

1. Program/Project Title: **National Western Center - P3 Project**
2. Name and Location of District Energy System or Project: **National Western Center, Denver, CO**
3. Name of System Owner: **City and County of Denver**
4. Name, relationship to the project/program, address, phone number & email of the person submitting the application:

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5. Executive Summary

In 700 words or less, summarize the project/program, demonstrating the key aspects of what was done and the overall benefits.



In 2015, the National Western Center Master Plan was released, laying the groundwork for the redevelopment goals surrounding the National Western Complex and the Denver Coliseum in Denver, Colorado. The redevelopment project was envisioned to convert the campus—situated on 94 acres and host to the annual National Western Stock Show—into a 250-acre development used throughout the year as an economic, tourism and entertainment hub.

The NWC project was borne out of a 2012 agreement signed between major partners including the City and County of Denver, Colorado State University, the Denver Museum of Nature and Science, History Colorado, and the National Western Stock Show Association.

The project seeks to grow the National Western Stock Show for the next 100 years as the state’s largest agriculture convention and ultimately position the City of Denver as a global player in 21st century agriculture.

In 2019, **CenTrio** partnered with AECOM to form EAS Energy Partners (EAS), a consortium comprised of CenTrio, AECOM, and Saunders Construction, Inc. to design, construct, and operate an integrated campus energy system for the 250-acre complex. CenTrio provides financing, day-to-day system operations, and ongoing lifecycle maintenance for this project. AECOM and Saunders Construction oversee and manage design and construction, including the coordination of all parties throughout all phases of the project, from implementation to project turnover and final completion. The NWC district energy system will be about 4 MW, making it the largest sewer-heat recovery district energy system of its kind in North America.

As lead developer and O&M provider for this \$1-billion project, CenTrio is responsible for overseeing the design and construction of this greenfield development project. The redevelopment of the National Western Centre complex will ultimately transform the complex into a hub for agriculture, food innovation and heritage. CenTrio manages the design-build process, development of the O&M strategy and will provide 100% O&M services to the City of Denver under a 40-year agreement.

CenTrio's services will allow the complex to be reconnected to its surrounding neighborhoods and will allow for the transfer of heat between the sewer system and main campus buildings via a closed distributed loop. The redevelopment project will also include solar PV systems to be erected in community solar gardens.

6. In 300 words or less, explain how the project/program is innovative and unique.

As a greenfield development project, the redevelopment of the National Western Center complex will ultimately transform the complex into a hub for agriculture, food innovation, and heritage in the local Denver community. This project is extremely innovative for three reasons: the size of the project, the innovative technology, and the various impacts on the local community.

The first reason this project is innovative is because of its sheer magnitude. With a capacity rated at 3.8 MW, this system is the largest sewer-heat recovery system in North America, and the nation's largest wastewater energy district.

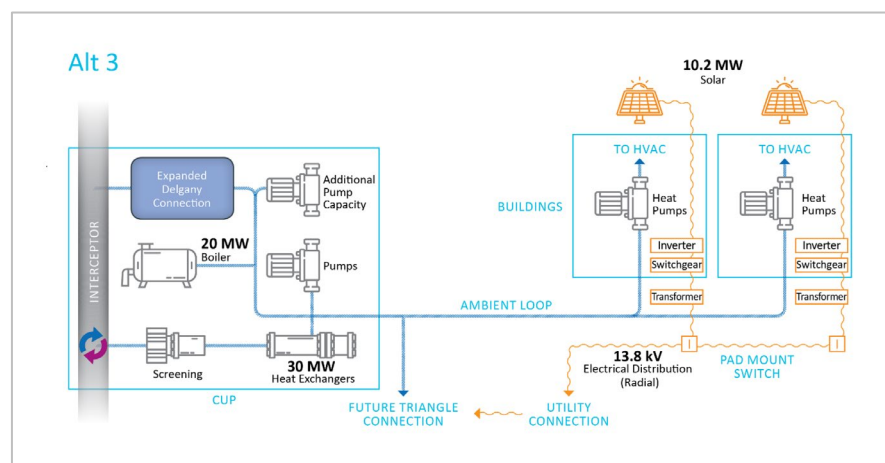
The second reason this project attests to innovation is because it utilizes sustainable, innovative technology. The utilization of heat from existing sewer pipes is an innovative technology which represents a trailblazing opportunity as a fully sustainable form of energy. The sewer heat recovery system has over 12 MW heating and cooling capacity and will source nearly 90 percent of its heating and cooling from the sewer heat recovery —rather than burning fossil fuels. The project reduces the overall carbon footprint by 70%, water consumption by 80% and emphasizes innovation, operational excellence, and academic collaboration. Using this system, NWC will avoid emitting an estimated 2,600 metric tons of carbon per year — the emissions equivalent of driving a car 6.6 million miles.

The third reason the NWC project is unique is because it will have a tangible impact on the local community. CenTrio's services will allow the NWC complex to be reconnected to its surrounding neighborhoods. The project also includes solar PV systems to be erected in community solar gardens. The following community collaboration strategies are being implemented at NWC.

Proposed Strategy	Intended Beneficiary	Frequency	Timing
Public Information Campaign (including web/text/social media updates, community open house meetings, signage, personal contacts)	Public Agencies, Private Developers, and General Public	Ongoing	Throughout the PDA, design and construction phases
Interactive Exhibit – “Power of Poo” and “Power of the Sun”	K-12 Students and General Public	One-time development	Designed during design phase, Built during construction
Design the central energy plant and underground sewer/ambient loop with view “portals” to demonstrate the path to power generation	General Public	One-time development	Designed during design phase, Built during construction
Educational Field Trips/Tours	K-12 Students	Twice a year	One in the fall and one in the spring for the entire term
University Internships	Five CSU Students (business, engineering, construction and sustainability majors)	Annually	Summers of 2019, 2020 and 2021
Charitable Giving Partnership/Program – Financial Contribution	Local GES citizens in need (Youth, Homeless, Low Income)	Annually	Every winter for the term
Homeless Outreach Partnership/Program – Volunteer Event (e.g., job interview training, food bank, day of service, etc.)	Homeless People in the GES Community	Quarterly	A total of 300 hours during the PDA, design and construction phases (100 hours per year)
Worknow Program Partnership – Financial contribution	Unemployed or underemployed people in the GES community	Ongoing	Throughout the PDA, design and construction phases
Worknow Program Partnership – Volunteer contribution	Unemployed or underemployed people in the GES community	Bimonthly	Throughout the PDA, design, construction and operational phases

7. With supporting data, demonstrate the improved energy efficiency benefit offered by the project/program, in 250 words or less.

The campus energy system for NWC uses advanced sewer heat recovery technology and solar PV energy. Our team’s design and operations strategy optimized the efficiency of the heat pumps within each building to reduce electricity consumption compared to initial estimates provided in the campus energy concept. Our design strategy has the massive potential to take the campus from net zero to net positive.



The system is designed to be an anchor for future system expansion to neighboring developments including the Triangle. Extending the system will reduce GHG emissions from the Triangle development compared to business as usual, thus reducing overall GHG emissions in Denver to support sustainability goals.

- 12 MW+ heating and cooling capacity
- Delivers critical services to municipal and Colorado State University buildings
- 90% of campus heating and cooling needs met by sewer pipe-sourced thermal energy
- Sewer Heat Recovery system utilization recycles energy and is the equivalent of eliminating 6.6 million passenger vehicle miles per year
- Carbon footprint reduced by 70% - Estimated 2,600 metric tons
- Over 80% water savings – equivalent of 5 Olympic-sized pools
- Removed 2-72 in. sanitary pipes overground and installed underground, enabling the local community access to a new riverfront park, including businesses and residential.
- The construction of more than 2.2 million square feet of new indoor and outdoor spaces is underway now, designed to host innovation and research labs, farmers markets, international conferences, outdoor festivals, and everything in between.

8. With supporting data and graphics, explain the financial advantages of this project/program in 250 words or less

- **Financial Advantages of the Project Model**
The P3 partnership with the National Western Center allows the City and County of Denver (CCD) to partner with a single, vested partner to fund the project. With CenTrio providing 90% equity and Saunders Construction providing 10% equity with a strong local presence in the Denver area, the partnership significantly increases the likelihood of meeting cost objectives under the P3 model compared with traditional public sector project delivery (“business as usual”) where the project is owned, managed, and financed by the government.
- **Financial Advantages related to Construction**
Our team minimizes construction costs and schedule by leveraging a phased approach to building out capacity and system expansion. Our strategy, along with our focus on optimizing solutions over their lifetime, translates to a better financial outcome than a “business as usual” approach. This transformational project established a precedent in Denver for a long-term investment model that reduces emphasis on capital cost and supports longer payback periods than developers would traditionally accept.
- **Financial Advantages related to Carbon Reduction**
Further, this partnership has the potential to accelerate net zero development throughout the Denver area. The process of working closely with architects, engineers, qualified contractors, and other industry experts will help generate interest in net zero solutions and provides a model to deliver them, further supporting Denver’s market transformation toward net zero solutions.

9. In 250 words or less, please provide any additional information about the project/program (What challenges did you face? What plans do you have for the future? How did your customer base or community react? Etc.)

Construction Challenges

We had to deliver construction during a time of extreme uncertainty-- height of the COVID-19 pandemic and amid unprecedented supply chain constraints—all while collaborating with multiple stakeholders to execute complex contracting mechanisms. The team worked tirelessly to successfully deliver the NWC project to market under 18 months, ahead of schedule.

Community Challenges & Opportunity

The local community, comprised of Globeville, Elyria, and Swansea (GES), has a rich, diverse history dating back to early mining settlements and has endured environmental and economic disparity. This project—including the NWC, Central 70 and private developments—required government agencies, and stakeholders, to work together with the citizens to see the value of a truly engaged, inclusive community.

With this in mind, we:

- Utilized local MWBE subcontracts resulting in achieving 38% more MWBE design work and 82% more MWBE construction.
- Established community engagement KPIs, including financial and volunteer support - building better relationships in the community.
- Held open houses to share the project updates, forming an increased sense of comradery
- Buried sewer pipeline running alongside the South Platte River, opening up recreational space for all to enjoy
- Established scholarships and internship programs with Colorado State University.

ESTIMATED TOTAL VALUE OF THE COMMUNITY COLLABORATION STRATEGY

Financial contributions:

Local charities partnership	TBD
Interactive exhibit – “Power of Poo” and the “Power of the Sun”	\$140,000
Workknow program sponsorship	\$25,000
Internships	\$60,000

Volunteer hours:

Local charities partnership	300 hours
Workknow program community advisory circle participation & engineer apprenticeship programming	50 hours
Educational tours/field trips	16 hours/year

Future Plans

- Fund educational exhibits, working with local partners such as the Denver Museum of Nature and Science, Children’s Museum and History Colorado.
- Wide range of community and homeless outreach initiatives, including helping residents and gain access to healthy, affordable food options in this ‘food desert’.

- Enhance plant design with large window openings and underground view portals, providing sustainability and educational opportunities to the public
- Position Denver as a global player in 21st century agriculture, helping advance knowledge of food production, safety, and expansion of healthy foods at a global scale

10. Please provide 3 to 5 attachments as images, diagrams or photographs in jpeg format with identifying captions

National Western Center Campus



CenTrio Denver – Plant Interior

CenTrio’s Sewer Heat Recover Plant uses raw sewage is used to heat and cool buildings at the National Western Center and the Colorado State University Spur campus.



CenTrio Denver – Plant Exterior

