AGENDA ITEM or FINAL CONTRACT REVIEW SUBMITTAL FORM

Agenda Item: Agreement; Western State Colorado University, Cent

Action Requested: County Manager Signature

Parties to the Agreement: WSCU

Term Begins: immediatly **Term Ends:** 12/31/2016 **Grant Contract #:**

Summary:

WSCU will build upon the UPPER GUNNISON RIVER WATERSHED GREENHOUSE GAS EMISSIONS INVENTORY completed in 2008. WSCU will update the inventory and build a tool for measuring success of actions and proposed actions. The forecast will focus on the impact of

Fiscal Impact: $12,480 from Facilities Budget

Submitted by: John Cattles **Submitter's Email Address:** jcattles@gunnisoncounty.org

Finance Review: (●) Required ( ) Not Required

Comments:
Total contract amount will be paid using 2016 adopted budget spending authority in the Facilities Program. No concerns. ln

Reviewed by: GUNCOUNTY1\lNienhueser Discharge Date: 9/24/2016

County Attorney Review: (●) Required ( ) Not Required

Comments:
ok - gs

Reveiwed by: GUNCOUNTY1\gstuhr Discharge Date: 9/26/2016 Certificate of Insurance Required Yes (●) No ( )

County Manager Review:

Comments:

Reveiwed by: GUNCOUNTY1\mbirnie Discharge Date: 9/30/2016

(●) Consent Agenda ( ) Regular Agenda ( ) Worksession Time Allotted: 0

Agenda Date: 10/4/2016

Revised April 2015

AGREEMENT

This Agreement ("Agreement") made effective the ___ day of _____, 2016, is by and between the Board of County Commissioners of the County of Gunnison, Colorado, whose address is 200 East Virginia, Gunnison, CO 81230 ("Gunnison County") and Western State University, Center for Environment and Sustainability, whose address is Kelley Hall 240, 600 North Adams Street, Gunnison, CO 81231 ("Contractor").

RECITALS

Contractor provides services to Gunnison County, located at 200 E. Virginia Ave., Gunnison, CO (hereinafter "Services"). Gunnison County desires to engage Contractor to provide Services according to this Agreement.

AGREEMENT

NOW THEREFORE, in consideration of the Recitals and the mutual covenants and obligations hereinafter set forth, the parties agree as follows:

1. SCOPE OF SERVICES.

Contractor shall furnish all materials, labor, supervision, supplies and equipment to commence, diligently pursue, and complete the services as more specifically set forth on Exhibit A, attached hereto and incorporated herein by this reference. All Services shall be performed in a timely manner and in accordance with generally accepted standards for Contractor's profession and all applicable federal, state and local laws and regulations affecting the Services or the subject matter thereof. Contractor acknowledges that this is a non-exclusive Agreement, and Gunnison County may contract with additional or other providers able to furnish the same or similar services as it deems appropriate to do so.

2. TERM.

The term of this Agreement shall commence on the date first set forth above and shall terminate when the scope of services is complete, but not later than December 31, 2016, unless sooner terminated or replaced as provided herein.

3. STRATEGIC RESULT.

Execution of this Agreement will assist the County with its PROTECT THE ENVIRONMENT strategy, as outlined in the Gunnison County Strategic Plan.

4. COMPENSATION, BONUS AND EXPENSES.

(a) In exchange for Contractors performance of the Services, during the Term, Gunnison County shall pay Contractor fees as more specifically set

forth in Exhibit A. Payment shall be made by Gunnison County to Consultant within 45 days of receipt of an invoice.

(b) The Compensation shall compensate Contractor for all charges, expenses, overhead, payroll costs, employee benefits, insurance subsistence, and profits, except as specifically set forth herein.

(c) This Agreement is subject to Gunnison County making an annual budget appropriation in an amount sufficient to fund this Agreement. If Gunnison County fails or refuses to make such an appropriation, Gunnison County reserves the right to terminate this Agreement without penalty to Contractor pursuant to paragraph 13 of this Agreement.

5. INSURANCE.

Contractor agrees that at all times during the Term of this Agreement that Contractor shall carry and maintain, in full force and effect and at its sole cost and expense, the following insurance policies. Within thirty (30) days of the execution of this Agreement, Contractor will provide insurance certificates to Gunnison County, listing Gunnison County as an additional insured, for the coverage's required herein which shall state that such policies shall not be materially changed or cancelled without thirty (30) days prior notice to Gunnison County.

(a) Worker's Compensation Insurance in accordance with Colorado and Federal law which adequately protects all labor employed by Contractor during the term of this Agreement.

(b) Comprehensive General Liability Insurance or the equivalent for any injury to one person in any single occurrence, Three Hundred Fifty Thousand and No/100 U.S. Dollars ($350,000.00); and For an injury to two or more persons in any single occurrence, the sum of Nine Hundred Ninety Thousand and No/100 U.S. Dollars ($990,000.00).

(c) Comprehensive automobile liability insurance on all vehicles used in the Services, in an amount no less than Three Hundred Fifty Thousand and No/100 U.S. Dollars ($350,000) for any injury to one person in any single occurrence and in an amount no less than Nine Hundred Ninety Thousand and No/100 U.S. Dollars ($990,000) for any injury to two or more persons in any single occurrence.

6. INDEPENDENT CONTRACTOR.

In carrying out its obligations and activities under this Agreement, Contractor is acting as an independent contractor and not as an agent, partner, joint venture or employee of Gunnison County. Contractor does not have any authority to bind Gunnison County in any manner whatsoever.

Contractor acknowledges and agrees that Contractor is not entitled to: (i) unemployment insurance benefits; or (ii) Workers Compensation coverage, from Gunnison County. Further, Contractor is obligated to pay federal and state income tax on any moneys paid it related to the services.

7. INDEMNIFICATION.

Contractor agrees to indemnify, defend and hold harmless Gunnison County, its Commissioners, agents and employees of and from any and all liability, claims, liens, demands, actions and causes of action whatsoever (including reasonable attorney's and expert's fees and costs) arising out of or related to any loss, cost, damage or injury, including death, of any person or damage to property of any kind caused by the misconduct or negligent acts, errors or omissions of Contractor or its employees, subcontractors or agents in connection with this Agreement.

This provision shall survive any termination or expiration of this Agreement with respect to any liability, injury or damage occurring prior to such termination.

8. DISCRIMINATION.

The Contractor agrees not to discriminate against any person or class of persons by reason of age, race, color, sex, creed, religion, disability, national origin, sexual orientation or political affiliation in providing any services or in the use of any facilities provided for the public in any manner prohibited by Part 21 of the Regulations of the Office of the Secretary of Transportation. Contractor shall further comply with the letter and spirit of the Colorado Anti-Discrimination Act of 1957, as amended, and any other laws and regulations respecting discrimination in unfair employment practices. Additionally, Contractor shall comply with such enforcement procedures as any governmental authority might demand that Gunnison County take for the purpose of complying with any such laws and regulations.

9. IMMIGRATION COMPLIANCE CERTIFICATION.

(a) Contractor certifies that Contractor does not and will not knowingly contract with or employ illegal aliens to work under this Agreement.

(b) Contractor certifies that Contractor has required its subcontractors to certify that they do not knowingly contract with or employ illegal aliens to work under this Agreement.

(c) Contractor certifies that it has attempted to verify the eligibility of its employees and subcontractors to work through the Basic Pilot Employment Verification Program administered by the Social Security Administration and Department of Homeland Security.

(d) Contractor agrees to comply with all reasonable requests made in the course of an investigation under C.R.S. 8-17.5-102 by the Colorado Department of Labor and Employment.

(e) Contractor agrees to comply with the provisions of C.R.S. 8-17.5-101 et seq.

10. ADA COMPLIANCE.

The Contractor assures Gunnison County that at all times during the performance of this Agreement no qualified individual with a disability shall, by reason of such disability, be exclude from participation in, or denied benefits of the service, programs, or activities performed by the Contractor, or be subjected to any discrimination by the Contractor upon which assurance Gunnison County relies.

11. MISCELLANEOUS.

(a) SEVERABILITY. If any clause or provision of this Agreement shall be held to be invalid in whole or in part, then the remaining clauses and provisions, or portions thereof, shall nevertheless be and remain in full force and effect.

(b) AMENDMENT. No amendment, alteration, modification of or addition to this Agreement shall be valid or binding unless expressed in writing and signed by the parties to be bound thereby.

(c) NO WAIVER OF GOVERNMENTAL IMMUNITY. Nothing in this Agreement is, or shall be construed to be, a waiver, in whole or part, by Gunnison County of governmental immunity provided by the Colorado Governmental Immunity Act or otherwise.

12. DELEGATION AND ASSIGNMENT.

This is a personal services contract with Contractor and, therefore, Contractor shall not delegate or assign its duties under this Agreement without the prior written consent of Gunnison County which consent Gunnison County may withhold in its discretion. Subject to the foregoing, the terms, covenants and conditions of this Agreement shall be binding on the successors and assigns of either party.

13. TERMINATION.

Either party shall have the right to terminate this Agreement at any time, with or without cause, upon thirty (30) days prior written notice to the other. Upon termination, Contractor shall be entitled to compensation for Services performed prior to the date of termination, per the compensation terms outlined in Exhibit A.

14. NOTICES.

Any notice, demand or communication which either party may desire or be required to give to the other party shall be in writing and shall be deemed sufficiently given or rendered if delivered personally or sent by certified first class US mail, postage prepaid, addressed as follows:

Gunnison County:	County Manager Gunnison County 200 E. Virginia Gunnison, Colorado 81230 Phone: 970-641-0248
With a copy to:	Board of County Commissioners of the County of Gunnison, Colorado 200 E. Virginia Gunnison, Colorado 81230
Contractor:	Western State Colorado University Center for the Environment and Sustainability Kelley Hall 240 600 North Adams Street Gunnison, CO 81231

Either party has the right to designate in writing, served as provided above, a different address to which any notice, demand or communication is to be mailed.

15. GOVERNING LAW.

This Agreement shall be governed by and interpreted in accordance with the laws of the State of Colorado. Exclusive jurisdiction and venue for any legal proceedings related to this Agreement shall be in the state District Court governing Gunnison, Colorado.

16. ATTORNEYS FEES.

If any party hereto shall bring any suit or action against another for relief, declaratory or otherwise, arising out of this Agreement, the prevailing party shall have and recover against the other party, in addition to all court costs and disbursements, such sum as the court may adjudge to be reasonable attorneys fees and expert witness fees.

17. COUNTERPARTS: FACSIMILE TRANSMISSION.

This Agreement may be executed by facsimile and/or in any number of counterparts, any or all of which my contain the signatures of less than all the parties, and all of which shall

be construed together as but a single instrument and shall be binding on the parties as though originally executed on one originally executed document. All facsimile counterparts shall be promptly followed with delivery of original executed counterparts.

18. ENTIRE AGREEMENT.

This Agreement contains the entire agreement between the parties hereto with respect to the subject matter hereof, and supersedes any and all prior agreements, proposals, negotiations and representations pertaining to the obligations to be performed hereunder.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date set forth above.

BOARD OF COUNTY COMMISSIONERS
OF THE COUNTY OF GUNNISON, COLORADO

By: _____
Matthew Birnie, County Manager ATTEST:

_____
Deputy Clerk

CONTRACTOR

By: _____

EXHIBIT A

Proposal For:

ENERGY, MATERIAL, and GREENHOUSE GAS (GHG) EMISSIONS FOOTPRINT BASELINE AND FORECAST – GUNNISON COUNTY, COLORADO

Mr. John Cattles
Facilities Director

Submitted By:

Western State Colorado University
Center for Environment and Sustainability (ENVS) – Sustainable and Resilient Communities

Contact: Dr. Abel Chávez
(970-943-2017; achavez@western.edu)

September 7, 2016

Introduction and Team

The Center for Environment & Sustainability (ENVS) at Western State Colorado University (WSCU) is honored to submit this proposal for the **Energy, Material, and Greenhouse Gas (GHG) Emissions Footprint Baseline and Forecast – Gunnison County, Colorado**. WSCU has a rich history of working intra- and inter-Colorado communities since its inception in 1911. More recently, and since its formation over 20 years back, ENVS has been connecting faculty and student research, service, and practicum with resilient solutions for ecological health and sustainable communities. Through a robust set of agency-, organizational-, and municipal-level partnerships, ENVS is able to maintain cutting-edge and real-world solutions that are tailor-made and context specific.

The ENVS team is comprised of global experts, thought leaders, and practitioners. While being solidly grounded in theory and best practices, the services rendered to our community partners are also continually updated and appropriately fit to local realities and demands. One of the leading faculty in this regard is Dr. Abel Chávez.

Dr. Abel Chávez directs ENVS' Sustainable and Resilience Communities (SRC) track. As SRC director, Dr. Chávez proudly integrates his global expertise gained across various related projects with cities such as Manila (Philippines), Berlin (Germany), Delhi (India), Mexico City (Mexico), as well as Colorado cities such as Denver, Aspen, Eagle, and Montrose, among many others in the US and abroad. Dr. Chávez is an expert in the community scale GHG inventory/footprint methodology proposed for Gunnison County as well as an author of the latest global GHG accounting standards. Dr. Chávez and his team of consultants work side-by-side with cities, stakeholders, citizens, businesses, and their regions to engage, articulate, and design forward thinking innovative solutions to locally define sustainability and resiliency challenges.

Overview, Approach and Expertise

Dr. Chávez and his team of consultants have spent countless hours in communities scoping, executing, implementing, and creating economic and sustainable solutions that are temporally, spatially, and socially relevant. A key value of Chávez's SRC team involves working with and alongside community stakeholders. We have developed our proven and nimble approach alongside countless communities through a variety of projects – providing tangible, actionable and visible results for communities. Moreover, as we have both authored and consulted the development of latest global GHG Accounting protocols (e.g., ICLEI-US, PAS 2070, GPC), we have developed tools and models that merge seamlessly with many of the standards used by communities today. Last, our structure is such that our partners receive high value and consultancy level products from both a team of dedicated experts in the field and a trusted academic institution with over 100 years of existence. Dr. Chávez maintains a high level of commitment to develop products tailored to the needs of a community at all phases of a project.

Tools for data and GHG accounting standard integration: An increasing amount of cities across the globe are adopting reporting platforms to help them make effective use of internal capacities and financial resources for relevant planning. While many of these reporting platforms are great tools for regional-to-global standardization, important community specific criterion remains. Thus, to allow communities to effectively and economically manage internal demands while also meeting global standards, we have developed two tools. The **BAFT** *(baseline, accounting and forecasting tool)* is used for measuring, benchmarking, and forecasting community-wide energy, material, and GHG emission flows. Meanwhile, the **EMiTT** *(effective mitigation transition tool)* is used to model, track, and quantify climate action mitigation targets and associated economic parameters in a dynamic real-time application by sector and community-wide. Both models were designed to directly complement global best standards and provide community leaders the tools to dynamically visualize the potential impacts of individual efforts.

SRC's strong partnerships with e.g., ICLEI has enabled us to ensure that both the BAFT and EMiTT models efficiently and seamlessly integrate with reporting platforms (e.g., ClearPath, Carbon*n*). Our BAFT model creates robust, customizable graphics, delineating energy, material, and GHG flows by sector and offering multiple options to visualize the community-wide emissions forecast. We have also integrated the ability to model multiple electric utilities, which takes into account the unique changes in projected emission factors for various utilities. Our EMiTT model uses five variables to calculate the long run impact of individual mitigation efforts on both sector-specific trends and the community-wide forecast. These five variables are baseline emissions, % annual savings, % participation rate, year implemented, and number of years active. This model allows for testing the sensitivity of each variable in real time, which creates great value for community leaders when engaging with key stakeholders.

Global Experts in Energy, Material, and GHG Accounting: Chávez and his SRC team have not only developed tools to help communities integrate tangible economies of scales into their sustainability and environmental operations, but our team are recognized global experts in the field of community-scale GHG accounting. On one hand, the peer-reviewed literature has been forever stamped by our work; on the other hand, we work with and in communities to implement pragmatic transitions. The GPC *(Global Protocol for Community-Scale Greenhouse Gas Emission Inventories)* explicitly states that communities should account for all out-of-boundary flows; said flows can either serve *production* or *consumption* activities tracing the entire supplychain serving the community.

Lastly, SRC adheres to strict accounting and reporting principles in all community-scale work and operates within an ethical framework – closely following global principles of relevance, completeness, consistency, transparency and accuracy to represent a fair and true account of emissions and to reduce tradeoffs.

Scope of Work

Gunnison County (Mr. John Cattles) and Western State Colorado University (Dr. Chávez) will partner to develop an **Energy, Material, and Greenhouse Gas (GHG) Emissions Footprint Baseline and Forecast for Gunnison County, Colorado**. While this work will refer to past know-how contained in the UGRW (2005) GHG Inventory, we will collect new data and apply best practices to complete this Footprint and Baseline.

Following are short narratives for each Scope of Work (SoW) item, as defined by Mr. John Cattles, projected to run through December 2016.

Task 1: Energy, Material, and GHG Footprint Baseline

The foundation to modern, relevant, and suitable planning includes robust community resource accounting. And while there are several types of said accounting that communities are adopting, the latest publicly and globally accepted standards, which Dr. Chávez's work in global cities (e.g., multiple US cities, China and India) helped inform directly, prescribe approaches adopted by communities today. Though there are several approaches for accounting the energy, material, and GHGs associated with a community (see figure 1), for this work we propose Gunnison County complete a baseline using the Purely Territorial *(Scope 1)* and the Expanded Production (*Scope 1, 2, 3 related to 'production'*) approaches. The latter approach is considered a Footprint (not an Inventory), and is well suited for assessing and communicating the **in-** and **out-of**boundary effects; for example, both tail-pipe fuel combustion (in-boundary) and life-cycle fuel processing (out-of-boundary). This combination will directly serve and significantly complement the County's ongoing efforts in real time. In the future, we suggest the County also explore completing the Consumption-Based (*Scope 1, 2, 3 related to 'consumption'*) estimate, which will provide a unique suite of planning scenarios. * *Note that the UGRW (2005) GHG Inventory is a Purely Territorial accounting.*

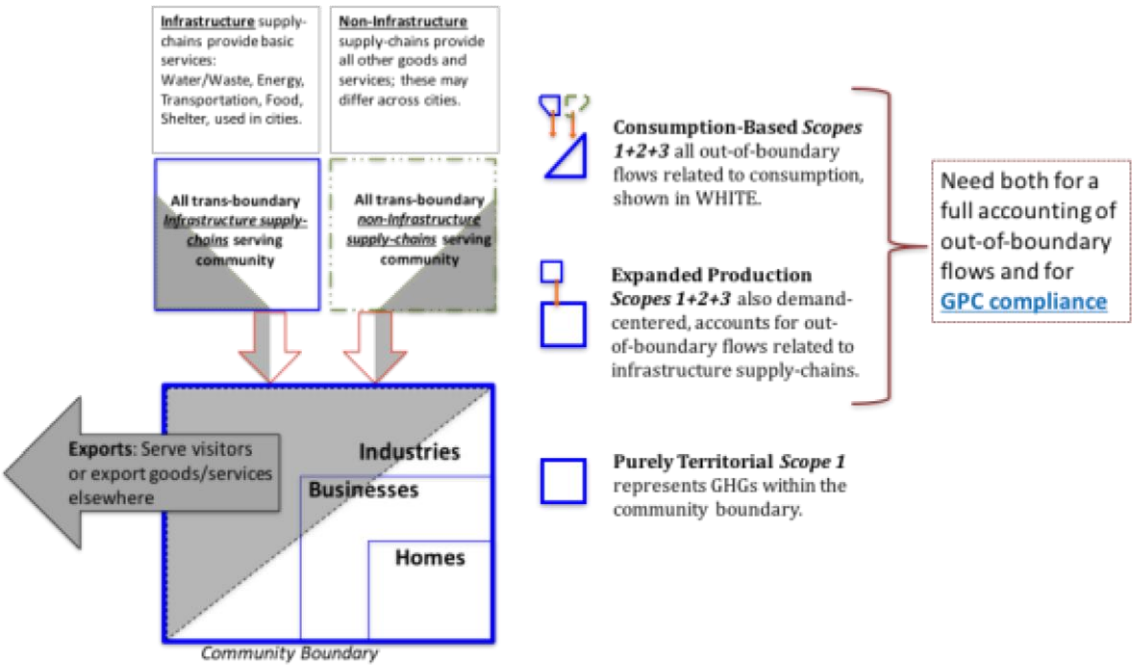

*Figure 1: Illustrating the three basic types of GHG accounting approaches for communities. For Gunnison County, we will begin by completing the 'Purely Territorial' accounting estimate, then as prescribed in the GPC, we will estimate the out-of-boundary flows via the **Expanded Production** approach. In the future, we recommend Gunnison County completing a **Consumption-Based** estimate. Adapted from Chávez et al. (2013).*

Further, in order to compile a baseline that is defensible and one that withstands all levels of scrutiny, Dr. Chávez will perform a series of data checks and benchmarks to assist in possibly identifying erroneous data points. Data benchmarks employed in BAFT will also help elevate the

defensibility of the forecast. While these benchmarks are not intended for comparative purposes, they do establish an efficient and rigorous framework for assessing local activity data. See table 1 for examples of possible benchmarks.

Table 1: BAFT adopts a robust set of benchmarks, by sector and in- & out-of-boundary for efficient data checks. Below is a short list to illustrate some of the possible benchmarks employed in BAFT. Benchmarks embedded in our tools have been gathered from community-scale best practices.

In-Boundary	Commercial Buildings	Electricity *(MWh)* Natural Gas *(therms)* Building Area *(sq-ft)* Electricity Intensity *(kBTU/sf/yr)* Natural Gas Intensity *(kBTU/sf/yr)*
	Residential Buildings	Electricity *(MWh)* Natural Gas *(therms)* Electricity Intensity *(kBTU/HH/mo)* Natural Gas Intensity *(kBTU/HH/mo)*
Hybrid	Transportation	Surface Travel Intensity *(VMT/capita/yr)* Public Transportation *(PMT/capita/yr)* Air Travel *(gallons-jet fuel/enplaned passenger)* Vehicle Fleet Fuel Efficiency *(miles/gallon)*
Out-of-Boundary	Imports	Food *(pounds/yr)* Retail goods *($/yr)* Services *($/yr)*

Task 2: Forecast BAU GHG Emissions to 2030

Using the outputs from Task 1, we will complete a business-as-usual (BAU) GHG emissions forecast for Gunnison County in our BAFT model. We estimate that some of the underlying activity 'growth rates' will leverage statistics from population trends, employment growth, consumer demand, and local energy use, among others. Forecasts can be used to help community members visualize the potential trajectory of BAU which can stimulate positive discussion. In addition, the power of forecasting opens the possibility of assessing innovative actions towards achieving community-wide goals, thus mobilizing action across various citizen groups.

In order to efficiently create a robust BAU forecast that is justifiable, reliable and defensible, we ask that all available past & present activity, energy, material, and GHG data for Gunnison County be shared with Dr. Chávez. A formal and detailed data request will be submitted at project launch.

Task 3: GHG Mitigation Potential from On-Road Fuel Switching

We will use EMiTT to demonstrate the GHG abatement capacity from fuel switching on-road transportation from existing gasoline and diesel to compressed natural gas. After robust data collection, consultation and benchmarking with community staff, outputs from BAFT include a series of data that are used as direct inputs into EMiTT. EMiTT accounts for five key customizable variables, all important for modeling and visualizing mitigation:

a) baseline emissions, by sector;
b) expected savings from mitigation action;
c) level of participation;
d) year action was implemented; and
e) number of years action is active.

Key features of EMiTT include sector and community-wide visual illustrations of mitigation impacts as well as key data for added analysis. Such a feature has been proven vital for real-time citizen and policy engagement for climate action planning. Our EMiTT model is also adaptable to mitigation action by type (i.e., voluntary vs. regulatory). The standard EMiTT model includes up to thirty (30) mitigation actions, per sector, which can be expanded upon request. As Gunnison County drives efforts with mitigation intersections, EMiTT can be used to model the estimated energy-material-GHG benefits of those actions (e.g., transportation fuel transitions, promotion of alternative modes of transport and efficient vehicle programs). Our EMiTT model is the perfect companion to garner buy-in across stakeholders!

The key strategies we will model are:

- On-Road Vehicle Fuel Switching – from gasoline and diesel to compressed natural gas. *Impacted footprint sector* – **ON-ROAD TRANSPORT**.

Lastly, as discussed with Mr. John Cattles, if this effort is able to launch in a timely manner, both BAFT and EMiTT can be used as one of the tools for engaging the local community throughout the anticipated sessions during the fall 2016 and spring 2017.

Project Management and Timeline

Effective project management (PM) is a priority for us. The SRC team carries hours of project management expertise across several types of projects in many settings. We are proud to adopt the Project Management Institute's (PMI) five-phase approach to PM, and while we do so rigorously, from our partners' purview, they simply reap the benefits of our meticulous PM. During the course of this effort, we are committed to meet with Mr. Cattles and other County representatives to ensure the quality of this partnership.

The products stated in the above SoW may be modified by the mutual consent of the parties. It is expected and largely desired that the above tasks (1-3) be fulfilled and delivered by December 31, 2016. The following table provides an estimated schedule towards delivery.

ACTIONS/TASKS	DELIVERY DATE

PROJECT LAUNCH AND TEAM CONFERENCE CALL	September 19, 2016
DATA COLLECTION FOR GHG INVENTORY	Weeks of September 19 and September 26, 2016
DATA COLLECTION FOR GHG FOOTPRINT	Week of October 3, 2016
DATA BENCHMARKING	Weeks of October 3 and October 10, 2016
DRAFT OF GUNNISON COUNTY BASELINE FOOTPRINT	October 17, 2016
DATA COLLECTION FOR 2030 GHG FORECAST	Week of October 17, 2016
FINALIZE BASELINE FOOTPRINT AND VISUALS	October 24, 2016
FIRST DRAFT OF 2030 GHG FORECAST	November 2, 2016
FINALIZE 2030 GHG FORECAST	November 11, 2016
BUILD GHG FORECAST VISUALS	Week of November 14, 2016
PRESENT GHG FOOTPRINT AND FORECAST TO COMMUNITY STAKEHOLDERS	Mid-November 2016
MODEL KEY TRANSPORT STRATEGY IN EMITT	Week of November 28, 2016
FINAL SUMMARY REPORT	December 15, 2016

Budget

The budget request for the products detailed in the SoW is $12,480.00. Half ($6,240.00) is requested at project start, and half ($6,240.00) at project completion, expected by December 31, 2016. The requested funds include the costs of travel to stakeholder meetings in Gunnison County,

as well as the complete BAFT and EMiTT models for Gunnison. We kindly ask that payments be submitted to the Western State Colorado University Foundation; invoices will be emailed shortly after project launch.

The SRC team is excited about the possibilities that a partnership with Gunnison County can yield for the entire community and region. We are humbled by the opportunity to partner with you and share our leadership in the area of GHG inventorying and footprinting, community outreach and engagement, and innovation in tools & data management. We look forward to a strong partnership with your team!

Works Cited

Chávez, A. (2012). Comparing City-Scale Greenhouse Gas (GHG) Emissions Accounting Methods: Implementation, Approximations, and Policy Relevance. *PhD Thesis.* University of Colorado Denver.

Chávez, A. (2016). Community Metabolism Footprints: Scaling Communities Towards Global Sustainability. In Preparation.

Chávez, A. & Ramaswami, A. (2013). Articulating A Trans-Boundary Infrastructure Supply Chain Greenhouse Gas Emission Footprint for Cities: Mathematical Relationships and Policy Relevance. *Energy Policy*, *54*, 376-384.

GPC (2014). Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC). Retrieved from: http://www.iclei.org/our-activities/our-agendas/low-carboncity/gpc.html.

ICLEI (2012). U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions. Retrieved from: http://icleiusa.org/publications/us-community-protocol/.

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UGRW (2005). Upper Gunnison River Watershed Greenhouse Gas Emissions Inventory. Office of Resource Efficiency, Crested Butte, CO.