TETRA TECH

Phase 1: Project Kickoff & Delivery

MONTANA DEPT. OF TRANSPORTATION

JULY 2025 I REV01

engineers for a **sustainable** future™

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Executive Summary

The Montana Department of Transportation (MDT) is seeking to evaluate and integrate renewable energy sources to power its diverse portfolio of buildings and facilities. In light of rising energy costs and the urgent need for sustainable solutions, MDT aims to offset energy consumption through investments in renewable energy, thereby enhancing operational efficiency and reducing costs. Tetra Tech has designed a comprehensive study to assess the feasibility and cost-effectiveness of various renewable energy options, including solar photovoltaic (PV) systems, wind turbines, battery energy storage systems (BESS), and HVAC electrification retrofits.

Beginning on June 1, 2025, Tetra Tech started to implement a structured approach to evaluate renewable energy potential across MDT facilities, which include office buildings, maintenance yards, and rest areas, each with unique energy demands and operational characteristics. Our extensive experience in renewable energy assessment positions us to deliver actionable insights and detailed analyses that will inform MDT's strategic investments in energy efficiency and sustainability.

Key objectives of the study include:

1. **Assessing Renewable Energy Potential:** Evaluating various renewable energy sources to meet MDT's energy and resilience needs.
2. **Conducting Financial Analysis:** Performing comprehensive financial assessments, including lifecycle costs and potential funding opportunities, to identify economically viable solutions.
3. **Determining Optimal Solutions:** Ranking renewable energy options based on lifecycle costs, resiliency, and other relevant factors.
4. **Designing Pilot Projects:** Developing detailed designs for pilot renewable energy systems at selected MDT facilities.
5. **Enhancing Resilience:** Evaluating hybrid systems and battery storage options to ensure continuous operation during power outages.
6. **Providing Subject Matter Expertise:** Offering expert guidance on renewable energy development and implementation.

The anticipated benefits of this initiative include significant cost savings for MDT, increased operational efficiency, and enhanced environmental sustainability. By transitioning to renewable energy, MDT can reduce reliance on traditional energy sources, lower operational costs, and contribute to cleaner air and improved public health.

Our research plan is divided into four phases, which we anticipate completing by the end of June 2026: Project Kickoff & Delivery, Energy Analysis, Implementation Plan, and Pilot Project Design. Each phase includes specific tasks and deliverables, ensuring a structured approach to achieving project objectives while maintaining stakeholder engagement and collaboration.

The contract between Tetra Tech and MDT began on June 1, 2025, and Phase 1 officially started with kickoff call on June 12, 2025. During this phase, Tetra Tech finalized our work plan and aligned key goals with MDT during the kickoff call, established a cadence of check-in meetings with the MDT project manager, conducted background research, and collaborated with MDT to begin the data collection process. Tetra Tech anticipates that the data gathering process will likely continue throughout the lifecycle of this project but has now gathered enough data to commence Phase 2.

Task 1a: Kickoff Meeting and Project Workplan

On June 12, 2025, Tetra Tech and MDT met for the project kickoff meeting to introduce key project stakeholders, review the proposed project work plan, initiate data sharing, and discuss any other critical items. The presentation that Tetra Tech prepared for this meeting is attached in Appendix A, along with the meeting minutes.

Following the kickoff call, Tetra Tech finalized the project workplan, which is attached in Appendix B, and collaborated with the MDT project manager to schedule routine project check in calls through the end of 2025. Tetra Tech's workplan aligns with the plan in our proposal, accounting for the actual project start date and incorporating the currently scheduled cadence of check-in meetings. The workplan is also designed to facilitate Tetra Tech's submittal of monthly progress reports.

Task 1b: Background Research

Tetra Tech conducted targeted background research to inform the MDT Renewable Energy Study and ensure that all subsequent phases are grounded in a strong understanding of the regulatory, financial, and operational landscape. This research focused on identifying opportunities and constraints that could influence the feasibility, cost-effectiveness, and implementation of renewable energy systems across MDT facilities.

Research Focus Areas:

1. Regulations & Codes - Federal, state, and local requirements relevant to renewable energy deployment.
2. Utility Rate Tariffs - Current and projected electricity and natural gas rates, including recent changes.
3. Funding & Financing - Available funding mechanisms and financing strategies.
4. Grants & Incentives - Federal and state-level programs, including IRA/IIJA provisions and utility rebates.
5. Asset Management - Internal MDT practices related to capital planning and infrastructure renewal.

REGULATIONS AND CODES

Tetra Tech reviewed applicable federal and state regulations to identify permitting, interconnection, and operational requirements that may impact the deployment of renewable energy systems at MDT facilities.

Federal Guidelines

At the federal level, interconnection standards are guided by the Federal Energy Regulatory Commission (FERC), which sets baseline requirements for distributed generation systems connecting to the grid. These include:

- Use of certified equipment and inverters
- Compliance with IEEE 1547 standards for interconnection
- Safety and anti-islanding protections. These standards apply primarily to systems exporting power to the grid and are often incorporated into state-level utility rules.

Montana Utility Regulations

Montana's net metering and interconnection policies are governed by the Montana Code Annotated (MCA) 69-8-602, which outlines the following requirements:[1]

- Utilities must allow net metering systems to interconnect using a standard bi-directional kilowatt-hour meter.
- Customers may be charged a minimum monthly fee equivalent to other customers in the same rate class.
- The Public Service Commission (PSC) may require additional metering equipment if deemed necessary and determine how associated costs are allocated between the utility and the customer-generator.

Montana also allows customers to accrue on-bill credits for excess energy exported to the grid. These credits can be banked for future use, though most utilities reset the credit balance annually ("true-up"), forfeiting unused credits[2].

Interconnection Standards

Montana's administrative rules (Subchapter 38.5.84) provide guidance for small generator interconnection, including:[3]

- Technical requirements for system safety and reliability
- Application procedures and timelines
- Utility review and approval processes

These rules are especially relevant for solar PV, wind, and battery energy storage systems proposed under this study. Tetra Tech will continue to monitor any updates to these regulations and incorporate permitting considerations into Phase 2 and Phase 4 deliverables.

Utility Regulations – NorthWestern Energy

Tetra Tech reviewed NorthWestern Energy's interconnection and net metering policies to identify key requirements and constraints for deploying renewable energy systems at MDT facilities. They are in line with State and Federal regulations which may be summarized again in the context of utility-specific policies.

Net Metering Overview

NorthWestern Energy (NWE) supports net metering for customer-owned renewable energy systems, including solar PV, wind turbines, and small-scale hydroelectric generators.[4]
Under this arrangement:

- A net meter measures the difference between energy consumed and energy produced.
- Excess energy exported to the grid is credited toward future bills.
- Credits reset annually, so unused credits will be forfeited at the end of the 12-month billing period.

Customers must receive a welcome letter from NWE confirming that the system is authorized for activation after successful inspection and meter installation.

[1] MCA 69-8-602 Utility Net Metering Requirements: https://archive.legmt.gov/bills/mca/title_0690/chapter_0080/part_0060/section_0020/0690-0080-0060-0020.html
[2] Montana Renewable Energy Association, Net Metering: https://montanarenewables.org/renewable-energy/net-metering/
[3] Montana Administrative Rules, Subchapter 38.5.84 Small Generator Interconnection: https://rules.mt.gov/browse/collections/aec52c46-128e-4279-9068-8af5d5432d74/sections/69fa6dfa-17b5-4746-9d97-58e8e6754f87
[4] Northwestern Energy, Net Metering and Private Generation: https://www.northwesternenergy.com/clean-energy/our-environmental-projects/net-metering-private-generation

Metering Requirements

NWE's metering requirements are designed to ensure accurate tracking of energy flows between customer-owned generation systems and the utility grid. These requirements vary depending on the type of metering infrastructure already installed at the facility.[4]

- Customers with AMI meters (Advanced Metering Infrastructure) can be remotely updated for net metering without a site visit.
- Customers without AMI meters require a meter exchange, which may involve a brief power outage and up to 20 business days for installation.

Interconnection Standards

Interconnection of small generator facilities (≤50 kW) is governed by Rules 16–23 of NWE's Electric Tariff.[4]

Key provisions include:

- Design and Safety Requirements: Systems must comply with IEEE 1547 standards and include anti-islanding protection.
- Permitting and Inspection: Systems must pass inspection before NWE installs the net meter.
- Curtailment Rights: NWE reserves the right to interrupt or reduce energy deliveries during emergencies or maintenance.
- Disconnection Authority: NWE may disconnect systems that pose safety risks or threaten grid integrity.

Operational Constraints

While NWE supports distributed generation, several operational constraints must be considered when designing and interconnecting renewable energy systems. This includes:

- NWE is not obligated to accept or pay for energy during system outages or grid emergencies.
- Customers must notify NWE of any changes to system capacity or configuration at least 30 days in advance.

Application and Permitting Process

To initiate interconnection, applicants must submit a "Small Generator Interconnection Request" to NWE. The process includes:

- Submission Methods: Applications may be submitted via email, mail, fax, or hand delivery to NWE's designated interconnection contact.
- Required Documentation: Includes system specifications, site location, requested in-service date, and point of interconnection.
- Processing Fees:
    - Level 2 (≤50 kW inverter-based systems): $500 non-refundable fee
    - Level 3 (complex systems): $200 fee
    - Level 4 (larger or non-standard systems): $1,000 deposit toward feasibility study
- Review Timeline: NWE will evaluate the application and determine if additional studies or upgrades are required.
- Approval and Activation: Upon successful review and inspection, NWE will issue a welcome letter and install the net meter.

UTILITY RATE TARIFF REVIEW

Understanding current and projected utility rate structures is essential for evaluating the financial viability of renewable energy and energy efficiency investments. During Phase 1, Tetra Tech conducted a preliminary review of MDT's utility rate schedules and identified several active tariffs across electric and

natural gas services. However, the accuracy of these classifications remains unverified and will be confirmed during Phase 2 through a review of scanned utility bills.

Preliminary Rate Schedule Review

Electricity

- **E090 & E110**: These are likely General Service electric delivery rates, typically applied to small-to-medium commercial customers.
    - **E090** appears to correspond to a standard general service rate, while
    - **E110** may be a time-of-use or demand-based rate, which includes higher charges during peak hours and lower rates during off-peak periods. These rates are commonly used for facilities with moderate, consistent energy use, such as MDT maintenance shops or administrative buildings.

Lighting

- **L020**: This is likely a dedicated lighting tariff, used for street lighting or outdoor area lighting.
    - These rates are typically fixed and based on the type and wattage of installed fixtures, rather than metered consumption.
    - MDT rest areas or highway signage lighting may fall under this rate.

Natural Gas

- **G0900, G1100, G1300, G1500**: These codes likely represent tiered commercial natural gas service levels, with increasing levels of usage or pressure requirements.
    - **G0900** and **G1100** may apply to small commercial or institutional buildings
    - **G1300** and **G1500** may be used for larger facilities or those with firm service agreements.
    - These rates may differ in terms of base charges, therm pricing, and interruptibility.

While these rate codes were identified during Phase 1, their application to specific MDT facilities has not yet been confirmed. Tetra Tech will verify each rate schedule during Phase 2 by reviewing scanned utility bills and confirming with NorthWestern Energy where necessary. This step is critical to ensure accurate modeling of baseline utility costs and to identify opportunities for rate optimization or cost avoidance through renewable energy deployment.

Forecasted Rate Increase

In May 2025, NWE implemented a 17% electricity rate increase across all customer classes—including residential, commercial, and industrial. The utility invoked a rarely used provision in Montana law that allows regulated utilities to self-implement rate changes if the PSC does not act on a rate case within nine months. Electricity tariffs will be evaluated in Phase 2 to identify increased pricing, so that the most current rates will be forecasted in project financial modeling. Electricity price increases will improve payback for renewable energy projects through increase utility savings.

Additional Considerations

Tetra Tech is also reviewing structural and contractual factors that may influence MDT's utility costs:

- Third-Party Natural Gas Contracts: MDT facilities may receive natural gas through rotating third-party providers. These contracts typically operate on three-year cycles, and Tetra Tech will assist in identifying cost-saving opportunities within this structure.
- Firm vs. Interruptible Contracts: Some facilities may be enrolled in firm natural gas contracts unnecessarily. Where appropriate, switching to interruptible service could reduce costs or, conversely, firm service may be needed for resilience in microgrid applications.

FUNDING, FINANCING, AND INCENTIVES

Tetra Tech evaluated a range of federal and state-level funding mechanisms, tax credits, and utility incentives that may support the implementation of renewable energy and energy efficiency projects at MDT facilities. These programs can significantly reduce upfront capital costs and improve the financial viability of both large-scale and small-scale energy improvements.

Federal Incentives

Federal renewable energy incentives were significantly expanded under the Inflation Reduction Act of 2022 (IRA), which extended and expanded tax credits for a wide range of clean energy technologies. Additionally, it introduced direct pay options, allowing non-taxable entities with a direct financial mechanism for participating in the incentive programs. However, these benefits have been curtailed by the passage of H.R. 1 – The One Big Beautiful Bill Act (OBBBA), signed into law on July 4, 2025. The legislation accelerates phaseouts for solar and wind tax credits, tightens domestic content requirements, and imposes new restrictions on projects involving foreign entities. These changes undermine the financial viability of many clean energy projects and reduce the window of opportunity for public agencies like MDT to benefit from renewable energy incentives. Tetra Tech will incorporate these constraints into project prioritization and lifecycle cost modeling to help MDT capture remaining incentives before they expire.

Investment Tax Credit

The primary federal incentive for renewable energy is the Business Clean Electricity Investment Tax Credit (ITC), which provides a base credit of 30% for eligible technologies, including solar PV, wind, geothermal, battery storage, and fuel cells. To qualify for the full credit, projects must begin construction before July 2026 and meet prevailing wage and apprenticeship requirements.

Eligibility

Projects need to consider prioritization due to the accelerated phaseout of federal renewable energy incentives.

- To qualify for the full 30% credit, solar and wind projects must begin construction before July 2026 and be placed into service before December 31, 2027.
- Geothermal, fuel cell, battery storage, and biogas systems still qualify for the full credit if construction begins before the end of 2033.

Impact

A base credit of 30% for projects within labor requirements, along with a 10% bonus for facilities built with certain percentages of domestic materials. The zip codes for the 8 listed sites do not reside in energy communities that would qualify for an additional 10%.

Recommendation

The ITC offers significant savings on a wide range of projects, particularly well-suited for larger, more expensive projects where state incentives may not be as beneficial. It is worth evaluating the benefits of shifting timelines or reprioritizing projects to fit within the qualifying timeframe to maximize the possible discounts. Overall, given its wide eligibility, it should be considered for any projects that can fit within its phase-out timeline.

Production Tax Credit

An additional federal incentive for renewable energy is the Production Tax Credit (PTC). This provides a performance-based incentive by offering a per-kilowatt-hour credit for electricity generated by qualifying systems over a 10-year period. However, like the ITC, to qualify for the full credit, projects must begin construction before July 2026 and meet prevailing wage and apprenticeship requirements.

Eligibility
Projects may need to consider prioritization due to the accelerated phaseout of federal renewable energy incentives.

- To qualify, projects must begin construction before July 2026 and be placed into service before December 31, 2027.
- Eligible technologies include wind, solar, geothermal, biomass, and certain hydropower systems.
- Geothermal, fuel cell, battery storage, and biogas systems still qualify for the full credit if construction begins before the end of 2033.

Impact
The PTC is particularly advantageous for high-output systems like wind and utility-scale solar, offering long-term financial returns based on actual energy production. With the accelerated phaseout now in effect, the window to benefit from this incentive is closing.

Recommendation
A system developed from this project will likely not reach the output required to fully-benefit from the PTC. Either the PTC or ITC can be utilized for a qualifying project, but not both. Tetra Tech recommends MDT utilize the PTC for projects associated with this study if they can meet the construction and service connection timelines.

State-Level Incentives and Funding

Several programs and opportunities at the state-level can support energy efficiency and renewable energy deployment at public facilities. These incentives, administered primarily through NorthWestern Energy and the Montana Department of Environmental Quality, can help offset capital costs and improve the financial viability of MDT's energy projects. While generally more limited in scope than federal programs, these resources are well-suited for small to mid-scale upgrades and can be layered with federal tax credits to maximize impact.

NorthWestern Energy Rebates

NWE provides cash rebates for eligible customers through their E+ Commercial Program by offering incentives for energy efficiency upgrades. These incentives are designed to reduce overall cost by providing rebates for upgrades across HVAC, lighting, and building envelope systems. While these incentives support common retrofit measures, they do not directly support renewable energy project development through their rebate program. NWE incentives fall into three categories:

- Commercial Electric Rebates
- Commercial Natural Gas Savings Program
- Commercial Electric Lighting Rebate

As of June 30, 2025, the most recent cycle of NorthWestern Energy's commercial incentive programs has expired, and updated program details have not yet been released. Tetra Tech will continue to monitor for updates and coordinate with NWE contacts as needed. Historically, program structures and eligibility criteria have remained relatively consistent between cycles, so we anticipate only minor adjustments in the forthcoming updates.

Eligibility
- Led lighting upgrades and occupancy sensors.
- Building envelope and hot water system improvements.
- Air source heat pump units, air- and water-cooled chillers, among other HVAC upgrades.

Impact
Cash rebates range across different upgrades and the number of units. Examples include: $800 per heat pump water heating unit, $75-$100 per chiller ton installed, and $100 per chiller ton of installed air source heat pump.

Recommendation
These rebates are ideal for smaller-scale retrofits or facilities with aging infrastructure. They offer a simple and effective way to reduce utility costs and emissions while improving building performance. NWE Energy rebates provide useful incentives for small-scale projects where renewable energy is not viable and energy efficiency improvements are sought to reduce utility bills and emissions. They offer simple savings to retrofit sites with outdated HVAC and lighting systems.

Northwestern Energy USB Funding

A key state-specific funding source is Northwestern Energy's Universal System Benefits (USB) program.[5] This program outlines grant funding for non-profit and government buildings on solar and wind projects.

Eligibility
- The program mandates qualified installers to install the project.
- Projects must have a 50kW nameplate capacity or less.
- Proposals are accepted within spring and fall windows ending on May 1st and November 1st, respectively.
- Must detail plan for providing education on the benefits of the energy project.
- Net metering is required.

Impact
Custom grants from USB funds. Funding is considered based on the amount detailed in the application as a percentage of total cost or dollar amount.

Recommendation
USB funding is a promising option, fitting the scale and technological scope of Solar PV projects for MDT buildings. It is a viable source of grant funding that fits well for projects in public locations with higher levels of traffic.

State Buildings Energy Conservation Program

Administered by the Energy Bureau within the Montana Department of Environmental Quality (MDEQ), the State Buildings Energy Conservation Program (SBECP) provides low-interest loans for energy efficiency upgrades and renewable energy projects at state-owned buildings. The program is a revolving, self-funded initiative that uses utility savings from completed projects to repay costs and reinvest in future conservation efforts[6]

Montana's Internal State Revolving Loan Program offers low-cost financing for state building projects based on their potential utility savings.

Eligibility
- Available to state agencies, universities, and community colleges
- Projects must demonstrate cost-effectiveness and meet payback criteria
- Typical upgrades include lighting, HVAC systems, building controls, and insulation

[5] NorthWestern Energy, Renewable Energy Incentives: https://northwesternenergy.com/account-services/for-business/energy-efficiency-for-business/e-renewable-incentives
[6] Montana DEQ, State Buildings Energy Conservation Program: https://deq.mt.gov/energy/Programs/statebuilding

Impact

- Loans provided are limited to utility savings from the project, with a 2.5% interest rate.
- Partial funding is also possible for projects to cost more than their respective utility savings.

Recommendation

SBECP funding is well-suited for projects where solar PV systems can be paired with MDT facilities undergoing deferred maintenance or capital upgrades. Projects with long-term high-performance outlooks and high use should be considered. The program is also provides good potential for partial funding of renewable energy systems, which can offset overall capital expenditures that MDT would otherwise need to fully cover. Tetra Tech will look to utilize SBECP funds for projects evaluated in this analysis.

ASSET MANAGEMENT

Tetra Tech reviewed available public resources and will continue to monitor for updates to long-range capital improvement plans maintained by MDT and the Department of Administration's Architecture & Engineering (A&E) Division. While no detailed public documentation of planned upgrades at MDT facilities was identified at this time, these plans are expected to inform future phases of the study, where relevant.

To align renewable energy recommendations with MDT's broader infrastructure goals, Tetra Tech will further investigate asset renewal and maintenance practices during Phase 2. This will include interviews and/or questionnaires with facility managers to identify:

- Facilities scheduled for major renovations or equipment replacements
- Opportunities to integrate renewable energy systems with planned upgrades
- Sites with aging infrastructure that may benefit from modernization

This approach will help ensure that renewable energy investments are strategically timed and aligned with MDT's long-term capital planning efforts.

Task 1c: Data Collection

Thorough data collection is essential to fully understand the existing systems and infrastructure, and it will lead to a more accurate energy analysis in Phase II. As the first step, Tetra Tech began collecting and consolidating relevant historical information. Collecting data can be a time-consuming effort and is a potential area of concern for maintaining the schedule. To mitigate this risk, Tetra Tech has developed a data collection process that alleviates some of the challenges and minimizes the impact on capital planning and facilities management groups. We scheduled data request meetings early in the project, established file-sharing protocols on preferred platforms, and provided a tracking tool to monitor the collected data (see the tool in Appendix C).

Preliminary Requests:

1. As-built drawings for the scoped buildings and associated electrical infrastructure
2. Previous engineering feasibility studies, energy modeling reports, or facility condition assessments
3. List of existing HVAC equipment's make, model, capacity, and location
4. List of existing or planned renewable energy project's capacity, type, and location
5. Utility and submeter energy data (electricity and natural gas) from the State Buildings Energy Conservation Program database
6. Compiled critical requirements list per facility
7. Name of the local electric utility and utility representative contact information
8. Schedule a dedicated resilience meeting with the emergency planner
9. Delivered fuel delivery records or receipts for the past 12 months

Organization:

Most of the information was received including:

1. As-built drawings for the scoped buildings and associated electrical infrastructure
2. Previous engineering feasibility studies, energy modeling reports, or facility condition assessments
3. List of existing HVAC equipment's make, model, capacity, and location
4. Compiled critical requirements list per facility

We carefully sorted the utility data and building lists provided, consolidating them into a master spreadsheet. This comprehensive document includes critical information such as building square footage, full-time equivalent (FTE) employees, critical facility assumption, and total electrical consumption and costs for each site. Organizing the data in a clear and effective manner will help streamline the analysis in subsequent phases of the project.

Outstanding Items:

Most of the requested information has been received. However, some items remain outstanding, listed below.

1. Utility representative contact information and utility bill PDFs showing electrical and gas rate schedules
2. Schedule a dedicated resilience meeting with the emergency planner
3. Delivered fuel delivery records or receipts for the past 12 months
4. A list of existing generators, including capacity, location

Additionally, the utility data we received was provided in monthly intervals. We requested 15-minute interval data to better understand peak load conditions to design for resilience. Since this data is not currently available, we will need to make further assumptions in the energy modeling process, which may reduce the accuracy of our results. We recommend that Montana DOT meter all electricity usage going forward in 15-minute intervals to improve future data collection and project outcomes.

Next Steps – Phase 2: Energy Analysis

Objective: Establish a clear understanding of the existing facility's energy and utility infrastructure systems. Document baseline existing conditions and energy performance and identify unique conditions. Identify potential energy technologies and conceptual system options to increase the presence of renewable energy systems at Montana Department of Transportation facilities.

Expected Timeline: July 20 – September 6

Task 2a) BUILDING, INFRASTRUCTURE, AND UTILITY REVIEW:

The existing conditions review will involve interviews and evaluation of existing engineering documents so that Tetra Tech can provide a comprehensive review of each building's existing systems and operational efficiency. Tetra Tech will evaluate each building's electrical and heating energy consumption to identify areas that require focus in the following phases. This information will be used for this phase's final deliverable.

1. Interviews with Area office managers and the MDT Facilities Bureau to understand programmatic operational and maintenance requirements that align with MDT's long-range building and facility repair and maintenance program. Interviews with individual on-site facility managers to quantify operational expectations during power outages and building-specific concerns for renewable energy technologies, such as available space and other physical constraints.
2. Verify existing systems using provided As-Built drawings
3. Provide a building database with key information and building summaries containing each facility's usage, condition, size, and unique considerations.
4. Confirm the reliability of the electrical utility infrastructure by reviewing utility drawings and interviewing facility staff regarding historical utility outages.
5. Develop an understanding of historical outage frequency and duration and potential future risks.

Task 2b) BUILDING ENERGY AND OPERATIONAL ASSESSMENT:

Tetra Tech will evaluate each facility's historical energy consumption and create a database benchmarking each facility's operational performance. The results will be included in this phase's final deliverable and used in future stages to size the various renewable energy power options.

1. Utilize the provided utility bill data to establish baseline energy performance at each facility
2. Use engineering analysis, building benchmarking databases, and previous project experience to estimate the different categories of energy consumption associated with each building to highlight areas of opportunity for energy offsets
3. Rank each facility's energy efficiency within the portfolio of buildings analyzed as well as against national averages for buildings of comparable type, size, and located in similar climates

Task 2c) RENEWABLE ENERGY TECHNOLOGY REVIEW:

Tetra Tech will evaluate various renewable energy backup power technologies to transition the MDT's power generation sources to cheaper and cleaner alternatives. Tetra Tech will build upon existing research and resources and provide specific considerations for each facility. This assessment will include:

1. Develop a technology summary matrix with key information about each distributed energy resource (DER) technology. This will include but is not limited to the following:
    a. Solar PV - Rooftop, Carport and Ground Mounted
    b. Battery Energy Storage System (BESS)
    c. Generators - Linear, Diesel, Natural Gas
    d. Microgrid Controls
    e. Wind Turbines

   f. Air and ground source heat pumps
   g. Geothermal energy
   h. Fuel Cells
2. Provide brief technology summaries, general system schematics, performance data, resilience considerations, technology readiness, design considerations, operations & maintenance impacts, retrofit applications, and other relevant information.
3. Provide preliminary rough order of magnitude costs.
4. Rank potential technologies and review with MDT stakeholders for feedback.

Task 2D) PERMITTING AND ENVIRONMENTAL CONSIDERATIONS:

Tetra Tech will review environmental and permitting requirements and identify key considerations. We recognize that it is crucial to identify any constraints early, and therefore, the permitting process will be prioritized during this phase. These constraints would likely focus on net metering regulations, environmental concerns, and any rules on exporting limitations.

Tetra Tech will provide early considerations for any permitting and environmental requirements that the MDT should be aware of when evaluating technology types and then build upon these considerations to develop permitting strategies in the final phase.

Appendix A

Montana Department of Transportation

Renewable Energy Study Kickoff Meeting

JUNE 12, 2025

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Office Locations

With 550 offices worldwide, we can quickly respond to our clients' needs.

TETRA TECH SNAPSHOT

WORKS IN
125
COUNTRIES

7
CONTINENTS

Publicly traded on NASDAQ as

TTEK

$5.2 billion
ANNUAL REVENUE

WORKS ON
110,000
PROJECTS
ANNUALLY

550 OFFICES WORLDWIDE

ENR RANKINGS

#1	Water Treatment/Desalination
#1	Environmental Management
#1	Wind Power
#1	Hydro Plants

25,000 CLIENTS

30,000 EMPLOYEES

Distributed Energy Resources Project Experience

George Mason University Resiliency Action Plan

Developed multiple pathways to carbon neutrality, with a focus on building energy, campus energy, resiliency, solar photovoltaics (PV), and fleet electrification.

Outcomes

- Developed multiphase project plan with the first several years of energy support and project management
- Achieved campus sustainability goals of **15%** carbon reduction
- Addressed aging infrastructure and best electrified replacement options

Confidential Government Program Resilience Study

Developed a microgrid feasibility study to add battery energy storage system (BESS) to existing solar PV for resilience and reduced operational costs.

Outcomes

- Detailed analysis of a matrix of PV and BESS combinations
- Electrical single-line diagrams and engineering design documents for the recommended BESS

Oregon State Treasury

Designed a microgrid and BESS to meet project resiliency goals for critical facility in the Cascadia Subduction Zone.

Outcomes

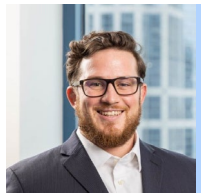
- Solar PV and BESS designed for 96 hours of off-grid operation
- Emergency generator tied to the microgrid
- Project completed 1 day early and $2 million under budget

Team Introduction

Zoe Roberts
Program Manager
Tetra Tech

Alec Jacobson
Project Manager
Tetra Tech

ENERGY TEAM



Drew Karson
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ELECTRICAL TEAM

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TECHNICAL EXPERTISE

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Monica Wright
Senior Review/ Sustainability Lead
Tetra Tech

Willenton Bridges Jr.
Data Analyst
Tetra Tech

Project Introduction

Project Background

- The Montana Department of Transportation wants to increase the resilience and cost effectiveness of their power systems.

Problem Statement

- **Resilience** – How can facilities continue to operate during high time of use periods and be prepared for emergencies?
- **Utility Costs** – How can we keep operational costs down, as electricity prices continue to rise?
- **Longevity** – What is the best way to operate buildings, not just in the short term, but over the building's lifespan?
- **New Technology** – What are the best renewable technologies to consider and implement?
- **Sustainable Practice** – How can we minimize environmental impact?

Project Goals

TETRA TECH

Assess Renewable Energy Potential

Evaluate various renewable energy sources to meet MDT's energy and resilience needs.

Conduct Financial Analysis

Performing comprehensive financial assessments, including lifecycle costs and potential funding opportunities, to identify economically viable solutions.

Determining Optimal Solutions

Ranking renewable energy options based on lifecycle costs, resilience, and other relevant factors.

Designing Pilot Projects

Developing detailed designs for pilot renewable energy systems at selected MDT facilities.

Enhance Resilience

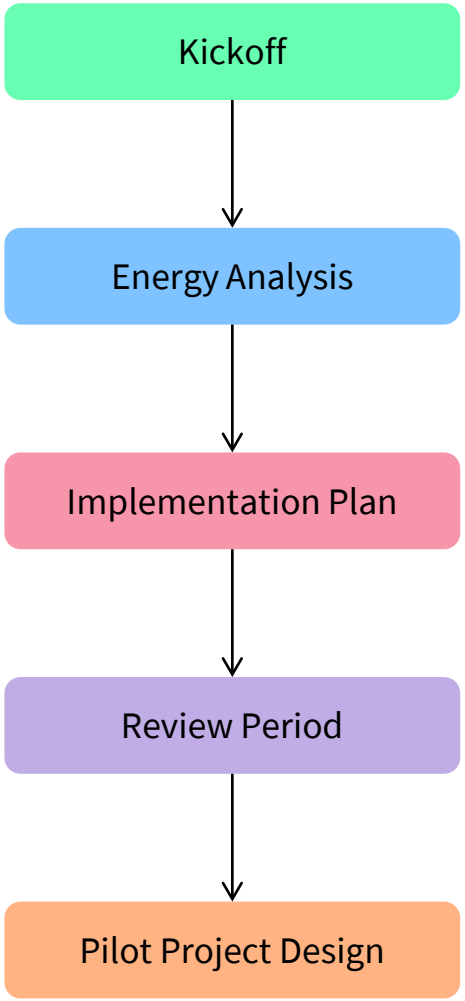
Evaluating hybrid systems and battery storage options to ensure continuous operation during power outages.

Provide Subject Matter Expertise

Offering expert guidance on renewable energy development and implementation.

Work Plan

- **Phase I – Project Kickoff & Delivery *(June 1 – July 4)***
    1. Kickoff meeting and project workplan
    2. Background research
    3. Data collection
- **Phase II - Energy Analysis *(July 7 – August 22)***
    1. Building, infrastructure, and utility review
    2. Building energy operational assessment
    3. Renewable energy technology
    4. Permitting and environmental considerations
- **Phase III – Implementation Plan *(August 25 – November 7)***
    1. Backup power and resilience energy modeling
    2. Cost estimating
    3. Life cycle cost analysis
    4. Funding and review
- **Review Period *(November 7 – January 30)***
    1. Draft deliverables available to MDT for review
    2. Respond to comments
    3. Finalize report and presentation
- **Phase IV – Pilot Project Design *(February 2 – April 10)***
    1. Pilot PV design
    2. Helena HQ PV design
    3. Delivery methods



Deliverable Schedule

By adhering to this schedule and proactively managing review periods, we aim to ensure the successful completion of the project within the allocated timeframe, while maintaining the highest standards of quality and thoroughness.

Phase I - Kickoff
June 1 – July 4

Leads:
- Rachel
- Drew

Deliverables:
- Kickoff meeting presentation
- Project workplan

Phase II - Energy Analysis
July 7 – August 22

Leads:
- Rachel
- Drew
- Andrew

Deliverables:
- Building database spreadsheet
- Energy analysis presentation
- Renewable power technology matrix

Phase III – Implementation Plan
August 25 – November 7

Leads:
- Rachel
- Drew
- Andrew

Deliverables:
- Draft report
- Draft presentation

Review Period
November 7 – January 30

- Review and comment from Montana DOT
- Final Report
- Final Presentation

Phase IV – Pilot Project Design
February 2 – April 10

Leads:
- Andrew
- Nick

Deliverables:
- Pilot PV design
- Helena HQ design

Additionally, Tetra Tech will provide:
- Monthly progress reports
- Task reports (within 1 month of completion)

Background Research

TETRA TECH

Regulations & Codes

- Federal, state, local, utility, and other relevant regulations, codes, and standards

Climate Patterns

- Future climate hazards and risks

Funding & Financing

- Existing funding streams and potential new sources

Grants & Incentives

- IRA / IIJA (ex. Investment Tax Credit), utility incentives, etc

Asset Management

- Review of internal assets, renewables, and maintenance practices

Document Requests

- **General:**
    1. Schedule a dedicated resilience meeting with the emergency planner
    2. Local utility representative contact information or specific department to coordinate with
- **For each building:**
    1. Gas and electricity bills (past 12 months)
        a) *State Energy Office utility database*
    2. Delivered fuels delivery records or receipts (12 months)
        a) *Propane, fuel oil, gasoline*
    3. As-built electrical drawings – single line diagrams, building circuits, switchboards
        a) *Architecture and Engineering Department or State Energy Office*
    4. Facility condition assessments or asset inventory data
        a) *Facility Inventory and Condition Assessment Reports*
        b) *Other documentation*
    5. List of existing generators with capacity, location, runtime, and age
    6. Facility coordinate locations and property boundaries

TETRA TECH

Discussion and Q&A

Date	6/12/25
Meeting Title	Research Project Kickoff: Renewable Energy
Location	Teams
Present	Alex, David, Joe, Reedie, Aaron, Andrew Choi, Nick, Rachel, Drew, Brian, Alec

Action Items	
Responsible	**Action**
Drew	Revise RFI
David, Reedie, and Brian	Coordinate to hand off as-built files
Alec	Send meeting minutes and RFI
Alex + Alec	Coordinate times for biweekly check-ins

Notes:

Goals of the project

- Try to look at different technologies that might help the department with efficiencies – Aaron proposed that they look at renewable opportunities to offset energy consumption
- Cost efficient to implement

David has added resources to the MDT Drive folder

- Energy database that shows all of MDT energy data
    - David thinks that it understates the energy load tied to the headquarters facilities – will need to identify meters and get invoices to confirm the loads
    - David has made some pivot charts – E is for energy, F includes unmetered street lighting, G is gas
- Commercial property database – statewide and maintained by Dept of Administration
    - Prefiltered for Helena and 2701 Prospect
    - Includes square footage for each facility
- Using Solesca to scope solar projects and David ran a preliminary analysis of one site
    - This also ties in with some third-party package

Brian – Do we need to considered delivered fuels at any locations?

- David – no bulk fuels in Helena, but there are elsewhere
    - Backup power at data center adjacent to HQ, for example
    - Makes sense to consider this a part of the campus
- Aaron - probably propane powering one facility (Dillon) – you'll have to interview office managers
- There are some underground storage tanks in the southeast corner of the facility

Drew –

- Some of the RFI is covered be the databases that David has already created
- We'll want to get the interview contact information
- RFI is an iterative process

Questions –

- Utility invoices for the last six months – every building on campus?
    - If it uses energy, we'd like to include it. If it's crazy hard to get, then ok.
    - MDT will discuss internally which buildings are included
- How does it work with a central renewables system if you have multiple meters?
    - This is a component that we'll want to address
    - Nick – case by case base to customize

Rachel – Workplan

Aaron – when you come up tax credits, etc – will it factor in things like IRA rollbacks?

- Drew – we'll work to come up with the ideal system in theory and then refine it based on equipment and available siting, then refined again based on up-to-date funding opportunities
- And we'll include sensitivity analysis
- Things can change day to day but we'll be tracking that

David – one thing to keep in mind for funding for a pilot PV, for example, has to qualify for Era by America or maybe BABA

Drew – any constraints on this project in terms of the timeline?

- Alex – if there's more time or money, we will need to make adjustments and go through the process.

Drew – one goal is a reasonable pay back time – is there a specific timeline in mind? Are there any challenges with reliability to keep any eye on?

- Aaron – the research is convey all of those pieces to upper management – but not sure what the magic bullet is to get the project on the ground
- I don't think there's going to be any one thing up there that's going to trigger a go decision – cost is a big thing but resiliency could play into it as well (though not as much as cost)
    - Reducing carbon emissions is probably not going to sell a project though
- Alex – the shorter turn around on cost savings/return, the better

Drew – is there a specific end product that will help sell this to decision makers?

- Aaron – goal will be study in a report that is easy to distribute and send to different people at MDT to make an informed decision

Rachel – Immediate next steps – Background Research

Alex – just had a town hall with directors and a big goal is asset management – if we can frame this as managing assets more wisely, that might be another way to sell this

Reedie – what do you look for in terms of assets/facility conditions?

- Identifying constraints – age and capacity of electrical infrastructure; roof systems; if we know that a building will be demolished within five yeas, we won't look at that for long term investment

David – I tried to upload some as-builts and it's too much to upload and keeps crashing

- Brian could collect a drive in person

Brian – RFI includes Asset info request – does MDT have more detailed info on assets versus state reports?

- Alex – someone is collecting this at the state level but we also have people in charge of maintaining assets so this could be a good question for our maintenance team
- Reedie – we do have asset management software

Drew – to expand

- Looking at address, square footage, building type
- Condition of equipment
- Age of facility
- Qualitative concerns
- Capital expense plans
- Demolition plans

Appendix B

Phase	Task	Description	Percent Complete	Original Begin Date	Revised Begin Date	Actual Begin Date	Original Completion Date	Revised Completion Date	Actual Completion Date	Outstanding Issues (Documented at Close of Month)	Schedule
											Week Start Date
											Week End Date
											Week Number
1	**Project kickoff and delivery**										
	Task 1	Kickoff meeting and project workplan	100%	1-Jun-25		1-Jun-25	7-Jun-25		14-Jun-25		
	Deliverable	Kickoff meeting							12-Jun-25		
	Deliverable	Project workplan							18-Jun-25		
	Task 2	Background research	90%	1-Jun-25		1-Jun-25	5-Jul-25				
	Task 3	Data collection	65%	8-Jun-25		8-Jun-25	5-Jul-25			At the end of the month (and as of submission of the June report) there are outstanding data request items, including facility as-built drawings, support to match electricity meter numbers to specific buildings, 15-minute electricity interval data, and data on facility criticality.	
2	**Energy Analysis**										
	Task 1	Building, infrastructure, and utility review									
	Task 2	Building energy and operational assessment									
	Task 3	Renewable energy technology review									
	Task 4	Permitting and environmental considerations									
	Deliverable	Building database spreadsheet									
	Deliverable	Energy analysis presentation									
	Deliverable	Renewable power technology matrix									
3	**Implementation plan**										
	Task 1	Backup power and resilience energy modeling									
	Task 2	Cost estimating									
	Task 3	Lifecycle cost analysis									
	Task 4	Funding and review									
	Deliverables	Draft and Final Reports (Final, Research Summary, Implementation, Performance Measures, Poster)									
	Deliverable 3-2	Final presentation and webinar									
4	**Pilot Project Design**										
	Task 1	Pilot PV Design									
	Task 2	Helena HQ PV Design									
	Deliverable 1	Pilot PV Design, Helena HQ Design									
	Deliverable 2	Associated Report or Memo									
	Task 3	Implementation Recommendations Analysis									

Week Start Date	1-Jun-25	8-Jun-25	15-Jun-25	22-Jun-25	29-Jun-25	6-Jul-25	13-Jul-25	20-Jul-25	27-Jul-25	3-Aug-25	10-Aug-25	17-Aug-25	24-Aug-25	31-Aug-25	7-Sep-25	14-Sep-25	21-Sep-25	28-Sep-25
Week End Date	7-Jun-25	14-Jun-25	21-Jun-25	28-Jun-25	5-Jul-25	12-Jul-25	19-Jul-25	26-Jul-25	2-Aug-25	9-Aug-25	16-Aug-25	23-Aug-25	30-Aug-25	6-Sep-25	13-Sep-25	20-Sep-25	27-Sep-25	4-Oct-25
Week Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		*							**									
																**		
									*							*		

Key:

Phase Duration	Task Duration	Deliverable	Timeframe

D = Draft deliverable provided to MDT

R = Draft deliverable reviewed and returned by MDT (allows approximately 1-month review period)

F = Final deliverable

* = Designates biweekly meeting

** = Designates meeting with Phase summary presentation

Week

5-Oct-25	12-Oct-25	19-Oct-25	26-Oct-25	2-Nov-25	9-Nov-25	16-Nov-25	23-Nov-25	30-Nov-25	7-Dec-25	14-Dec-25	21-Dec-25	28-Dec-25	4-Jan-26	11-Jan-26	18-Jan-26	25-Jan-26	1-Feb-26	8-Feb-26	15-Feb-26	22-Feb-26	1-Mar-26	8-Mar-26	15-Mar-26	22-Mar-26	29-Mar-26	5-Apr-26	12-Apr-26	19-Apr-26	26-Apr-26	3-May-26	10-May-26	17-May-26	24-May-26	31-May-26	7-Jun-26	14-Jun-26	21-Jun-26
11-Oct-25	18-Oct-25	25-Oct-25	1-Nov-25	8-Nov-25	15-Nov-25	22-Nov-25	29-Nov-25	6-Dec-25	13-Dec-25	20-Dec-25	27-Dec-25	3-Jan-26	10-Jan-26	17-Jan-26	24-Jan-26	31-Jan-26	7-Feb-26	14-Feb-26	21-Feb-26	28-Feb-26	7-Mar-26	14-Mar-26	21-Mar-26	28-Mar-26	4-Apr-26	11-Apr-26	18-Apr-26	25-Apr-26	2-May-26	9-May-26	16-May-26	23-May-26	30-May-26	6-Jun-26	13-Jun-26	20-Jun-26	27-Jun-26
19	20	21	22	23	Review and Revision Period (3-Cycles)												36	37	38	39	40	41	42	43	44	Review and Revision Period (3-Cycles)											

*																**																					
				D1	Allows for review and response times in “Deliverables Format and Submission Process” Section											F																					
				Tentative – dependent upon final report review period																																	

																		*			*																**
																									D	Allows for review and response times in “Deliverables Format and Submission Process” Section										F
																									D											F

Appendix C

Tetra Tech: Montana Department of Transportation

Item #	Discipline	Item Needed	Date Requested	Date Needed	Date Rec'd/ Completed	Status	Comments
1	General	Please edit existing MDT_UtilityData.xlsx to clarify units for existing electrical utility bills showing total kWh consumption, peak kW demand, total cost ($) per month, and utility rate structure/tariff name.	6/12/2025			**Open**	**Medium Priority** - Received kWh consumption, but not peak demand. If possible, please provide metered electricity demand in 15 min intervals. Peak demand and the daily operational profile is critical for resiliency/backup power calculations.
2	General	Please provide gas utility bills showing total therms, total cost ($) per month, and utility rate structure/tariff name.	6/12/2025			**Closed**	
3	General	A list of full meter numbers per building and, if any submeters are present, descriptions of what submeter serves each building/section of building/operation.	6/12/2025			**Open**	**High Priority** - Match properties names in "MDT_2025_comm_property.xlsx" with account numbers in "MDT_Utility Data.xlsx". The common denomonator is building address, but it is unclear which property descriptions belong to which account numbers. For example, there are 5 buildings listed for the "100 Nelson Road" address in the "MDT_Utility Data.xlsx" with Building Number and Name (columns D & E). For this same address, there are 2 account numbers and 6 meter numbers (columns A & B). There is no common link to see which building numbers and names correspond to each account and meter number.
4	Energy	To explore utility interconnection rules and requirements, please provide the name of the local electric utility. If there is a utility account representative assigned, please provide that contact information.	6/12/2025			**Open**	Please provide the account representative for future communications with the utility.
5	Electrical	Please provide As-Built drawings for the scoped buildings and associated electrical infrastructure. Please include electrical Single Line Diagrams showing the building circuit and switchboards for each building/site	6/12/2025			**Closed**	**High Priority** - (actively being worked on with Reedie)
6	General	Schedule a dedicated resilience meeting with the emergency planner and/or emergency prepardenss department. Ideally this will inform a list of critical operations, facilities, and associated equipment/infrastructure.	6/12/2025			**Open**	Tetra Tech team to coordinate.
7	Electrical	Please provide a list of existing generators with capacity, location (if associated with specific buildings), runtime (gallons of storage), and age.	6/12/2025			**Open**	**High Priority** - (actively being worked on with Reedie)
8	General	Previous engineering feasibility studies, energy modeling reports, facility condition assessments or asset inventory data	6/12/2025			**Closed**	
9	General	Please provide existing HVAC equipment's make, model, capacity, and location	6/12/2025			**Open**	**High Priority** - (actively being worked on with Reedie)
10	Energy	Delivered fuels delivery records or receipts (past 12 months)	6/12/2025			**Open**	Open
11	General	Facility locations (address and coordinates, if available) with property boundaries defined per site	6/12/2025			**Closed**	