU.

1) Substantial utility corridor just to the east of proposed facility site, including utilities from CSU, City of Fort Collins and City of Loveland. Need to consider all these easements in future planning.

E. Wildlife Services' Mission: Provide Federal leadership to resolve conflicts between people and wildlife. World class lab – one of just a few in the entire world. Specialize in:
   i. Agriculture
   ii. Zoonotic Diseases
   iii. Human Health and Safety
   iv. Property and Natural Resources
   v. Endangered and Threatened Species
   vi. Invasive Species
F. NWRC Research Branch of Wildlife Services has: 160 employees, 33 PhD scientists, 17 current research project areas (like genetics, fertility, wildlife disease, rabies). Hoping to add a CWD project in fall.
   i. Approaches:
      1) Understand Behavior and Ecology of Species
      2) Develop Methods/Tools
      3) Evaluate Efficacy of Methods/Tools
      4) Assess Wildlife Damage
      5) Analyze/Model Risk
      6) Develop Adaptive Management Plans
      7) Transfer Technology to Others
   ii. Expertise:
      1) Animal Behavior and Ecology
      2) Wildlife Disease
      3) Genetics
      4) Economics and Human Dimensions
      5) Modeling
      6) Toxicology/Pharmacology
      7) Fertility Control
      8) Invasive Species
G. NWRC Headquarters Facilities
   i. 43-acres on CSU Foothills Campus
   ii. Indoor and outdoor animal holding pens
   iii. 1-acre flight pen
   iv. Rodent buildings
   v. Specialized laboratories
   vi. Simulated natural environment rooms
H. Secured Facilities
   i. Perimeter Fence around facility
   ii. 24-hour Security Guard
   iii. Security Cameras
   iv. Multi-level Security Access Points – badge to get through doors
I. Bio Archive Storage Background
   i. Congress specifically provided funding to USDA APHIS WS NWRC to expand chronic wasting disease (CWD) research effort
      1) Want to leverage funding through congress to build the bio-archive storage.
   ii. Collecting/maintaining biological samples will be critical in fulfilling research needs

iii. Supports other biological sample/storage efforts such as SARS, HPAI, ASF, etc.

J. Bio Archive Storage Proposal - the proposed structure is slab with a prefab building to house approx. 100 ultra-cold freezers. Not designed to be an office, but designed as a warehouse to store bio-archived samples from CWD and other things.
   i. Establish specialty warehouse to store multiple ultracold freezers & contents
   ii. APHIS will complete project & manage it as owned space
      1) They will utilize their own funds.
      2) Will work with FM to ensure they are following CSU guidelines and standards.
   iii. Resource for other APHIS Programs, State and University partners & collaborators
   iv. Increase overall research opportunities

K. Ability to provide utility service to the facility, have in planning and can accommodate it.

L. Next Steps:
   i. Engage APHIS design team with CSU FM staff (July 2022)
   ii. Federal procurement process (Late summer 2022)
   iii. Modify lease agreement with CSURF (Pending)
   iv. Larimer County Planning Commission approval required prior to construction (Late Summer 2022)
   v. Construction (Fall 2023)
   vi. FM staff supports the project and a modification to the Foothills Campus Master Plan; recommends approval of the project.

M. Tamara Alexander asks in chat, "Is it fully funded?"
      1) Yes, fully funded by USDA Wildlife and Animal Services.
      2) No CSU funding associated with the project.

N. Mari Strombom motions for the approval of NWRC master plan update to accommodate the construction of the USDA BioArchive Storage Facility.
   i. David Bradford seconds the motion.
   ii. No opposition from Master Plan Committee; everyone is in favor. This is approved by MPC to advance it further.

2. District Energy Master Plan (Informational) – Carol Dollard & Gene Ellis

A. Where we are today
   i. We have a reliable system for heating, cooling, hot water, and process loads.
      1) District system refers to what is provided on east side of main campus.
      2) West half of the steam utility retired. Chill water utility only extends to Scott Bio Building and Visual Arts (Meridian).
   ii. District system efficiency is due to density of buildings and diversity of load across buildings
      1) Need to be maintained and refurbished
   iii. Coming up on significant equipment replacement cycles in both utilities.

B. Need to consider
   i. Existing Conditions
   ii. Sustainability Goals and Environmental Regulations
   iii. Feasible Options
   iv. Life Cycle Cost Analysis
   v. Proposed Locations of Infrastructure
   vi. Critical Timing Milestones

C. History of Heating on Campus

i. The first coal fired boilers were installed around 1900.
ii. In the 1960s, the newly installed boilers burned natural gas instead of coal.
iii. Coming up on first major boiler replacement in steam utility (boiler installed in 1960).

D. History of Cooling on Campus
i. The district cooling system is much newer.
ii. Around 2000, began to phase out old refrigerants in chiller equipment across Main Campus.
iii. That system has grown and now serves 53 buildings.
iv. Chillers are not as long lived as district heating equipment. (These last about 30 years.)
v. District Cooling Plant #1 will reach end of life in about 2030.
vi. District Cooling Plant #2 will reach end of life in about 2040.

E. State of existing System - Equipment reaching end of life and critical decisions need to be made for:
1) Boiler #3 is past normal end of life (> 60 years old)
2) Steam and condensate piping is aging and will need significant refurbishments / replacement
3) Chillers at Plant #1 are approaching end of life

F. Air Quality Issues: Impacts to Region
i. Air quality of front range is deteriorating. Impacts Rocky Mountain National Park.
1) Front Range (from approx. Wellington to Colorado Springs) is currently designated "SERIOUS" non-attainment for ozone. It means we are under stricter air quality emissions limits than if we were outside of that zone.
2) Anticipated to be elevated to "SEVERE" before Sept 2022 because of very poor air quality in recent summers.
3) Limits emissions from stationary equipment (the boilers we use now to heat campus).

G. Air Quality Issues: Impacts to CSU for "SEVERE" designation are:
i. Very low limits on NOx emissions for new sources such as boilers at CSU.
ii. If CSU exceeds its permitted emission limits, we will be subject to New Source Review permitting process.
iii. Requires CSU to install expensive, continuous emission monitoring systems on other people's equipment in this region.
iv. For larger boilers, regulations will require expensive and time-consuming studies to install new equipment including air quality monitoring.
v. Monitoring could show that existing boilers do meet applicable emission limits.
vi. Also impacts all of our other combustion devices (smaller boilers, generators, etc.).

H. Climate Impacts
i. CSU committed to be carbon neutral by 2040
1) Currently emissions from natural gas combustion accounts for 35% of CSU's total Greenhouse Gas (GHG) emissions.
2) The district energy plant alone makes up the majority of CSU's natural gas-related GHG emissions.
3) Electricity is currently the largest GHG emissions at 51%.
ii. CSU and the regional utilities have all committed to 100% renewable electricity by 2030
1) Thus, by 2030 CSU's emissions related to electricity are expected to be zero – cutting CSU's total emissions in half.

2) If we keep with the "business as usual" system, natural gas is estimated to be nearly 75% of GHG emissions in 2030.
3) Converting to a different District Energy system will shift significant heating and hot water energy use from natural gas to electricity – substantially reducing GHG emissions.

I. CSU's Greenhouse Gas Emissions Trends (per Million GSF)
   i. Scope 1 – Items like the heating plant and other natural gas combustion, cars we own, agriculture we do.
      1) Scope 1 emissions have been very hard to reduce.
      2) The only reduction in scope 1 is the increase in efficiency as we add more bldgs.
   ii. Scope 2 – Electricity
      1) Headed to zero in 2030.
   iii. Scope 3 – travel, commuting
      1) Trending toward smaller values.

J. Analysis of Existing District Energy System
   i. FM staff started analysis of the district energy system in 2018.
   ii. FM staff researched other universities' systems, new tech options and are keeping up-to-date of the ever-changing regulatory environment
   iii. In 2021, FM engaged Affiliated Engineering for a feasibility study with following parameters:
      1) Main Campus east of Meridian Avenue was evaluated (covered most of the buildings served by the district systems)
      2) Campus growth was included (based on the Campus Master Plan)
      3) Existing building energy efficiency was considered fixed
   iv. Result is a 60-year Life Cycle Assessment of district energy system

K. District Heating Master Plan Projection for 2024 (Results of District Energy Master Plan completed in 2012)
   i. Current reality has aligned closely with this projected map.

L. 60-year Life Cycle Assessment Options
   i. *Option 1:* Business as usual (not really a good option)
      1) Replace Boiler #3
      2) Refurbish / Replace steam and condensate piping
      3) Replace District Cooling Plant #1 and #2 with standard equipment (chillers, pumps, etc.)
      4) Lower capital cost and a higher operational cost
         a. The $158M BAU investment includes a $22M boiler replacement project for 2025 and approximately $30M in 2030 for a conventional chill plant #1 replacement. The remaining $106M is capital renewal spread over time. *Based on the feasibility study's budget opinions, using 2020 dollars
      5) Business as usual impacts
         a. We will not achieve carbon neutral targets without significant investments in offsets (which is neither a fiscally nor environmentally sustainable strategy)
         b. We can choose business as usual; however, we could be forced on a different course by environmental regulation at very high costs in a tight window of time
   ii. *Option 2:* Combined heating and cooling system with Building Airside Energy Recovery (CHC + BAER)

1) CHC with hot and chilled water distribution system, fueled by heat recovery chillers and supplemented by new ultra-low NOx natural gas boilers
2) Includes building airside energy recovery (BAER)
3) Heating and cooling loops will be connected to large multi-story insulated tanks that will store the energy to serve peak loads and avoid running equipment during times of high electricity cost
4) Option 2: CHC + BAER Requires Capital Investments in the Next Decade
    a. Between now and 2030, the following capital investments will be required to convert to the CHC + BAER system:
        A. Install 2 new ultra-low emissions boilers at District Heating Plant = $22M*
        B. Replace steam and condensate piping with hot water supply and return piping, and replace steam converters with heat exchangers in buildings = $104M*
        C. Heat Recover Chiller Plant (replace District Cooling Plant #1) and thermal energy storage tanks = $54M*
        D. This $180M total investment between now and 2030 is most of the $195M life cycle capital cost for this option. This gives some perspective on how front-loaded the costs are for this option.
        E. * Based on the feasibility study's budget opinions, using 2020 dollars
5) Option 2: CHC+BAER Requires Upgrades to the Campus Electrical System
    a. Switching from natural gas to electricity for the majority of heating and hot water on campus will require upgrades to the campus electric system
    b. Based on agreement with City of Fort Collins' Utilities, the Main Campus has the capability to grow electric load up to 30 MW (existing peak loads are just under 20 MW)
    c. The feasibility study does not show the campus exceeding the 30 MW limit.
    d. However, individual circuits within the campus are expected to require upgrades.

M. Relative carbon emissions reductions compared to Business as Usual
    i. Number in parenthesis (46%) is reduction in greenhouse gas emissions compared to business as usual (0% reduction as baseline). Could add on:
        1) Building airside energy recovery (71%)
        2) GeoX (81%)
        3) GeoX & BAER (99%)

N. Life Cycle Cost Analysis
    i. Option 2 has a bigger capital cost, but the natural gas use goes way down yet electricity doesn't go up for option 2, so we are doing it more efficiently and with a cleaner resource.
    ii. The first thing to do is replace the boiler for both option 1 and option 2.
        1) With option 2, as we complete the transition, we will just use the boilers less, and they will provide resiliency. For example, if there's an electrical outage on a cold night, we could still heat campus.

O. Environmental Regulations and Life Cycle Costs
    i. These regulatory risks have so much uncertainty that they are difficult to quantify; therefore, they are not included in the life cycle cost analysis

ii. However, regulatory issues have the potential to add a great deal of complications and costs to the "Business as usual" option.
iii. The biggest regulatory risk is that the "Business as usual" option has so many potential regulatory barriers and unknown costs that it could be unattainable Proposed Locations

P. Heating Plant Location
   i. All the equipment replacement/modifications will be interior to the building, nothing outside will change. Will have to get some big equipment in and out, so that will be visible, but the finished product will look the same as now.
   ii. District Cooling Plant #1 Location
      1) Plant will be removed and another building in its place – taller but less conspicuous.
   iii. Motorpool Parking Lot – east of District Cooling Plant #2 location
      1) Building deconstruction and program relocation
      2) New facility construction, includes 2 thermal energy storage tanks and pumping facility

Q. Timing Milestones: In parallel with District Energy Master Plan
   i. Efforts to improve the efficiency of all campus buildings should continue and even accelerate – to ensure that the District Energy system is not larger than necessary
   ii. Efficiency improvements reduce both operating costs (energy bills) and capital costs (the size of the District Energy system)
   iii. Adopt a policy of "No New Combustion" in campus buildings
   iv. Build any new buildings to the highest standard for efficiency
   v. All new buildings should be built to accept the new hot water district energy system

R. Timeline of Steps Required Between Now and 2030
   i. 2022 - Improve existing building efficiencies, Ongoing
   ii. 2022 - Design "Big 3" for District Energy compatibility, Start NOW
   iii. 2023 - Replace steam piping with hot water piping campus-wide (Requires 7 years)
   iv. 2024 - Replace Boiler #3 with 2 new ultra-low emissions boilers, Before 2025
   v. 2025 -2030 - Install 2 thermal energy storage tanks, Before 2030
   vi. 2030 - Replace District Cooling Plant #1 with heat recovery chiller plant, 2030

S. Princeton video shared in Teams chat: https://www.districtenergy.org/blogs/district-energy/2022/06/21/geo-exchange-heat-pumps-at-princeton-university

T. Comparison of Options
   i. Option 1: Business as Usual - *Pros*
      1) Aging boilers and distribution system equipment still needs to be replaced but lower near-term capital investment
      2) Lower visual impact to the campus
   ii. Option 1: Business as Usual - *Cons*
      1) Higher lifecycle costs
      2) Higher air quality impacts - Most likely will result in new regulatory processes and costs associated with air quality issues. Costs are high risk and unknown.
      3) Higher carbon emissions - Probably cannot reach 2040 carbon neutral goal
      4) Higher operating costs because of system inefficiencies
   iii. Option 2: CHC + BAER system – *Pros*
      1) Lower life cycle costs
      2) Lower air quality impacts

3) Lower carbon emissions
4) Every new building and building renovation can claim the energy efficiency of the CHC system for LEED
5) Strong resiliency for the campus

iv. Option 2: CHC + BAER system - *Cons*
1) Requires significant capital investments in the next 8 years to initiate the transition
2) Requires upgrades to the campus electrical system
3) Higher visual impact – particularly the thermal energy storage tanks

U. Question - What are we doing on Foothills and South Campuses, as we think strategically about emissions and how we plan delivering utilities for two separate campuses that can't feed into this larger system?
i. On South Campus, there is a district chill plant. Primarily for heating, each bldg. has a boiler or share boilers.
ii. As we buildout these campuses, we do need to have these conversations. It takes a certain density of buildings for these systems to make sense.
iii. At Foothills Campus we just installed a district chilled loop at the IDRC Complex. Foothills Campus may stay more individual and do smaller district systems as the density makes sense.
iv. Gene is working with Tetrad to do something like they just presented for main campus but on a smaller scale on south campus, just inside the Vet Teaching Hospital and addition to get the efficiency in the building up.
v. The tool for main campus can be modified for other campuses, but right now we are focused on getting main campus ready.

V. Comment - Planning for the infrastructure of these locations is done with consideration of how they tie into adjacent facilities that exist, trying to minimize impacts. Even though it will be an impactful buildout, Facilities Management is looking at how to minimize tearing up green spaces and leveraging streets that may need work done on them already. Considering how to collaborate and minimize collateral damage within the context of campus. FM meets frequently with the City of Fort Collins. The upgrade of electric is top of mind in conversations with utility partners.

W. Carol Dollard is often asked - Can you use existing steam tunnels?
i. They have to run in parallel until the hot water lines are in place and the system to feed the hot water. Need the redundancy for the buildings.

X. Question - What are next steps with approvals and the Board of Governors?
i. Conversation with Lynn Johnson as a strategy to move forward.
ii. Recent Board of Governors, Lynn Johnson presented plan. Approved at that meeting as a strategy.
iii. David Hansen foresees this topic coming back to MPC in future for discussion of the redevelopment at motorpool.

3. Glover, Clark, Biomedical Discovery Center (Physiology site) – Mike Rush

A. Anticipating Glover site in Phase 2 could accommodate a bldg. as tall as 8 stories; 5 – 5.5 stories at Physiology site; 4 story addition to Clark bldg. Intent to leverage the remaining sites on campus more robustly in terms of vertical height of buildings.

B. Funding
   i. $80M Glover Phase 1
   ii. $135.2M Clark Total development cost – identified as three phases
      1) Phase 1 funding accommodated $8M from state of Colorado and $30M in cash spending authority – in process of working with central administration for plan of finance and develop RFP.
   iii. $115M Biomedical Discovery Center– 1 Phase project
   iv. Don't know exactly where biomedical discovery or Clark will land; tying all these projects into the university space assessment and utilization study and that will start to inform future phase funding for Clark and amount of money request from state going forward.
C. Glover Site Redevelopment Analysis
   i. 125,000 SF of new teaching lab, laboratories, office and classroom space
D. Clark Building Site Redevelopment Analysis
   i. Contemplating significant additions to northsides of A & C Wings. Promote idea that B wing could be deconstructed to open up new contiguous green space and tie academic spine into Monfort Quad.
E. Biomedical Research Center Site Development Analysis
   i. Originally thought may be redeveloped in 2 phases, but now only 1 phase
F. RFP Logistics – Anticipating all projects will be Design Build with GMP.
   i. Includes program planning or program plan verification, design, construction, through occupancy and warranty period with one continuous design build firm.
G. Next step is to identify logistical challenges associated with construction
   i. Academic spine is heavily populated
   ii. Considerations for staging and lay down areas
   iii. Keep everyone safe on campus
H. Working with College of Business and Housing & Dining Services on advanced planning for site by Rockwell Hall to inform capital campaigns for what is proposed as a new entrepreneurial center. Potential adaptive reuse of Allison bldg. More to come.
   i. How to tie into Glover, Clark, Biomedical Discovery Center site redevelopments into the phase 1 of the long-term utility infrastructure master plan. Make sure mechanical systems are adaptable and adaptive to the utility master plan.

4. Campus Planner Selection Update – David Hansen

A. In the process of reviewing the three finalists and doing background checks. Tom Satterly should be able to make an offer within a couple of weeks.