

May 27, 2022

Julie Kennedy, Purchasing Agent
Routt County Commissioners Office
522 Lincoln Avenue, Suite 30
Steamboat Springs, CO 80487

RE: RFP 766: Facilities Energy Use Assessment 2022

Routt County Professional Service Agreement Exhibit A

Dear Ms. Kennedy,

Cadmus is pleased to present this proposal to assist Routt County Commissioners Office in developing a building energy use and electrification potential assessment of eight of its county facilities. Routt County has set out to be a leader in minimizing climate impacts and has recently adopted its own climate action plan (CAP). Routt County is interested in analyzing the current facilities to strategically develop a plan to align with the objectives in the CAP. Eliminating gas and propane use, increasing adoption of renewable or other clean energy solutions, increasing overall efficiency, and adoption of a fuel switching plan are immediate goals.

Through our proposed energy auditing process, we will help the county uncover efficiency and electrification strategies at each targeted building. Our investigation will focus on evaluating the benefit analysis of energy savings, cost savings, and carbon savings to determine the most viable measures for the county to pursue at each individual building. Our team offers expert integrated services, unbiased technical audits with customized recommendations, and extensive experience to help cities navigate the complexities of implementing climate action plans.

Cadmus will use local staff from Boulder, Colorado, to conduct the on-site meetings and building walkthroughs/assessment. Mike Kaar, as technical lead, has extensive experience in the field performing both energy audits and retro-commissioning reports. Our Cadmus team has delivered energy audits and decarbonization roadmaps for customers, utilities, states, and federal agencies.

As indicated in the RFP, we confirm receipt of Addendum 1.

Should you wish to discuss our proposal in further detail, please contact principal investigator Michael Reinhold at 617-673-7023 or by email at michael.reinhold@cadmusgroup.com.

On behalf of the Cadmus team, thank you for your time and consideration. We look forward to supporting Routt County Commissioners Office in this important work.

Sincerely,



Boulder

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Cadmus Headquarters

100 Fifth Avenue, Suite 100 Waltham, MA 02451 Tel (617) 673-7000

cadmusgroup.com

CADMUS

Terry Fry
Senior Vice President





Proposal for
RFP 766: Facilities Energy
Use Assessment 2022

May 27, 2022

Prepared for:

Routt County Commissioners Office

522 Lincoln Avenue, Suite 30

Steamboat Springs, CO 80487

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Approach to the Project and Cadmus Experience

Cadmus is an industry-leading consultancy specializing in energy program research and evaluation. For over 30 years, we have supported cities, utilities, and state agencies in their efforts to save energy, lower energy demand, and transition to promoting clean energy solutions.

Established in 1983, Cadmus employs approximately 550 employee-owners in its six major practice areas: energy, built environment, natural environment, health, climate, and sustainable transportation. Our clients include energy and water utilities, federal and local government agencies, and nongovernmental organizations throughout North America and Europe. Our multidisciplinary staff of utility resource planners, evaluators, economists, engineers, financial analysts, and statisticians offer demonstrated expertise in providing our clients with comprehensive solutions to complex problems.

Cadmus has extensive experience conducting research to determine the actual energy savings of measures, whole-building initiatives, and behavioral modifications. We have conducted countless measure analyses through program evaluations, potential assessments, end-use and point-of-use metering, cost-effectiveness calculations, pilot projects and emerging technology assessments, and utility planning engineering support.

Cadmus has provided quality assurance and technical support and has developed measures for technical reference manuals in Arkansas, Illinois, Indiana, Iowa, Maine, Minnesota, Pennsylvania, Texas, Wisconsin, and other states. Recently, we analyzed summer peak demand reduction for a comprehensive set of energy efficiency measures for National Grid.

Cadmus' team of engineers and technicians collects, reviews, documents, and analyzes the data needed to establish baseline and post-retrofit conditions, which are then used to calculate energy and demand savings, benefit/cost metrics, and non-energy benefits. We conduct on-site assessments and virtual site visits, develop energy savings measurements for a variety of measures and situations, and bring first-hand knowledge of hundreds of technologies and the full measurement and verification (M&V) process.

Our team and approach offer Routt County Commissioners Office the following benefits.

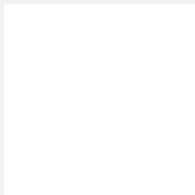
- **Integrated services in LEED consulting, portfolio performance optimization, commissioning, energy audits, sustainable building design, ENERGY STAR®, building systems analytics, and measurement and verification.** We serve building owners and managers, tenants, and developers, as well as the professionals who support them. We take the time to understand our clients and their needs then tailor advice to help them select, prioritize, and sequence enduring improvements to their buildings. We excel at identifying and applying best practices that minimize operating costs while maximizing value and stakeholder satisfaction.
- **Unbiased technical audit and suite of recommendations.** We understand the importance of not limiting the options of Routt County and providing a final set of recommendations that are in the best interest of the county. Unlike other energy service companies that may be looking for the potential of future work by implementing their recommendations, we serve as an unbiased third-party company.



- **Extensive experience helping cities navigate the complexities of implementing climate action plans and identify the best way to achieve the plan’s goals.** Our experience working on utility-scale energy efficiency programs as well as helping guide cities and government agencies to implement policy decisions will help us frame a plan for Routt County to take real action toward achieving its CO₂ reduction goals. For example, Cadmus supported the Central New York Regional Planning and Development Board and provided municipalities technical assistance services related to municipal fleet inventories, fleet electrification, wastewater facility efficiency improvements, energy conservation measures, and solar.
- **Deep technical bench for performing on-site building assessments.** Cadmus has a strong understanding of building construction design and operations. We have in-house capabilities to perform energy modeling, recommissioning, and ASHRAE audits. Our proposed project team has over 30 years in auditing, building commissioning, HVAC and controls design, energy analysis, and mechanical design. As a large clean energy consultancy, we can offer a capable team of experienced engineers and analysts to support this project as needed.

Team Qualifications and Experience

Cadmus has assembled a small team with extensive expertise in on-site engineering, auditing, and retro-commissioning. The principal investigator, **Michael Reinhold**, will provide overall technical oversight, assuring all work deliverables meet the highest standards of quality. Our project manager, **Josh Hoyng**, will be the primary point of contact. Mr. Hoyng will set clear project expectations and take ultimate responsibility for all project deliverables, oversee day-to-day activities, and monitor project progress. As technical lead, **Mike Kaar** will provide technical advisory services and oversee on-site assessments.

The following lists the proposed team, their roles for this project, and their experience. Resumes are included as *Appendix A*, along with resumes for Cadmus’ research and analysis support staff.

Name	Experience Summary and Task Assignment
Cadmus	
<p>Michael Reinhold, Principal Investigator</p>  <p>Years of Experience: 22</p>	<p>Michael Reinhold has worked in the energy efficiency industry for over 22 years and has broad experience in HVAC and controls design, project management, engineering analysis, utility energy efficiency program design, and implementation. Mr. Reinhold has managed energy efficiency portfolios on behalf of the Michigan Public Power Agency and for Consumers Energy and his work includes program and pilot design.</p> <p>Michael Reinhold, will provide overall technical and management oversight and assure all work deliverables meet Routt County expectations with the highest standards of quality.</p>

Name	Experience Summary and Task Assignment
<p>Josh Hoyng, Analyst Project Manager</p>  <p>Years of Experience: 2</p>	<p>Josh Hoyng, a member of the Energy Services' Program Evaluation & Performance team, works primarily on impact evaluations and has assisted with numerous additional projects. Prior to joining Cadmus, Mr. Hoyng worked in the building optimization division at a mechanical, electrical, and plumbing consulting firm, where he conducted on-site energy audits and was involved in retro-commissioning projects for hospitals and commercial buildings.</p> <p>Josh Hoyng, as project manager and primary point of contact to Routt County, will direct the team in all tasks, communicate regularly with the county staff, and have ultimate responsibility for project deliverables.</p>
<p>Mike Kaar, Senior Associate Technical Lead</p>  <p>Years of Experience: 17</p>	<p>Mike Kaar has 17 years of experience in energy auditing, commissioning, retro-commissioning, and mechanical design. Mr. Kaar is an expert in completing detailed energy analysis of low-cost measures, capital measures, and maintenance opportunities for various building types. He has also served as the mechanical consulting and design engineer for many projects. This varied background has been invaluable in allowing Mr. Kaar to effectively analyze and test complex mechanical systems.</p> <p>Mike Kaar will provide technical advisory services and oversee on-site assessment. He will work with Routt County personnel to ensure that all mechanical, electrical, and building shell components are captured and evaluated as well as understanding the details of how the buildings are being operated and maintained.</p>

Scope of Work

Task 1a. Gather Project Information

To initiate the project, prior to the initial kickoff meeting, Cadmus will request the following documents to prepare for on-site visits:

- Past 24 months of all utility bills for each building
- Floor plans/mechanical drawings/specifications/other pertinent information (if available) for each building
- Past 24 months of maintenance expenses
- Future budget constraints that we should be aware of in designing the model/road map

Task 1b. Project Kickoff Meeting

Within 30 days of contract award, Cadmus will schedule an in-person meeting to initiate the project and discuss how the project will proceed. During the meeting, we will introduce the project team members, confirm project objectives, establish communication channels and protocols for data transfer, schedule check-in meetings, and finalize the project approach and timeline.

Within two weeks following the meeting, we will submit a memorandum documenting the results of the discussion, decisions made, protocols established, and any issues that require resolution. This will further inform development of the work plan.

Task 2. Perform On-Site Building Envelope Assessments

Cadmus will perform eight facility audits over a three-day period. We will work with Routt County to determine the appropriate staff contacts for each building and work with each contact to schedule the on-site visit. Our on-site building envelope assessments will cover windows, doors, roof, insulation, etc. Our audit will include capturing all available technical details and dimensions of each component of the building shell. We will use the standard audit template designed by the U.S. Department of Energy.¹ See *Appendix B* for an example of an audit report.

Task 3. Conduct Energy Audits to Identified Beneficial Measures

Cadmus will conduct a building walkthrough with facility staff to discuss opportunities with staff and identify key energy consuming systems. We will complete energy audits that identify measures to reduce greenhouse gas (GHG) emissions, improve energy efficiency, and analyze cost savings. To do so, we will collect the following information:

- System layout and specific configurations of lighting, mechanical, electrical, and controls equipment
- All nameplate data and pictures of equipment and identification with location tags for report
- All available additional documentation including controls sequences
- Work with on-site staff to document the following:
 - Maintenance practices
 - Maintenance costs and concerns
 - Operating parameters
 - Any identified issues or general concerns with the building or equipment
 - Planned and budgeted capital expenditures

Task 4. Create Prioritized List of All Effective Modifications

Cadmus will submit a final report including the following deliverables:

- Description of current conditions of systems included in the audit. This will include heating, ventilation, air conditioning, building shell measures, and Lighting.
- ENERGY STAR® Portfolio Manager population or updating with building information and utilities
- Calculated energy usage for each measure and compared to all alternative measures. We will focus on measures that provide the best path to achieving decarbonization targets and will provide a list of measures that were considered but not pursued.
- Breakdown of both site and source total energy usage and carbon dioxide emissions
- General description of recommended energy conservation measures and provide a prioritized report based on energy savings, cost, CO₂ reduction and payback period. We will discuss the

¹ Office of Energy Efficiency & Renewable Energy. "Building Energy Data." Accessed May 2022.
<https://www.energy.gov/eere/buildings/building-energy-data>

identified EEM measures with the Routt County team to ensure aligned prioritization of measures.

- Inventory of types and quantities of products

Task 5. Create Model to Guide Implementation of Recommended Measures

Cadmus will present a plan and model the implementation actions to achieve the Climate Action Plan goal of 74% reduction in emissions by 2050. This model will include the following:

- Energy savings and cost analysis of proposed equipment, controls, building shell, and system design and layout improvements. Considering that the developed model considers measures into the future, cost estimates will generally be within a $\pm 20\%$ range.
- Simple payback period considering capital costs, labor costs, and energy savings of the proposed measures
- Estimated energy savings and carbon dioxide reduction with each measure. This will be done by assigning a price to carbon that will reduce the overall payback period of the measure. We will base this price off of the current federal government estimate of \$51 per metric ton. If there is more localized pricing in Colorado, we can consider this in our analysis.
- Using energy savings, CO₂ reduction, and factoring in costs, the model will prioritize measures for energy efficiency, electrification, or renewables to achieve the Climate Action Plan goals. The model will also consider the generation mix of the utility through EIA data and will be able to factor in emissions factors of the utility for published renewable energy goals.

Task 6. Prepare and Submit Final Level III Survey and Analysis Report

Cadmus will present a final written report including all items discussed above. We will also deliver a PowerPoint presentation to Routt County and be available to answer all questions regarding our findings. The final report will include the following information:

- Energy conservation measure list (quantitative energy and cost-savings estimates for each identified low-cost/no-cost and capital improvement measure. We will include annual estimates for energy use reduction, energy cost reduction, carbon reduction, as well as estimates of project capital costs and simple payback period.
- Historic energy use and utility bill analysis. Summary of any irregularities found in monthly energy use patterns, along with possible causes. Description of cost-savings potential from switching to different utility rate structures.
- Current energy use intensity (EUI) and assistance in developing target EUI. Proposed energy savings targets for the property, and corresponding annual energy cost savings.
- Systems narratives describing the HVAC and electric systems in the facility.
- Energy end-use profile outlining approximate consumption of energy use among the applicable end uses..

Task 7. Present Findings to Routt County

Cadmus will meet virtually to present final findings to Routt County. We will compile and present our findings to key Routt County personnel, and our presentation will cover the project overview, key findings, conclusions, and recommendations. The final deliverables will consist of a standard ASHRAE report presenting the energy and carbon saving measures with costs estimated, the excel spreadsheet model providing the measure mix pathway to achieve decarbonization goals (Exhibit B), and a final MS Power Point executive summary presentation.

Contract Agreement

The Cadmus team takes no exceptions to the contract terms provided by Routt County.

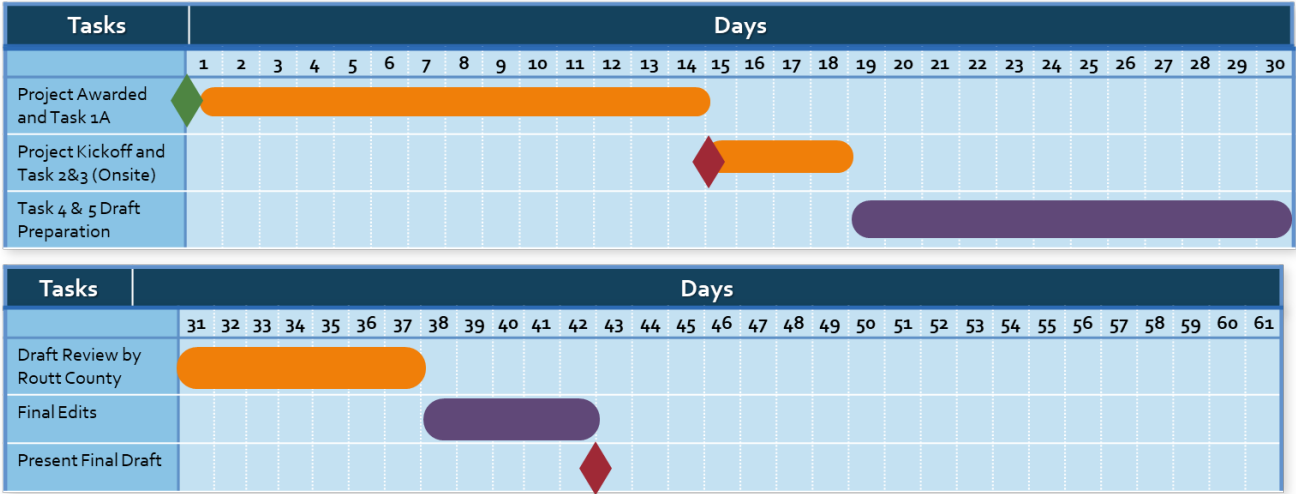
Timeline/Schedule

Figure 1 shows Cadmus' timeline for completing the tasks and providing the deliverables described in this proposal over the performance period starting from the time the project is awarded.

We based this timeline on Routt County's reporting schedule in the RFP and on our experience with similar projects. Upon receiving notice of award, Cadmus will work with Routt County to obtain all preliminary documentation in the first two weeks prior to the on-site building walkthroughs of the Courthouse, Annex, Detention Center, Fairgrounds Exhibit Hall, Road and Bridge District 1 shop, Road and Bridge District 2 shop, and Road and Bridge District 3 shop. We scheduled three full days for building walkthroughs and interviews to gain an understanding of operations and maintenance. In addition to the site visit, Cadmus plans to have 3 additional meetings via MS Teams including a kickoff meeting with staff to review project, a meeting to review recommendations and draft report, and a final meeting to present final report with MS Power Point presentation.

After the walkthroughs, we will take about one month to pull together our energy measures, recommendations, and CO₂ reduction model and then to prepare the draft report for Routt County's initial review. Upon review, we will make final edits in a couple of days and be prepared to deliver the final report as well as make ourselves available for the final presentation.

Figure 1. Proposed Cadmus Timeline



Pricing Breakdown

Task	Hours	Cost
Kickoff/Planning/Management/Meetings	30	\$5,270
On-Site Assessment	34	\$9,810
ECM Development	36	\$6,940
Model Development	76	\$14,760
Prepare Report	36	\$6,358
Total	212	\$43,138

References

Cadmus has conducted similar work for dozens of clients. The following example projects reflect various project sizes and highlight the elements most relevant to the proposed Routt County facilities assessments.

Wisconsin Focus on Energy		
Large Industrial Program Evaluation (2011-present)	Project Relevance:	
	✓ Complex Engineering Analysis and Savings Estimates	✓ Building Modeling
	✓ Large and Complex Engineering	✓ Existing and New Construction
		✓ Measurement and Verification
<p>Focus on Energy has sponsored Wisconsin’s statewide energy efficiency and renewable resource programs since 2001. Cadmus conducts EM&V activities, including technical audits, energy modeling, metering and measurement, technical plan reviews, and engineering analysis. Cadmus has evaluated and consulted with the state utility commission on just about every type of commercial and industrial facilities. As part of this project, Cadmus evaluates Wisconsin’s large industrial offering and agriculture offering. This includes evaluating the largest project in Wisconsin history, a biogas project that will process manure sourced from multiple locations via anaerobic digestion (AD). The resultant biogas will be upgraded to renewable natural gas (RNG) and injected into pipeline an existing gas pipeline. The process will also produce recovered fiber, liquid fertilizer, and cleaned water. The project is expected to produce 6 million therms per year and cost over \$100 million. This is also the largest incentive provided by Focus on Energy and expected to be \$10 to \$15 million.</p>		
McCormick Spice Energy Audit		
ASHRAE Level III Energy Audit and Support (2016)	Project Relevance:	
	✓ Energy Audits	✓ Measurement and Verification
	✓ ASHRAE III	Energy and Gas Savings
<p>Cadmus conducted a four-day site visit of the McCormick Hunt Valley Plant. The objective of the report and analysis is to identify, evaluate, and recommend—through analyses of industrial plant’s operations—any opportunities to conserve energy, minimize waste, and reduce overall costs of operations. Cadmus installed power meters, conducted spot measurements, took infrared pictures and flow readings, and had extensive discussions with the facility on opportunities for energy efficiency. The energy audit resulted in 21 recommendations totaling 6.4M kWh in savings opportunities, which represented 30% of electrical energy use at the facility. Cadmus supported the project with implementation of some measures at the facility once the energy audit was completed.</p>		
Energy Trust of Oregon		
Large and Complex Evaluation (2016-Present)	Project Relevance:	
	✓ Large and Complex Projects	✓ Building Modeling
	✓ Measurement and Verification	Full cycle project evaluation
<p>Cadmus evaluates Energy Trust’s large and complex industrial program, which includes the largest and most complex projects in the Energy Trust portfolio. We perform a live evaluation on these projects, meaning Cadmus works hand in hand with Energy Trust and the Program Delivery Contractors from project inception to completion to develop measurement and verification (M&V) plans, collect trend data, and monitor progress of the implementation.</p>		

Client Name: Consolidated Edison	Project Name: Commercial and Industrial Measurement & Evaluation
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Contact Name: Paul Kenline	Phone, Email: (212) 460-4211, kenlinep@coned.com
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Cadmus Role: Third-Party Engineering and Technical Services Provider	Contract Amount: \$3,100,000
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Cadmus provides third-party engineering services for ConEdison’s Demand Management program for C&I and multifamily buildings. For each project, we perform desk reviews, develop M&V plans, conduct site visits, collect system performance data (e.g., data loggers, meters and building management trends) and determine energy savings and peak demand reductions. We use whole-building meter data to analyze and confirm project impacts. To date, Cadmus has reviewed over 200 projects.

Cadmus also provides on-call engineering services for ConEdison’s C&I programs. We support program staff during periods of high project volume or with complex projects requiring technical expertise. This includes reviewing the initial program application and supporting energy savings estimates, compiling application data into workbooks, reviewing final applications for incentive payments, reconciling post-inspection reports and invoices and reviewing cut sheets to inform the final approved savings. Cadmus has processed over 400 projects including technologies such as lighting, variable frequency drives, motors, HVAC equipment upgrades, refrigeration, compressed air, elevators and HVAC controls upgrades. Since the start of the COVID-19 pandemic, we have provided virtual audits for pre-installation and post-installation verification and data collection for an additional 175 projects. Cadmus also created the M&V Guideline for Battery Storage Systems.

Client Name: PSC of Wisconsin	Project Name: Focus on Energy Evaluation
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Contact Name: Mitch Horrie	Phone, Email: (608) 267-3206, mitch.horrie@wisconsin.gov
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Cadmus Role: Statewide Technical Evaluator	Contract Amount: \$12,500,000
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Funded by Wisconsin investor-owned energy utilities and participating municipal and electric cooperative utilities, Focus on Energy has been Wisconsin’s statewide energy efficiency and renewable resource program since 2011. Cadmus has evaluated several of Focus on Energy programs since their inception. Business programs include agriculture, schools and government, business incentive, design assistance for commercial and multifamily, emerging technologies, large energy users, multifamily energy savings, multifamily new construction, small business and a strategic energy management program. Residential programs include appliance recycling, energy efficiency products, HVAC, home energy assessments, new home certification, renewable energy and smart thermostat.

Cadmus leads an evaluation team to independently verify program administrator reports of energy savings and recommend improvements on program design, delivery and measurement approaches. We also quantify the energy savings impacts of the programs on Wisconsin citizens and the economy and deliver biennial economic impacts reports. Over the past two years Cadmus has conducted M&V activity for over 650 projects in the Focus on Energy nonresidential portfolio. For the impact evaluations, we use billing analyses, deemed savings verifications, engineering estimates, and hundreds of on-site metering studies and verifications to determine realized savings.

We have conducted a large-scale residential and commercial baseline study and a statewide potential study that included over 1,000 surveys and 540 site visits. Additionally, we co-lead development of the Wisconsin Technical Reference Manual, a collaborative effort between Cadmus, the Public Service Commission of Wisconsin, implementers, and the program administrator.

Client Name: Energy Trust of Oregon **Project Name:** Large/Complex Buildings Evaluation

Contact Name: Dan Rubado **Phone, Email:** (503) 459-4069,
dan.rubado@energytrust.org

Cadmus Role: Third-Party Evaluator **Contract Amount:** \$160,000

Cadmus has worked with the Energy Trust of Oregon since 2011. For Energy Trust’s New Buildings program, Cadmus evaluated electric and natural gas measure impacts for custom, prescriptive, and whole-building analysis tracks. Our field engineers conducted site verification visits for a sample of buildings (ranging from 30 to 50 per program year). At least half of each year’s evaluation sample included sites with the largest reported energy savings. Where applicable, we installed meters to log power, temperature, and/or lighting operations. We also obtained at least one full year of post-occupancy utility billing data and trend data from energy management systems when available and used these data to confirm or modify engineering calculations on the prescriptive and custom-track projects. For whole-building analysis projects, Cadmus calibrated the as-built model’s performance to reflect actual post-occupancy performance. We then compared as-built performance with a code baseline model to evaluate energy savings impacts.

Cadmus is also currently providing impact evaluations for Energy Trust’s large and complex new building projects. We evaluated savings from efficient lighting measures at three newly constructed, large distribution warehouses in the Portland, Oregon, metro area. The warehouses are leased by a third party and built by two local developers. Cadmus conducted document and engineering reviews, on-site power spot measurements, and facility walk-through assessments.

Appendix A. Team Resumes

Resumes for the proposed team are included on the following pages.

Michael Reinhold, Principal

Michael Reinhold has worked in the energy efficiency industry for over 22 years and has broad experience in HVAC and controls design, project management, engineering analysis, utility energy efficiency program design, and implementation. Mr. Reinhold has managed energy efficiency portfolios on behalf of the Michigan Public Power Agency and for Consumers Energy including program and pilot design.

Relevant Experience

- ***Prism Energy Solutions: Director of Engineering (2021-2022).*** Oversaw the engineering staff, led on-site field audits, and performed energy-savings calculations and proposal design. Modeled building performance using Trace 700 and worked with contactors to implement energy-savings projects for building owners.
- ***Solutions for Energy Efficiency: Director of Strategic Operations and Engineering (2019–2021).*** Responsible for new program design including savings models, budget buildups, and strategy for RFP response and launch. Oversaw the existing programs and worked with program managers to achieve target savings and budget for existing utility clients.
- ***Consumers Energy: Commercial and Industrial Energy Efficiency Program (2017–2019).*** Managed the commercial and industrial energy efficiency and small business direct install program. Managed the profit and loss and incentive budgets as well as a staff of over 130. Achieved savings goals and customer satisfaction goals each year and worked to design and implement several pilot programs.
- ***Michigan Public Power Agency: Energy Efficiency Portfolio Manager (2013–2016).*** Managed the profit and loss responsibility and conducted program design and management of all residential and commercial energy efficiency portfolios on behalf of 18 municipal utilities.

Education and Certifications

MBA, Business Analysis, Georgia State University
BS, Chemical Engineering, Kansas State University
Professional Engineer (Michigan, Massachusetts)
Project Management Professional
Certified Energy Manger
LEED AP (Accredited Professional)

Technical Skills

In addition to the Microsoft Office suite and Teams, Mr. Reinhold is skilled in using Projects, Visio, Dynamics 365, Trace700, Fortran, C++, Adobe Acrobat, and Salesforce.

Mike Kaar, PE, LEED AP, CEM, Associate

Mike Kaar, an associate at Cadmus, has 15 years of experience in commissioning, retro-commissioning, mechanical design, and energy auditing. Mr. Kaar is an expert in completing detailed energy analysis of low-cost measures, capital measures, and maintenance opportunities for various building types such as offices, data centers, universities and schools, hotels, recreation centers, government buildings, retail centers, and laboratories. With a background in HVAC and controls design and contracting, Mr. Kaar has served as mechanical consulting and design engineer on many projects across the country, responsible for completing every aspect of a project's mechanical design scope. He draws on this varied background to effectively commission and test complex mechanical systems.

Relevant Experience

Retro-commissioning

- ***Poudre Valley Hospital, Fort Collins, Colorado.*** Retro-commissioning of 670,000 square-foot hospital through Platte River Power Authority were energy savings of 760,000 kWh per year.
- ***Altona Middle School, Longmont, Colorado.*** Retro-commissioning of 120,000 square-foot middle school for the Saint Vrain Valley School District, funded by the Platte River Power Authority, with energy savings of 9% per year (72,000 kWh).
- ***Bank of America Operations Center, Tempe, Arizona.*** Retro-commissioning of 197,000 square-foot office building/call center through Salt River Project program with energy savings of 720,000 kWh per year.
- ***Amgen Production Facility, Longmont, Colorado.*** Retro-commissioning of 200,000 square-foot pharmaceutical manufacturing facility with energy savings of 1,400,000 kWh per year.

Energy Auditing

- ***Celestial Seasonings, Boulder, Colorado.*** Performed an ASHRAE Level 2 energy audit of office and manufacturing facility to comply with the City of Boulder's sustainability requirements.
- ***Boulder Valley School District, Boulder, Colorado.*** Performed technical energy audits at two schools for district's sustainable energy plan's first step in comprehensive energy retrofits.
- ***The Fountains at Piedmont Center, Atlanta, Georgia.*** Performed ASHRAE Level 1 energy audit at office complex of four buildings totaling approximately 560,000 square feet, with two chiller plants and approximately 40 air handling units.
- ***Bank of America Operations Center, Tempe, Arizona.*** Performed an ASHRAE Level 2 energy audit with retro-commissioning of facility to identify capital intensive energy savings measures.
- ***Mansell Overlook, Roswell, Georgia.*** Performed ASHRAE Level 2 energy audit for four buildings in complex as part of LEED O&M certification. LEED EBOM certification achieved.

Education and Certifications

BS, Mechanical Engineering, Georgia Institute of Technology
 Professional Engineer, Mechanical (Colorado and Wyoming)
 LEED Accredited Professional, U.S. Green Building Council
 Certified Energy Manager, Association of Energy Engineers

Josh Hoyng, Analyst

Josh Hoyng, a member of the Energy Services' Program Evaluation & Performance team, has been at Cadmus since 2021 and primarily works on impact evaluations but has assisted with numerous additional projects. Prior to joining Cadmus, Mr. Hoyng worked in the building optimization division at a mechanical, electrical, and plumbing consulting firm, where he conducted on-site energy audits and was involved in retro-commissioning projects for hospitals and commercial buildings.

Relevant Experience

- **CenterPoint Indiana: Income Qualified Weatherization and Targeted Income Program (2021-present).** Impact evaluation lead. Conducts engineering analysis, analyzes survey results, summarizes findings, suggests improvements, and conducts quality control reviews.
- **EmPOWER Maryland: Appliance Rebate and Kits Programs (2021-present).** Impact evaluation lead. Conducts engineering analysis, analyzes survey results, summarizes findings, suggests improvements, conducts quality control reviews, and presents results to the client.
- **Northern Indiana Public Service Company: Residential HVAC and Multifamily Direct Install Programs (2021-present).** Impact evaluation lead. Conducts engineering analysis, analyzes survey results, summarizes findings, suggests improvements, and conducts quality control reviews.
- **Avista Utilities: Multifamily Direct Install Program (2021-present).** Impact evaluation lead. Conducts engineering analysis, analyzes survey results, summarizes findings, suggests improvements, conducts quality control reviews, and presents results to the client.
- **PPL Electric Utilities: Commercial and Industrial Downstream Lighting Program (2021-present).** Support engineer. Conducts engineering analysis, carries out EM&V activities such as on site measurements and verification, summarizes findings, and informs suggested improvements.
- **Energy Trust of Oregon: Production Efficiency and New Buildings Programs (2021-present).** Support engineer. Conducts engineering analysis, carries out EM&V activities such as on site measurements and verification, summarizes findings, and informs suggested improvements.
- **Econoler and Efficiency Manitoba Savings Verification (2021-present).** Support engineer. Conducts engineering analysis, carries out EM&V activities such as on site measurements and verification, summarizes findings, and informs suggested improvements.
- **PacifiCorp: Evaluation, Measurement, and Verification (2021-present).** Support engineer. Conducts engineering analysis, carries out EM&V activities such as on site measurements and verification, summarizes findings, and informs suggested improvements.
- **Energy Audits and Retro-Commissioning (2020):** Reviewed as-built drawings and conducted site visits to collect data on building energy systems. Analyzed large sets of trend data to evaluate baseline and seasonal energy use to inform energy conservation measure design and calculate projected savings. Assisted in overseeing implementation and completion.

Education and Certifications

MS, Renewable and Clean Energy, University of Dayton

BA, Physics, Wittenberg University

BA, Financial Economics, Wittenberg University

Technical Skills

Mr. Hoyng is skilled in using Python, MATLAB, and Minitab.

Appendix B. Example Audit Report

This appendix contains an example of the Building Energy Asset Score: Data Collection Long Form.