AGENDA 2:30 P.M.

CITY COUNCIL MEETING WEDNESDAY, SEPTEMBER 11, 2024

NOTES:

- Meeting room is wheelchair accessible. American Disabilities Act (ADA) accommodations are available upon request. Please phone 928-282-3113 at least two (2) business days in advance.
- City Council Meeting Agenda Packets are available on the City's website at:

  www.SedonaAZ.gov

THE MEETING CAN BE VIEWED LIVE ON THE CITY'S WEBSITE AT WWW.SEDONAAZ.GOV OR ON CABLE CHANNEL 4.

GUIDELINES FOR PUBLIC COMMENT

PURPOSE:

- To allow the public to provide input to the City Council on a particular subject scheduled on the agenda.
- This is not a question/answer session.
- The decision to receive Public Comment during Work Sessions/Special City Council meetings is at the discretion of the Mayor.

PROCEDURES:

- Fill out a "Comment Card" and deliver it to the City Clerk.
- When recognized, use the podium/microphone.
- State your:
  1. Name and
  2. City of Residence
- Limit comments to **3 MINUTES.**
- Submit written comments to the City Clerk.

1. CALL TO ORDER/PLEDGE OF ALLEGIANCE/MOMENT OF SILENCE
2. ROLL CALL
3. SPECIAL BUSINESS — LINK TO DOCUMENT =
   a. AB 3101 **Discussion/possible action** regarding approval of Year 2 of the Home Energy Retrofit Project Agreement with CozyHome LLC in an amount not-to-exceed $90,000.
   b. AB 3098 **Discussion/possible direction** regarding sustainability programming and the Decarbonization Roadmap created with McKinstry Essention LLC.
   c. **Discussion/possible action** regarding ideas for future meetings/agenda items.
4. EXECUTIVE SESSION

   Upon a public majority vote of the members constituting a quorum, the Council may hold an Executive Session that is not open to the public for the following purposes:
   a. To consult with legal counsel for advice regarding matters listed on this agenda per A.R.S. § 38-431.03(A)(3).
   b. Return to open session. **Discussion/possible action** regarding executive session items.
5. ADJOURNMENT

Posted: 08/29/24

By: DJ

JoAnne Cook, CMC
City Clerk

Note: Pursuant to A.R.S. § 38-431.02(B) notice is hereby given to the members of the City Council and to the general public that the Council will hold the above open meeting. Members of the City Council will attend either in person or by telephone, video, or internet communications. The Council may vote to go into executive session on any agenda item, pursuant to A.R.S. § 38-431.03(A)(3) and (4) for discussion and consultation for legal advice with the City Attorney. Because various other commissions, committees and/or boards may speak at Council meetings, notice is also given that four or more members of these other City commissions, boards, or committees may be in attendance.

A copy of the packet with material relating to the agenda items is typically available for review by the public in the Clerk's office after 1:00 p.m. the Thursday prior to the Council meeting and on the City's website at www.SedonaAZ.gov. The Council Chambers is accessible to people with disabilities, in compliance with the Federal 504 and ADA laws. Those with needs for special typeface print, may request these at the Clerk's Office. All requests should be made **forty-eight hours** prior to the meeting.

NOTICE TO PARENTS AND LEGAL GUARDIANS: Parents and legal guardians have the right to consent before the City of Sedona makes a video or voice recording of a minor child, pursuant to A.R.S. § 1-602(A)(9). The Sedona City Council meetings are recorded and may be viewed on the City of Sedona website. If you permit your child to attend/participate in a televised City Council meeting, a recording will be made. You may exercise your right not to consent by not allowing your child to attend/participate in the meeting.

CITY COUNCIL CHAMBERS
102 ROADRUNNER DRIVE, SEDONA, AZ

The mission of the City of Sedona government is to provide exemplary municipal services that are consistent with our values, history, culture and unique beauty.

CITY COUNCIL AGENDA BILL

AB 3101
September 11, 2024
Special Business

Agenda Item: 3a
Proposed Action & Subject: Discussion/possible direction regarding approval of Year 2 of the Home Energy Retrofit Project Agreement with CozyHome LLC in an amount not-to-exceed $90,000.

Department	Sustainability/Bryce Beck
Time to Present	10 minutes
Total Time for Item	15 minutes
Other Council Meetings	Project Discussed in Sustainability Updates on February 8, 2022, September 28, 2022, June 28, 2023, May 29, 2024
Exhibits	A. Home Energy Retrofit Project Agreement

Finance Approval	Reviewed 8/28/24 JDM
City Attorney Approval	Reviewed 8/27/24 KWC
City Manager's Recommendation	Approve the Year 2 agreement with CozyHome. JAD 8/28/24

Expenditure Required	
$	Up to $90,000 / FY
Amount Budgeted	
$	90,000 / FY
Account No. (Description)	10-5350-01-6405 Professional Services

SUMMARY STATEMENT

Background:

The Home Energy Retrofit Project launched in March of 2022 as an initiative of the city's Climate Action Plan. CozyHome LLC has been the project's partner since that time. In the summer of 2023, Request for Qualification (RFQ) No. 2023/24-003 was released for the project. CozyHome was awarded the project through the competitive evaluation process of the RFQ. The first year of the agreement was approved by the city manager on October 27th, 2023. This is the second year of the agreement and 3 years remain.

CozyHome has successfully performed weatherization and energy efficiency work with 70 homes over the past three years, through the city program, and over 1,200 homes since 2012, for the company overall. CozyHome has performed exemplary work in performing duct sealing, air sealing, home energy audits, insulation repair, weatherization, and mini-split installations over each round of the program. They have been responsive to community member inquiries, scheduling, and servicing, and have helped establish the Home Energy Retrofit Project as a valued community program that helps serve disadvantaged community members.

Figure 1: Before and After Insulation Repair performed by CozyHome

Surveying the participants in the first round of the project showed 85% of respondents were very satisfied, and CozyHome consistently rated high in scheduling, work performed, project results, and staff categories. On the following graph, the purple bars represented the number of instances respondents provided a score of 5 (Very satisfied) in a variety of areas. CozyHome's customer service and expertise has been well-received by the community, and they have provided strong communication, project documentation, and flexibility throughout the program years.

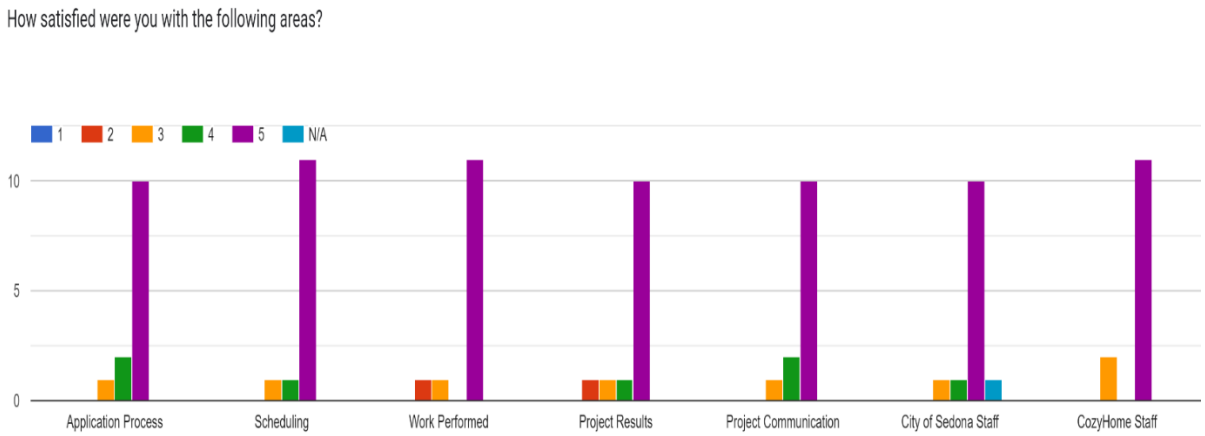


Figure 2: Home Energy Retrofit Project - First Round Survey Results

The Home Energy Retrofit Project has averaged roughly 23 households per year of the program. CozyHome has delivered on the project needs and have satisfactorily met all agreement criteria in each year of the project. Their staff has completed this work through courteous and knowledgeable interactions with community members and extensive expertise in home energy, weatherization, and building retrofits.

Climate Action Plan/Sustainability Consistent: ☒**Yes -** ☐**No -** ☐**Not Applicable**

The Home Energy Retrofit Project was initiated directly from ideas and actions from the city's Climate Action Plan. The project aims to reduce greenhouse gas emissions, improve equity, and enhance the livability of residences within city limits. So far, CozyHome's services through this project have led to an estimated average reduction of 1.5 metric tons of greenhouse gas emissions per household.

Board/Commission Recommendation: ☐**Applicable -** ☒**Not Applicable**

Alternative(s): Council could elect to not approve the renewal of the agreement and advise staff to resolicit services for the Home Energy Retrofit Project.

MOTION

I move to: approve Year 2 of the Home Energy Retrofit Project Agreement with CozyHome LLC, in an amount not-to-exceed $90,000.

Comprehensive Residential Energy Assessment and Retrofit Services

RFQ No. 2023/24-003

Contracted Services Agreement

CITY OF SEDEONA

RFQ No. 2023/24-003

Comprehensive Residential Energy Assessment and Retrofit Services

AGREEMENT FOR CONTRACTED SERVICES

FOR

THE CITY OF SEDONA

This Agreement for Contracted Services ("Agreement") is made and entered into this 27th day of October, 2023 ("Effective Date") by and between the City of Sedona, an Arizona municipal corporation ("City") and CozyHome LLC , an Arizona limited liability company, and licensed, bonded, and insured Arizona contractor ("Contractor").

RECITALS

WHEREAS, the City is a municipal corporation organized under the laws of the State of Arizona and entitled to provide services and enter into contracts for the purpose of obtaining services or benefits which it otherwise could provide; and

WHEREAS, the City issued a Request for Qualifications on the 17th day of August, 2023 for home energy audits, weatherization and retrofitting services and Contractor was the selected respondent.

WHEREAS, the Contractor is a private contractor dedicated to maintaining a standard of excellence and service towards improving building utility efficiencies, reducing environmental impacts, and reducing utility costs for residents and entities who reside in Northern Arizona.

WHEREAS, the City desires to contract for assistance with home energy audits, retrofitting services to improve homeowners' quality of life, reduce utility demand and consumption, reduce associated greenhouse gas emissions for the benefit of the residents of the City, and Contractor desires to provide the City certain services.

NOW, THEREFORE, in consideration of the mutual promises and covenants of the parties, and other good and valuable consideration, the parties agree as follows:

1. **Term:** The term of this Agreement shall be from October 27, 2023, to October 27, 2024, with the option to extend for four (4) additional one (1) year terms upon agreement of the City and Contractor.

2. **Payment:** Contractor and the City acknowledge that the services and programs to be provided to Sedona residents are a direct public benefit to the City. The services benefiting the City are set forth in Section 4 below. In consideration of services provided by Contractor, the City agrees to pay Contractor in an amount not to exceed **NINETY THOUSAND DOLLARS ($90,000.00)**, subject to the availability of funds from the City, for services provided beginning October 19, 2023, and ending October 19, 2024.

   Contractor agrees to provide up to $5,000 in home energy audits, weatherization and retrofitting services per household served. The City agrees to reimburse Contractor up to FIVE THOUSAND DOLLARS ($5,000) per City-approved household served by Contractor. Payment will be made within 30 days of the City's receipt of an approved invoice. All households served shall not exceed the cumulative Agreement total of NINETY THOUSAND DOLLARS ($90,000.00).

   a. Approved funding allotments per household will be agreed upon based on the area's median income (AMI) and shall not exceed the dollar limits as follows:

      i. Households that are under 80% of the AMI would receive up to FIVE THOUSAND DOLLARS ($5,000.00) towards home retrofitting and weatherization projects.
      ii. Households between 80-100% of the AMI would receive up to THREE THOUSAND FIVE HUNDRED DOLLARS ($3,500.00) towards home retrofitting and weatherization projects.
      iii. Households between 100-120% of the AMI would receive up to TWO THOUSAND DOLLARS ($2,000.00) towards home retrofitting and weatherization projects.
      iv. Households above 120% of the AMI would receive up to ONE HUNDRED DOLLARS ($100.00) towards the completion of an energy audit.
      v. Households below 120% of AMI who do not continue with weatherization and retrofitting services provided by this project will still have the cost of the energy audit covered as part of the funds that would have been allotted for that household. vi. All requests for payment from Contractor for services rendered must include the following:
         i. Dates of Service
         ii. Description of services provided; and
         iii. iii. Fees for services
         iv. Prior written approval by City of services rendered.

v. vii. Initial payment will not be made to Contractor by the City until the City has received a valid, signed IRS Form W-9.

viii. Contractor shall complete and document all services rendered per Sedona household prior to invoicing the City. Contractor shall invoice the City no later than the end of the month following the month in which the work is performed.

b. The following chart will be utilized to determine the funding level awarded per Sedona household based on the AMI:

Household size		1	2	3	4	5	6	7	8
Max. Household Income	80%	$50,900	$58,200	$65,450	$72,700	$78,550	$84,350	$90,150	$96,000
	100%	$63,625	$72,750	$81,812	$90,875	$98,187	$105,437	$112,687	$120,000
	120%	$76,350	$87,300	$98,175	$109,050	$117,825	$126,525	$135,225	$144,000

c. Estimated costs for services rendered varies with each household depending on the size of the household, equipment, extent of problems and repairs needed, size of equipment, etc. To provide increased cost clarity, Contractor has submitted the estimated cost ranges below that the City should expect invoiced services to typically range from. The following cost ranges are for services commonly rendered by Contractor and align with agreed upon services as found in Section 4 Part VII of this document:

Service Category	**Cost Range**
Duct Sealing	$500-$1,750
Air Sealing	$200-$1,750
Insulation Repair	$500-$4,000
Lighting Upgrades	$300-$2,000
Mini-split Installations	$3,500-$6,500
Head Pump Installations	$6,500-$15,000

d. Weatherization and home retrofitting rebates and incentives that currently exist at the County, State, and Utility Provider levels shall be sought after by the Contractor and utilized prior to the use of City funds. City funds for this project are to be in addition to currently available incentives that may be found at the County, State, and Utility Provider levels.

3. **Funding Obligation:** The City's obligation to provide the funding herein stated is conditioned on the availability of funds as provided in the City's annual budget, and the ultimate realization of budgeted revenues being received by the City. The City's fiscal year

ends on June 30th of each year. Otherwise, the City warrants and represents it will not reduce Contractor's funding during any period because of private donations or business received by Contractor that is generated outside of this project.

4. **Services & General Process:** Contractor shall provide the following goods and services:

   a. Contractor shall provide home weatherization and energy retrofitting services to residents of the City of Sedona to advance the City's sustainability initiatives. Services provided by Contractor under this agreement shall be applied only to homeowner occupied residences within City limits, providing a minimum standard of service to qualified applicants and the services shall include, but are not limited to:
      i. Collection of project signup forms from prospective project applicants will occur from two different avenues
         1. Primary avenue: Participants will complete signup forms by accessing the City's website. Completed forms will be submitted to the City's Sustainability Team email and physical addresses, independent from Contractor.
         2. Secondary avenue: In the event that Contractor has direct contact with a potential project participant, Contractor may collect and submit received signup forms to the City's Sustainability Department by email or to the physical address of the City.
            a. Contractor shall not verify or assess a participant's eligibility.
            b. Secondary avenue is to be auxiliary and complementary of primary avenue.
      ii. Applications received will be submitted to the City's Sustainability Team, who will verify recipient qualifications.
         1. The City's Sustainability team will evaluate signup forms.
         2. Verification of Recipient Qualifications will be assessed through information obtained on the signup form, on which applicant must report the following:
            a. Income Level – Participant-reported on a scale of the Area's Median Income (AMI)
            b. Homeowner Verification – Participant-reported physical address of property receiving services.
            c. Additional information may be requested from copies of tax returns, pay stubs, utility bills, property deeds etc. to assess an applicant's responses and qualifications. This information will be found within signup form documentation and is independent of this agreement.
      iii. Submit applicant signup forms to the City Sustainability Team for review if application delivered to Contractor. The City shall attempt to review applications and provide notice in a timely manner.
         1. The City shall notify applicants of evaluation outcomes, and approved applicants should be contacted to confirm applicants' awareness of project scope and services.
      iv. Perform an energy audit of every approved household receiving services under the Home Energy Retrofit Project.

v. Report results of the energy audits to the City's Sustainability Team.

vi. Contractor shall prepare, upon request from the City, a price proposal for a given project. The scope of work for each individual household will vary, but work shall be consistent with the kind of work described in article vii below.

vii. Upon agreement of services to be rendered with a homeowner and approval by the City. Provide home weatherization and retrofitting services for approved homeowner occupied residences which may include but not limited to:

1. Duct sealing
2. Air Sealing
3. Insulation repair
4. Lighting upgrades
5. Mini-split installations
6. Heat pumps installations

viii. Provide a post services energy audit or outcome calculations report to City Sustainability Team. Initial energy audit can be submitted with outcome report.

ix. Throughout duration of the project, coordinate with City staff for project outreach, reporting, and resident participation.

1. Provide project photographs for inclusion in City outreach and reporting materials.

x. Provide yearly and end of contract review of Home Energy Retrofit Project to identify successes, challenges, and future opportunities.

xi. Provide an outreach and contact page related to the Home Energy Retrofit Project on Contractor's website.

b. Contractor will provide appropriate notice to City staff prior when conducting outreach events and posting outreach on social media.

5. **Financials:** Contractor shall use City funds only for purposes in relation to home weatherization and retrofitting services and provide written accounting to the City describing the manner and use of City funds at the City's request. The City shall have the right to audit the books of Contractor at all reasonable times for the purpose of confirming the expenditures of City funds with reasonable notice to Contractor.

6. **Project Disagreements with Homeowners**: In the event that a disagreement on selected services rendered occurs between Contractor and a homeowner, attempts should be made between Contractor and the homeowner(s) to collaborate and identify alternative project solutions in good faith. If all attempts have been exhausted and a disagreement on services rendered still exists, the City will favor the expertise of Contractor in identifying solutions and services provided to the home that would provide the most effective utility cost savings, emissions reductions, and home livability.

a. If an agreement cannot be made on services to be rendered for the respective household, Contractor and the City are not obligated to continue weatherization and retrofitting services. No services are required to be provided to a respective household. Only agreed upon services will be permitted.

7. **Applicant Misreporting**: In the event that an application has been deemed invalid, does not meet project income and homeowner verification, or is misreported and/or falsified information is present, Contractor will not be held liable for applicant errors, application disqualification or rejected determinations, or any other scenario where an applicant has been deemed to misrepresent or misreport on forms and activities relating to the Home Energy Retrofit Program.

8. **Service Costs Considerations:** After a home energy audit has been performed, the total monetary amount of weatherization and retrofitting services needed to fully restore a home to optimal efficiency may exceed the funding from City sources and from external rebates. Homeowners participating in this program will not be obligated to perform all recommended services that exceed funding allotments. Participants in the program will be allowed to proceed with weatherization and retrofitting services up to the amount of total funding available.

9. **Reporting to City**: Contractor shall provide status/performance reports yearly and at the end of each contract term that will include statistics related to the Home Energy Retrofit Project as a result of the home energy and retrofitting services provided by Contractor's staff on behalf of the City. Upon the request of the City Council or City Manager, Contractor will provide an annual presentation to City Council on the activities and accomplishments of the agency and the service provision within the City of Sedona.

10. **Termination:** Either party may terminate this Agreement, without penalty, upon 30 days written notice to the other. Upon such termination, the parties shall assess the services rendered to the date of termination and the City shall make any necessary payment, or Contractor shall make any necessary reimbursement as may be required so that payment for the services rendered to the date of termination shall have been paid by the City.

11. **Legal Compliance**: Should a court of competent jurisdiction or any administrative agency with oversight authority determine that any part of this Agreement is contrary to established Federal, State and City laws applicable to the respective responsibilities of the Parties as described herein, this Agreement, and any part thereto that is in conflict with said laws, shall be modified upon mutual agreement of the Parties in order to bring the Agreement into full legal compliance.

12. **ADA**: Contractor must conform to the Americans with Disabilities Act of 1990, including changes made by the ADA Amendments Act of 2008 (P.L. 110-325) (ADA) and the Rehabilitation Act of 1973, as amended. This includes prohibiting discrimination against the handicapped in employment, programs, services and activities and making reasonable accommodations to allow their full and equal access to all such employment, programs, services, and activities. Contractor shall comply with all other federal, state and local regulations prohibiting unlawful discrimination in employment, programs, services, activities and contracting.

13. **Legal Compliance; Venue; Jury Trial Waiver:** Contractor agrees to comply with all Federal, State, local and City laws or regulations applicable to Contractor's business or services or to the performance of these services. This Agreement shall be governed by and enforced using the law of the State of Arizona. The parties agree that any judicial action

brought to enforce the terms or conditions of this Agreement shall be brought in a court of competent jurisdiction in Yavapai County, State of Arizona. Both parties hereby waive any right to a jury trial which they may otherwise have in the event of litigation arising out of this Agreement or the subject matter thereof and consent to a trial to the court.

14. **Liability**: The City shall not be liable for any act or omission occurring in Contractor's performance of this contract. Contractor shall indemnify, defend, and hold harmless the City, its officers, agents, and employees from and against any and all liabilities, demands, claims or damages to persons or property, and losses of whatever nature, arising out of or resulting from any services performed under this contract by Contractor or Contractor's negligence or misconduct.

    a. Contractor will provide the City with proof of liability insurance in an amount acceptable to the City.
    b. The City shall have no liability under this contract beyond payment of fees, not to exceed the stated amount, for services rendered. Contract payments to be made under this contract are contingent upon the availability of funds to the City, authorized for expenditure in the manner and for the purpose of home weatherization and retrofitting services described.
    c. Contractor shall require each approved participant to sign and provide a waiver of liability that indemnifies the City for participation in the home energy audits, weatherization and retrofitting services.

15. **INSURANCE**.

    a. General:
        - The CONSULTANT agrees to procure and maintain in force during the term of this Agreement, at its own cost, the following coverages and as may be requested by CITY, either in the initial bid, or prior to commencement of particular tasks. CONSULTANT shall submit to CITY before any work is performed, certificates from the CONSULTANT's insurance carriers indicating the presence of coverages and limits of liability as follows:

        - Worker's Compensation Insurance:
          Coverage A: Statutory benefits as required by the Labor Code of the State of Arizona.
          Coverage B: Employer's Liability

Bodily Injury by accident	$1,000,000 each accident
Bodily Injury by disease	$1,000,000 policy limit
Bodily Injury by disease	$1,000,000 each employee

        - Commercial General or Business Liability Insurance with minimum combined single limits of ONE MILLION DOLLARS ($1,000,000.00) each occurrence and TWO MILLION DOLLARS ($2,000,000.00) general aggregate for the project.

        - Automobile Liability Insurance with minimum combined single limits for bodily injury and property damage of not less than ONE MILLION

DOLLARS ($1,000,000.00) for any one occurrence, with respect to each of the CONSULTANT'S owned, hired or non-owned automobiles assigned to or used in performance of the Services. Certificate to reflect coverage for "Any Auto, All Owned, Scheduled, Hired or Non-Owned."

- Professional Liability coverage with minimum limits of ONE MILLION DOLLARS ($1,000,000.00) each claim and TWO MILLION DOLLARS ($2,000,000.00) general aggregate. If approved by CITY, evidence of qualified self-insured status may be substituted for one or more of the foregoing insurance coverages. Coverage must have no exclusion for design-build projects.

b. CONSULTANT shall procure and maintain the minimum insurance coverages listed herein. Such coverages shall be procured and maintained with forms and insurers acceptable to CITY, acceptance of which shall not be unreasonably withheld. All coverages shall be continuously maintained to cover all liability, claims, demands and other obligations assumed by the CONSULTANT pursuant this Agreement. In the case of any claims made to the policy, the necessary retroactive dates and extended reporting periods shall be procured to maintain such continuous coverage.

c. All policies must be written by insurance companies whose rating, in the most recent AM Best's Rating Guide, is not less than A- VII or higher, unless CONSULTANT obtains prior written approval of CITY.

d. A Certificate of Insurance shall be completed by the CONSULTANT'S insurance agent(s) as evidence that policies providing the required coverages, conditions and minimum limits are in full force and effect and shall be subject to review and approval by CITY. The Certificate shall identify this Agreement and shall provide that the coverages afforded under the policies shall not be canceled, terminated or limits reduced until at least thirty (30) days prior written notice has been given to CITY. The CITY shall be named as an additional insured. The completed Certificate of Insurance shall be sent to:

City of Sedona
102 Roadrunner Drive
Sedona, AZ 86336 ATTN:
City Clerk

e. Failure on the part of CONSULTANT to procure or maintain policies providing the required coverages, conditions and minimum limits shall constitute a Material Breach of Contract upon which CITY may immediately terminate this Agreement or, at its discretion, CITY may procure or renew any such policy or any extended reporting period thereto and may pay any and all premiums in connection therewith, and all monies so paid by CITY shall be repaid by the CONSULTANT to CITY upon demand, or CITY may offset the cost of the premiums against any monies due to CONSULTANT from CITY.

f. CITY reserves the right to request and receive a certified copy of any policy and any pertinent endorsement thereto. CONSULTANT agrees to execute any and all

documents necessary to allow CITY access to any and all insurance policies and endorsements pertaining to this particular job.

g. All policies shall provide primary coverage and waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to any person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay for the insurance premium directly or indirectly and whether or not the person or entity had an insurable interest in the property damaged.

h. The following policies shall include Additional Insured endorsements: Automobile Liability Insurance and Commercial General Liability.

16. CITY reserves the right to require higher limits of liability coverage if, in the CITY's opinion, operations or services create higher than normal hazards.

17. **Registered Contractor:** Contractor agrees to maintain Bonded and Insured licensing under State of Arizona Requirements for contractors in its field of service.

18. **Performance**: Contractor agrees to provide a specific product which consists primarily of development and delivery of home weatherization and retrofitting services. The City does not have the authority to control the actual work of Contractor, but the City may establish deadlines for delivery and standards for the quality of work.

19. **Non-Assignment**: This agreement is non-assignable. Any attempt to assign any of the rights, duties, or obligations of this Agreement is void.

20. **NO BOYCOTT OF ISRAEL OR USE OF FORCED LABOR OF ETHNIC UYGHURS IN PEOPLES REPUBLIC OF CHINA.** As applicable, CONSULTANT certifies and agrees it is not currently engaged in and for the duration of the Agreement will not engage in a boycott of Israel, as that term is defined in A.R.S. §35-393 and will not use forced labor or goods or services produced by forced labor of ethnic Uyghurs in the People's Republic of China (PRC) or any contractors, subcontractors or suppliers that use forced labor or goods or services produced by forced labor of ethnic Uyghurs in the PRC as provided by A.R.S. §35-394.

21. **Written Changes:** This Agreement contains the entire Agreement of the parties with respect to the subject matters hereof and it may be amended or modified only by an instrument in writing signed by both parties.

a. Written notices to City shall be sent to:

City Manager
City of Sedona
102 Roadrunner Drive Sedona,
AZ 86336

b. Notices to Contractor, shall be addressed to:

CozyHome LLC
Eli Chamberlain
2700 S Woodlands Village Blvd Ste 300-375
Flagstaff, AZ 86001

22. **Independent Contractor:**

a. The parties agree that Contractor provides specialized services, and that the Contractor enters this agreement with the City as an independent contractor. Nothing in this contract shall be construed to constitute that Contractor, nor any of its personnel, volunteers, or directors, are agents, employees, or representatives of the City.
b. As an independent contractor, Contractor is solely responsible for all labor and expenses in connection with this agreement and for any and all damages that may arise during the operation of this Agreement.
c. As an independent contractor, Contractor is not entitled to Workers' Compensation benefits from the City. Contractor shall be responsible for obtaining any required business registration or license required for performance of this contract, as well as any tax liability created by the Agreement.
d. Contractor shall carry appropriate insurance and shall indemnify and hold the City and its officials, employees and agents harmless from any and all claims, demands, actions and causes of action (including administration or alternative dispute resolution proceedings) penalties or costs (including attorneys' fees) or liability for damages for personal injury or property damage resulting from the acts or omissions of Contractor's officers, directors, agents, employees, or volunteers, in connection with this agreement or in any way arising from the activities or services of Contractor as set forth in this agreement. Contractor shall provide a copy of the insurance certificate, which lists the City of Sedona as an additional insured, to the City Manager's Office prior to the first installment release.
e. It is understood and agreed that Contractor is free to contract with other parties or to otherwise provide additional services.

(Signatures to follow on next page)

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their duly authorized officials on the aforementioned date.

CITY OF SEDONA, ARIZONA

By: DocuSigned by: 2CBB6B38C7F24C8...

City Manager

Date: 10/31/2023

CONTRACTOR

By: DocuSigned by: Eli Chamberlain 635034C56F004C2...

Owner

Date: 10/31/2023

ATTEST:

DocuSigned by: Joanne Cook F3F3574389784E3...

City Clerk

Date: 10/31/2023

APPROVED AS TO FORM:

DocuSigned by: Kurt Christianson DA6BB971B6AF411...

City Attorney

Date: 10/31/2023

CITY COUNCIL AGENDA BILL

AB 3098
September 11, 2024
Special Business

Agenda Item: 3b
Proposed Action & Subject: Discussion/possible direction regarding sustainability programming and the Decarbonization Roadmap created with McKinstry Essention LLC.

Department	Sustainability / Bryce Beck
Time to Present	1 hour 30 minutes
Total Time for Item	2 hours
Other Council Meetings	November 14, 2023
Exhibits	A. City of Sedona Decarbonization Roadmap

Finance Approval	Reviewed 8/28/24 JDM
City Attorney Approval	Reviewed 8/27/24 KWC
City Manager's Recommendation	Reviewed 8/28/24 JAD

Expenditure Required	
$	N/A
Amount Budgeted	
$	N/A
Account No. (Description)	

SUMMARY STATEMENT

Background:

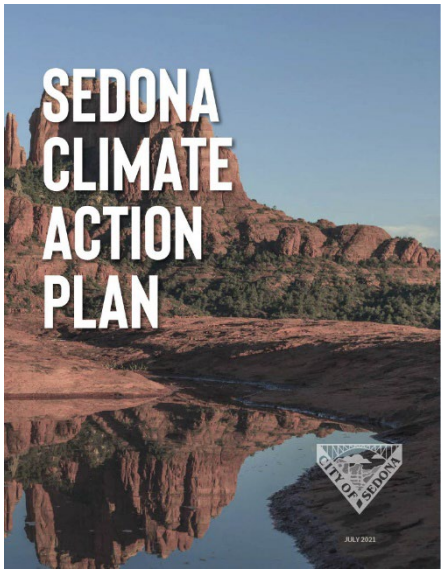
This item will include the Sustainability Program update, and we will present the outcome of the Decarbonization Roadmap effort.

We will start with the Decarbonization Roadmap, and McKinstry team members will lead this portion of the presentation. The roadmap is included as Exhibit A to this Agenda Bill. City staff will provide updates on the 2023 municipal greenhouse gas (GHG) inventory and other sustainability program items.

Starting with the Decarbonization Roadmap, we will cover the following:

- The history of the Decarbonization Roadmap effort
- The Decarbonization Roadmap, overview
- The Decarbonization Roadmap, outcomes

History - Climate Action Plan and Initiatives:



The Climate Action Plan for the City of Sedona sets out an ambitious goal of reducing community-wide greenhouse gas emissions 50% by 2030, while the 2020 Municipal Sustainability Plan strives for carbon neutrality in municipal operations by 2030. There have been several initiatives to generate progress towards these goals, but a roadmap to evaluate the extent of infrastructure needs was not available.

The CAP identifies 50 actions to be taken across five sectors (buildings & energy, transportation & land use, materials & consumption, water & natural systems, and climate resilience). Additionally, the Municipal Sustainability Plan (MSP) established objectives to reduce emissions from city transportation systems and equipment, increase efficiency of city energy systems and sourcing renewable energy, and transition city facilities towards carbon neutrality. Greenhouse gas emissions inventories are conducted yearly to evaluate progress towards emissions goals and objectives.

Emissions are generally bucketed in three different scopes:

- **Scope 1**: Direct emissions from owned or controlled sources (i.e. fleet, equipment, natural gas usage)
- **Scope 2**: Indirect emissions from the generation of purchased electricity. (i.e. APS electricity for building HVAC and lighting systems)
- **Scope 3**: All other indirect emissions that occur in the value chain, including both upstream and downstream emissions. (i.e. purchased goods, commuting, waste disposal)

Municipal operations have more direct control over scopes 1 and 2 than scope 3. Scope 3 consists of categories, such as investments and upstream transportation, the City has limited indirect control of.

The greenhouse gas inventories have led to the creation of a variety of projects within municipal operations levels to reduce emissions, improve utility costs, and provide additional benefits. Some of the projects that have been derived from the carbon accounting practices include:

- Solar Lighting at Posse Grounds Park
- Green Power Partners Program with Arizona Public Service
- EV Chargers at Posse Grounds & Sunset Park
- Electric Vehicle Procurement
- Streetlights Retrofit Project Anticipated Installation in FY25
- Wastewater HVAC Upgrades
- Wastewater Backwater Filtration System

Additional programming and initiatives have been implemented to advance efforts and progress across CAP Sectors. Some of those initiatives include the following:

- Community Composting Program (Materials & Consumption)
- Household Hazardous Waste Collection Events (Materials & Consumption)
- Ripple Effect – Integrated Demand Management Program (Water & Natural Systems)
- Watershed Cleanups and Outreach (Water & Natural Systems)
- Home Energy Retrofit Project (Buildings & Energy)
- Public Trailhead Shuttles (Transportation and Land use)
- School Sustainability Programming (Climate Resiliency)
- Sustainable Neighborhood Program (Climate Resiliency)
- Urban Heat Mapping and Recommendations Guidebook (Climate Resiliency)

A foundation of offerings has been created within the Sustainability Department. However, a comprehensive roadmap had not been established to map out needed projects, estimate financial requirements, and build a timeline to meet the 2030 carbon neutrality goals for municipal operations in the CAP and MSP. This is what's provided in the Decarbonization Roadmap.

So far, GHG emissions from municipal operations are estimated to be approximately 50% below the 2018 baseline, which has been accomplished primarily through renewable energy credits. This pursuit is needed to meet the 2030 goals.

History - Decarbonization Roadmap:

In FY24, the city dedicated funds for the creation of a decarbonization roadmap. On November 14th, 2023 the Sedona City Council approved the contract agreement with McKinstry Essention LLC for the development of a decarbonization roadmap.

The project was initiated shortly after Council approval. Since January of 2024 McKinstry has conducted site assessments, infrastructure analysis, rough order of magnitude (ROM) financial analysis, and potential timeline development. The completed roadmap is included as Exhibit A. It sets an ambitious and achievable path to carbon neutrality for municipal operations emissions. The goals of the decarbonization roadmap include the following:

- **Plan Review:** Review of existing sustainability and CAP Goals and propose updates to polices and metrics that improve feasibility and effectiveness.
- **Decarbonization Strategy:** Establish a preferred decarbonization strategy for building and fleet vehicle emissions. This includes Scope 1 in its entirety, electrical load reduction and energy efficiency strategies to reduce Scope 2, as well as further Scope 2 reductions via city-owned renewables.
- **Benefit/Cost Analysis:** Identify the up-front and long-term benefits and costs to achieve decarbonization, including additional benefits that improve employee health and performance, inspire the broader Sedona community to reduce its carbon footprint, enhance operational resiliency and passive operability, and increase portfolio longevity.
- **Capital Planning and Financing:** Inform current and future capital planning and propose funding and financing pathways to reach decarbonization goals.
- **Develop Implementable Pilot Project:** Move directly from the roadmap into a developed pilot project based on the decarbonization analysis and financial planning.

Decarbonization Roadmap Outcomes:

The roadmap targeted scope 1 and 2 emissions sources, since the City has more direct control over these sources. Additionally, while the roadmap serves as a snapshot in time against current operations and facilities, the findings of the roadmap can inform future municipal operations and construction projects to mitigate and adapt to future climate impacts. The key findings from the roadmap are as follows:

- City's current operations are fairly efficient.
- Current decarbonization targets are reasonably achievable with a clear cost-effective path with current technologies, with the following exception:
  - Heavy duty equipment and public transit vehicles need improved vehicle availability and infrastructure that is not currently readily accessible.
- Biggest carbon reductions come from fleet electrification and Wastewater Treatment Plant efficiencies
- It is less expensive to produce municipally owned renewable electricity than purchase through APS.
- Direct air capture and carbon offsets, where CO_2 certificates are obtained through projects like reforestation or mechanical removal from the atmosphere, will still be needed.

Decarbonization Roadmap Recommendations:

- Implement Substantial EV/Solar Phase now to begin accruing benefits and capture Inflation Reduction Act (IRA) Benefits.
- An additional renewable target should be added to clarify and strengthen the city's commitment to renewable energy.
- Put dedicated focus on the Wastewater Treatment Plant and its associated solar system to enable additional plant efficiency.
- Work with APS to establish a City Green Locate/Commit offsite with opportunities for the broader community.

Municipal Decarbonization Costs and Next Steps:

Implementation Costs

FINANCIAL NOTES:

YEAR	GROSS IMPLEMENTATION COST	AVOIDED EQUIPMENT REPLACEMENT COSTS	LIFETIME UTILITY SAVINGS	INCENTIVES, GRANTS, & SOLAR IRA DIRECT PAY (25.5%)	NET PROJECT COST
Phase 1 (2024)	$500,000	$0	$324,841	$0	$175,159
Phase 2 (2025)	$8,448,572	$530,950	$4,896,796	$930,854	$2,089,972
Phase 3 (2027)	$1,956,047	$395,900	$824,426	$64,259	$671,462
Phase 4 (2030)	$2,131,200	$1,024,899	$7,820	$0	$1,098,481
TOTAL	**$13,035,819**	**$1,951,749**	**$6,054,353**	**$995,114**	**$4,035,074**

Figure 1: Decarbonization Implementation Costs

Figure 2: Co-Benefit Values

The implementation of decarbonization projects will require significant capital funding. Total lifetime implementations costs are estimated at $13 million through 2030. However, avoided equipment replacement costs, operational savings, and tax incentives bring the net cost down to $4 million over the life of the projects. Quantified co-benefits can help bring the projects close to cost neutral. Cost breakdowns per phase can be found in Exhibit A. The efforts to achieve these benefits and reach CAP goals are currently ongoing.

There are three decarbonization projects targeted for FY25 as a part of Phase 1 implementation. HVAC control systems, LED streetlight installation, and EV and Solar Infrastructure Planning and Design. The EV & Solar planning leads directly into possible phase 2 projects. Planning costs were included in the FY25 budget. Additional funding sources are also being pursued by the Sustainability Department. Grant applications through programs such as the Climate Pollution Reduction Grant Program and Energy Efficiency Conservation Block Grant have been and will continue to be pursued to meet the city's climate action goals, build capacity, and reduce project costs. Decarbonization projects are just one of the items the Sustainability Department is undertaking at this time.

Municipal Decarbonization Conclusion:

The decarbonization roadmap helps chart a path to make the CAP and MSP goals for municipal operations a reality. By implementing the FY25 projects, further reductions will be made in municipal GHG emissions. Additional projects will be proposed in future budgets, which will help the city ultimately reach the 2030 goal of carbon neutrality for municipal operations. Municipal emission reductions are only a portion of the overall communitywide goal, while this effort is focused on municipal operations it does help meet the overall goal, it shows the community the city is doing its part, and it leverages current funding opportunities. No funding changes are needed for FY25, future year funding changes will be presented with the FY26 proposed budget.

Sustainability Updates:

Decarbonization projects are just one of the items the Sustainability Department is undertaking at this time. Sustainability has several programming updates to provide during this Council session. The projects and events span the entire range of CAP sectors.

Staff will provide an update on the remaining areas of the overall Sustainability Program, as outlined below:

- Update on 2023 GHG Municipal Inventory (Buildings & Energy)

- Sustainable Neighborhoods Network update on Les Springs initiatives (Climate Resiliency)
- Northern Arizona Solar Co-op Launch (Buildings & Energy)
- ADEQ Smart Recycling Receptacles Grant Implementation (Materials & Consumption)
- West Sedona School Sustainability Artwork Project (Climate Resiliency)
- Upcoming Sustainability Events:
    - Household Hazardous Waste Collection Event (Materials & Consumption)
    - Water Festival in collaboration with Project WET and Arizona Water Company (Water & Natural Systems)
    - Resiliency Workshops (Climate Resiliency)

Sustainability efforts across the municipality have built upon past initiatives and progress. The decarbonization roadmap helps chart a path to make the CAP and MSP goals for municipal operations a reality. Additional strategies through carbon offsets, direct air capture, and improving markets of technology will be needed to help bolster and enhance the sustainability efforts to date.

Climate Action Plan/Sustainability Consistent: ☒**Yes -** ☐**No -** ☐**Not Applicable**

The Decarbonization Roadmap was initiated directly from ideas and actions from the city's Climate Action Plan (CAP). The roadmap sets a potential pathway for reducing greenhouse gas emissions from municipal operations in alignment with the CAP. Additionally, sustainability program updates include waste diversion efforts, school and residential education initiatives, and solar co-ops updates that align with climate action planning.

Board/Commission Recommendation: ☐**Applicable -** ☒**Not Applicable**

Alternative(s): N/A

MOTION

I move to: For possible direction only.

AUGUST 16, 2024

CITY OF SEDONA
Decarbonization Roadmap

01

ROADMAP OVERVIEW

The goal – a climate positive Sedona

On July 14, 2021, the Sedona City Council adopted a Climate Action Plan (CAP) for the Sedona community as a whole. Included in the CAP were challenging but attainable targets for eliminating climate harm by the City's municipal operations:

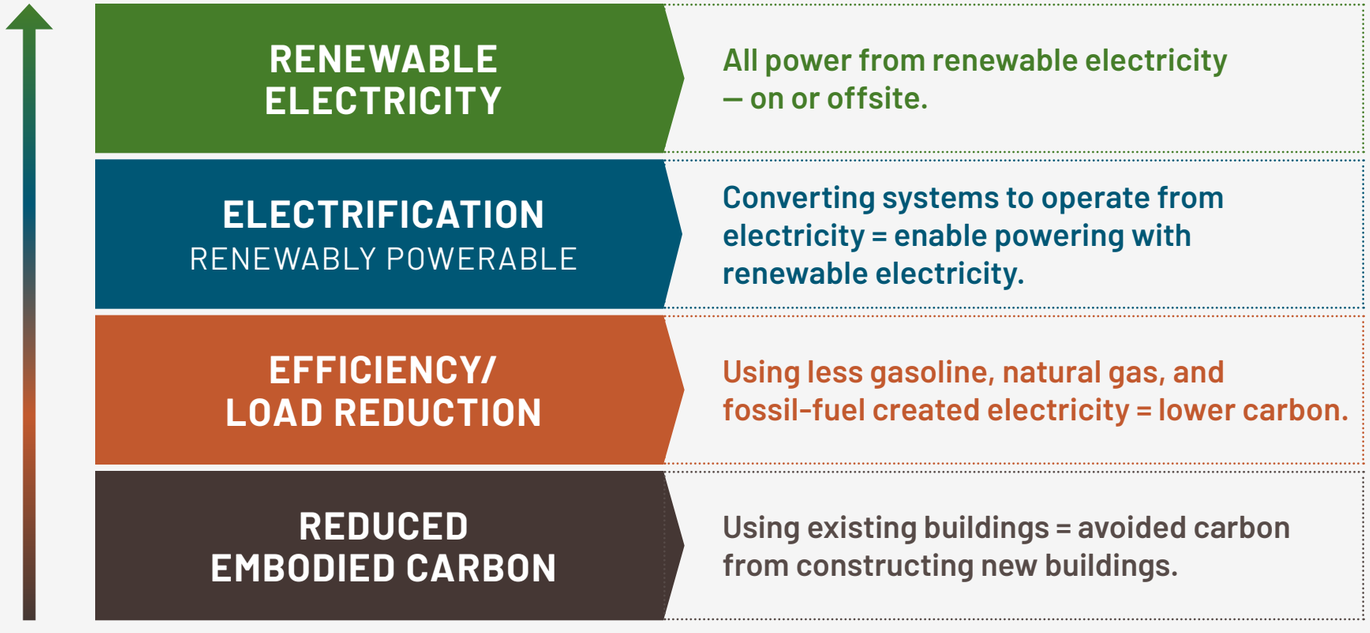
2030: CARBON NEUTRAL MUNICIPAL OPERATIONS
By 2030, the City aims for municipal operations to be carbon neutral. While much of this reduction will require changing how and what type of energy the City consumes, some reliance on carbon offsets may be necessary.

2030: ALL CITY PASSENGER VEHICLES ZERO EMISSIONS
By 2030, the City strives to transition all passenger vehicles in the City fleet to 100% zero emissions vehicles.

2025: ALL MUNICIPAL ELECTRICITY 100% RENEWABLE
By 2025, the City will transition to consuming 100% renewable energy for municipal operations.

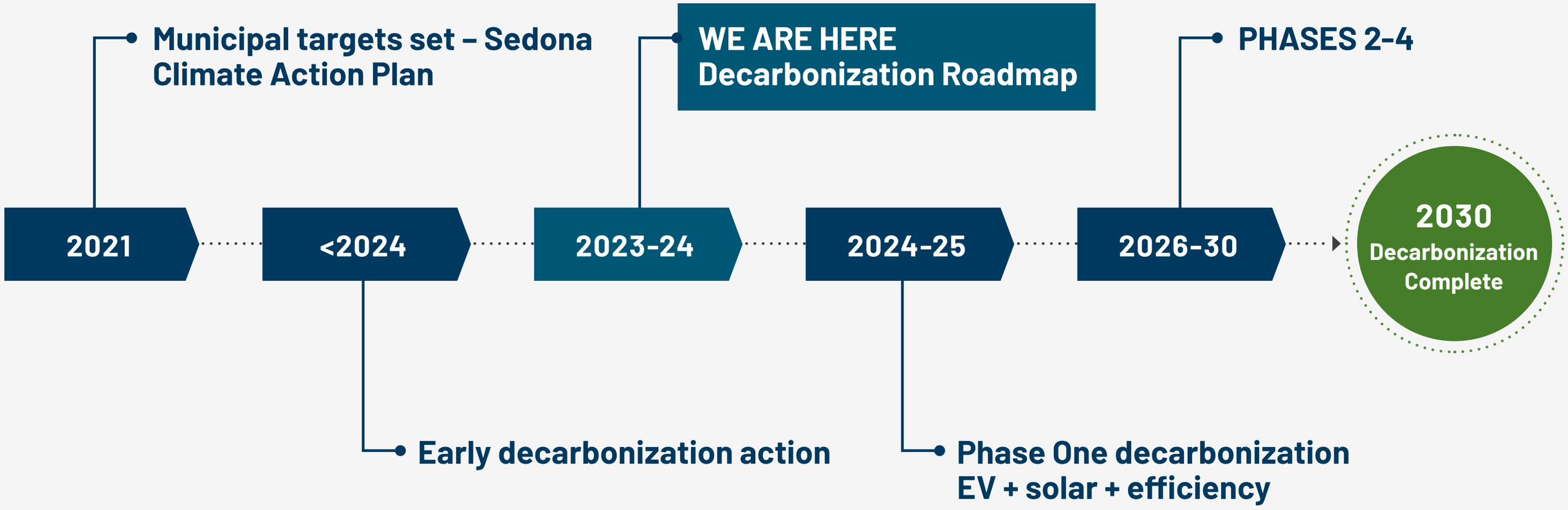
To provide for systematic pursuit and achievement of these goals, the City Council approved the creation of a detailed Decarbonization Roadmap on November 14, 2023. The intent of the Roadmap was and is to provide the least cost, most beneficial way to achieve the Council's established goals over time.
This document is that Roadmap.

SEDONA DECARBONIZATION AT-A-GLANCE



01. ROADMAP OVERVIEW

Sedona is in the middle of a journey to decarbonize. This roadmap will help focus and direct efforts to ensure complete decarbonization is done in the cost-effective, smartest, and responsible manner possible for the Sedona community as a whole.



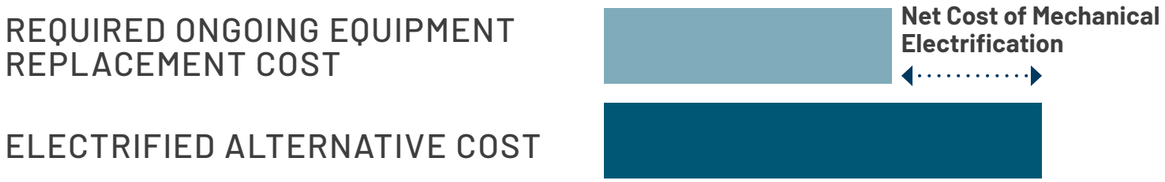
Roadmap guiding principles

These principles and concepts illuminate this plan:

HIGH DECARBONIZATION INTEGRITY – NO GREENWASHING Throughout its decarbonization journey, Sedona has prioritized actions which result in actual reduction in its carbon footprint. This Roadmap provides a pathway for complete, actual decarbonization of the City's entire municipal operational footprint by reducing energy use and eliminating both direct combustion and indirect (dirty electricity) fossil fuel use – the source of climate harm.

PROVIDE THE GREATEST VALUE FOR LEAST COST Decarbonization requires significant investment. Creating additional benefits (such as improved employee performance, satisfaction, and retention through better lighting, indoor air quality and appropriate indoor temperatures) in addition to decarbonization is critical. Also, considerable financial incentives are available from various sources, and many decarbonization measures, if done strategically, can provide other benefits – opening up value streams that offset costs.

BE FISCALLY RESPONSIBLE – DON'T REPLACE EQUIPMENT BEFORE IT'S WORN OUT Sedona currently replaces HVAC equipment only when it reaches end of life. Substituting this upkeep with installing decarbonized alternatives when replacement time comes will reduce decarbonization costs by up to 100%. Also, completely tearing out and replacing complete existing HVAC systems (including distribution ducting, electrical, etc.) has higher embodied carbon, is usually more costly, and always more disruptive.This Roadmap calls for using/reusing existing systems as long as safely possible.[1]



USE PROVEN TECHNOLOGIES Full decarbonization of typical commercial/institutional buildings at a reasonable cost is ready for prime time. This Roadmap can be achieved via current technologies. Sedona needs practical recommendations and should not be a guinea pig for untested prototypes.

1 A very small handful of exceptions will be converted in 2030 to complete decarbonization – and in these cases equipment will be surplused for use elsewhere.

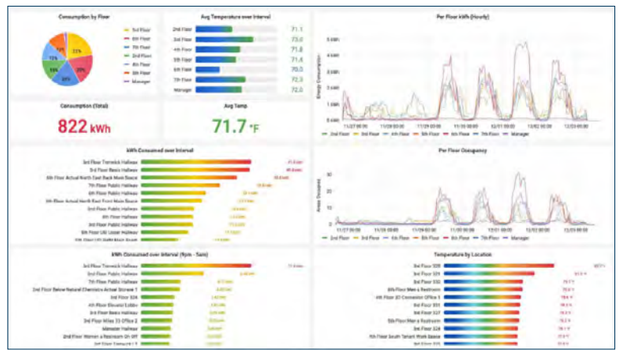
Progress on the goals to date

Prior to the creation of this Roadmap, the City has reduced its climate impacts in a number of ways, including:

ONSITE SOLAR Through a long term power purchase agreement, the City enabled in 2012 development of a substantial, 556 kw solar system associated with the Wastewater Treatment Plant. It also is leasing the Brewer Road Court and Office building that comes with a previously installed approximately 20 kW solar array. Together these systems currently provide approximately 28% of the City's current electricity use.

ROOF TOP HEAT PUMPS The City has replaced a number of natural gas and propane fueled rooftop and pad-mounted heating units with heat pumps that utilize a reversing valve to heat or cool the building air. These heat pumps provide 2-3x more efficient heating when compared to gas furnaces or electric resistance type, while dramatically eliminating the use of gas.

BREWER ROAD GROUND SOURCE HEAT PUMP
The Brewer Road Public Works facility was constructed in 2008 and included an all-electric ground source heat pump for heating and cooling. This is one of the most efficient heating and cooling technologies available, and since electric, can be renewably powered from the existing solar array.



BUILDING CONTROLS
The City recently implemented a building controls system through Autani, enabling evaluation of efficiency over time as well as thermostatic control.

ELECTRIC VEHICLES AND CHARGING INFRASTRUCTURE
The process of electrifying Sedona's vehicle fleet has already begun, with two Level 2 chargers and two all-electric vehicles at City Hall, with five more approved by Sedona's City Council this year. The City also partnered with APS, utilizing their "Take Charge AZ" program and installed Level 2 chargers at City Hall and Sunset Park. Also, in partnership with Electrify America and APS, four DC Fast chargers were installed at Posse Ground Park, with up to ten more anticipated at the parking garage under construction.

LED STREET LIGHTS The City has procured but not yet installed new, dark sky compliant, LED streetlights to replace the inefficient high pressure sodium (HPS) bulbs currently in use. This LED retrofit will significantly reduce the energy consumption of the streetlights across the City.

WASTEWATER TREATMENT PLANT An array of current beneficial operating approaches by wastewater have resulted in Sedona's sewage treatment plant operating at top-of-class efficiency. A new, energy efficent, UV light disinfectant system will be implemented in the near future, further reducing electricity use.

APS GREEN CONNECT RENEWABLE ENERGY CREDITS
Sedona has a long term agreement to buy open market Renewable Energy Credits as part of its electricity purchase from Arizona Public Service. This is considered an interim step on the way to completely attributable, additional renewable electricity for the City (discussed in detail on page 13).

Annual Energy Use and Carbon Emissions

Today

HOW DO SEDONA FACILITIES GENERATE CARBON EMISSIONS TODAY?

- Using electricity generated off-site by fossil fuel based power plants
- Direct combustion of natural gas on-site for heating and hot water
- Direct combustion of gasoline from vehicle use

62,300 Gallons equivalent
TOTAL FOSSIL FUEL USE

2,840,000 KWH
TOTAL ELECTRICITY USE

507
M TONS
FOSSIL FUEL CO_2E

1056
M TONS
ELECTRICITY CO_2E

EQUAL TO:

372 gas cars fuel use for one year

OR

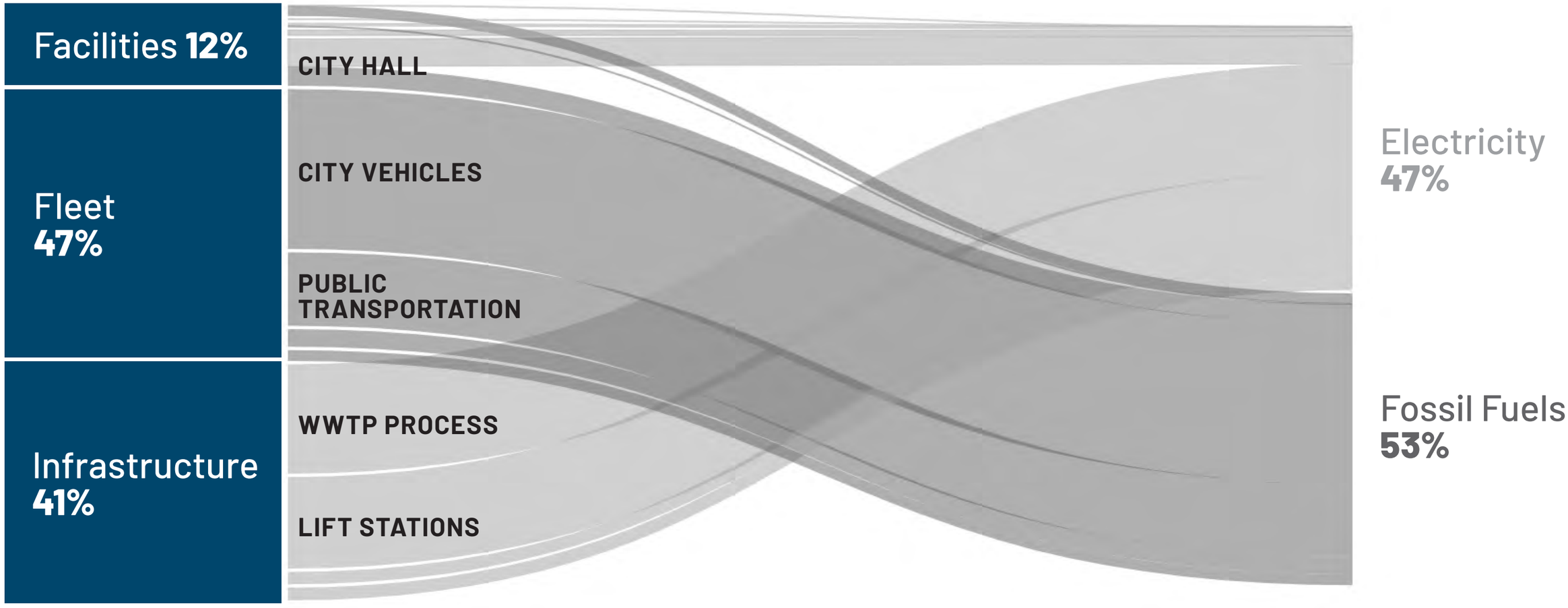
204 homes energy use for one year

OR

Driving to moon and back 8x

Annual Energy Use

The Details



All energy converted to common metric. Wastewater Treatment Plant energy use net of solar production of existing associated solar arrays. Detailed figures are provided on page 21.

Energy Use and Carbon Emissions

Current State > Decarbonized Future State

2030

DECARBONIZED FUTURE STATE

HOW?

- Efficiency/load reduction
- Renewable powerability (electrification)

HOW?

- Efficiency/load reduction
- On-site solar
- APS Green Commit Offsite Renewables

ON-SITE FOSSIL FUEL USE: **DECREASING OVER TIME**

DIRTY ELECTRICITY: **DECREASING OVER TIME**

TODAY

CURRENT STATE

507 M TONS

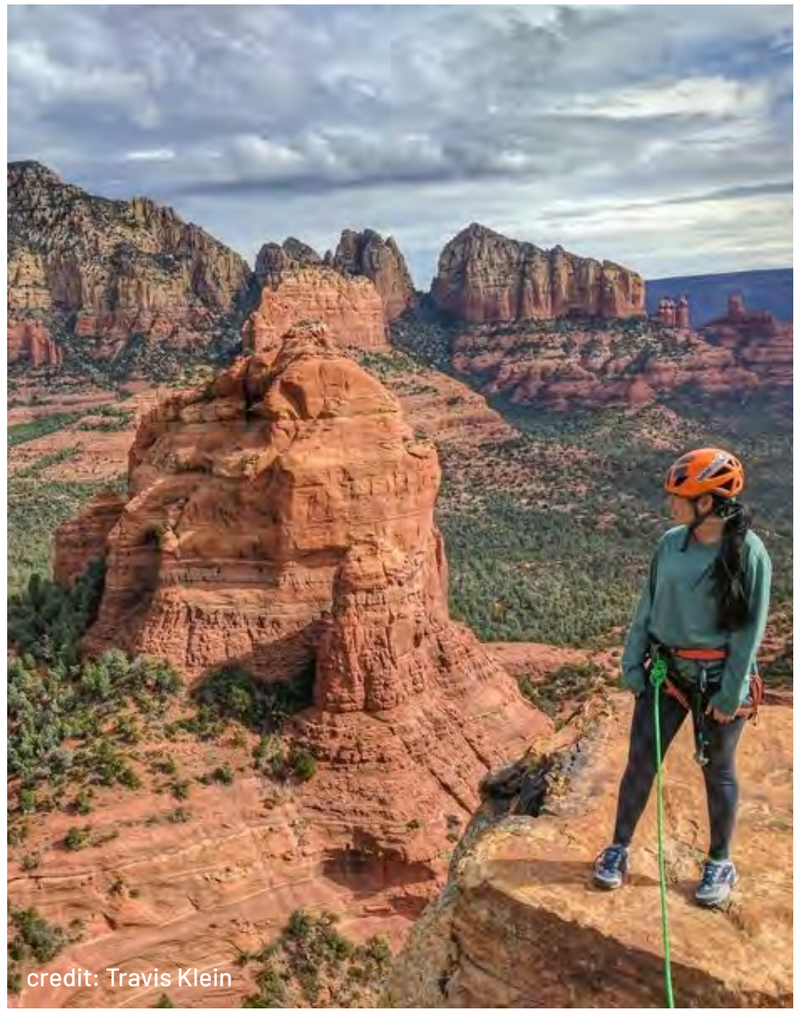
ANNUAL FOSSIL FUEL CO_2E

1056 M TONS

ANNUAL ELECTRICITY CO_2E

How to eliminate Sedona's climate impact?

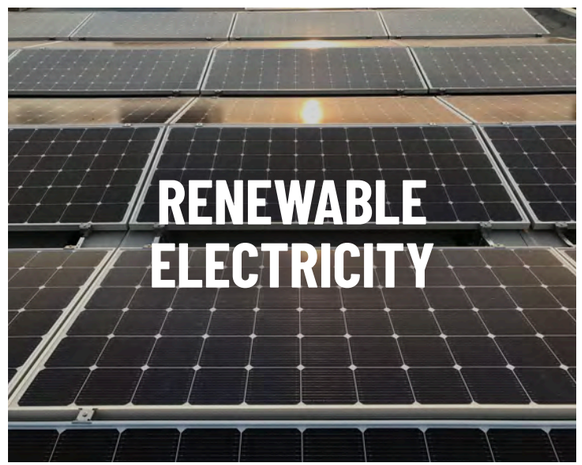
Climbing the spire of decarbonization



credit: Travis Klein

01. ROADMAP OVERVIEW

Eliminating Sedona's carbon footprint requires action in four main areas:



REDUCED EMBODIED CARBON Retrofitting existing buildings, rather than tearing down and building new zero carbon buildings, avoids the carbon emissions inherent in the construction process. Sedona can achieve carbon neutrality faster by retrofitting existing buildings, rather than tearing down and replacing them with new buildings with low carbon operations (except those at the end of their useful life). Note that evaluation of embodied carbon of potential future new buildings is not part of this Roadmap.

EFFICIENCY & LOAD REDUCTION Reducing building energy use, and thereby reducing carbon emissions, reduces the amount of renewable energy needed for total decarbonization. Efficiency also reduces the peak energy load demand on HVAC systems (load reduction), sometimes enabling end of HVAC equipment life replacements with smaller, less costly systems. Efficiency is typically the least expensive decarbonization element and often includes additional benefits, such as indoor air quality improvements.

ELECTRIFICATION – ENABLING RENEWABLE POWERABILITY Eliminating use of fossil fuels, either through conversion of natural gas burning in buildings or internal combustion engines to their electricly powered alternatives, allows the buildings and vehicles to be powered by renewable electricity. Converting operations from fossil fuels to electricity is typically the most costly and challenging aspect of decarbonization.

RENEWABLE ELECTRICITY Renewable electricity can be obtained either from solar electricity generating systems located on City properties or facilities, or from offsite sources, including APS' Green Locate or Green Commit programs, or participation in large scale regional renewable (solar or wind) projects.

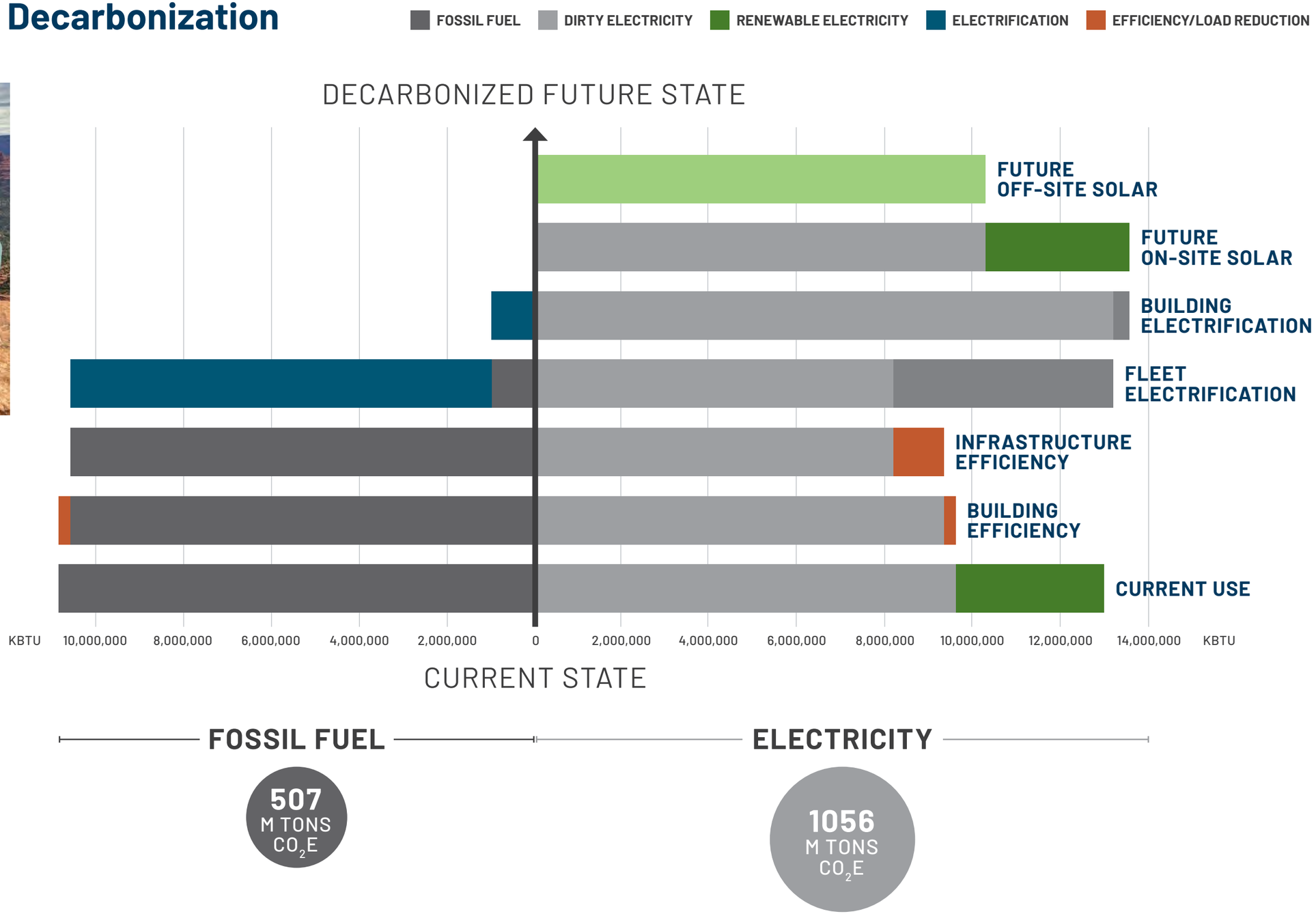
Note that these four activities aren't necessarily implemented sequentially. This roadmap identifies the most cost-effective and high-value phasing plan for implementation.

Also note that both carbon offsets and nonattributable, nonadditional renewable energy credits are considered an interim solution only in the City's quest to eliminate its climate harm. For this reason, this Roadmap focuses on implementation of complete decarbonization according to the framework above.

Climbing the Spire of Decarbonization


credit: Travis Klein

This graph summarizes the steps and impacts to eliminating Sedona's carbon footprint. The left side of the graph shows the steps to elimination of fossil fuels, and the right shows the transition to full renewable electricity. Detailed descriptions of these steps are provided in Chapter Two.



Roadmap key findings

THE CITY'S CURRENT OPERATIONS ARE FAIRLY EFFICIENT.
While some opportunities for cost-effective efficiency exist (discussed below), for the most part, based on a review of Energy Use Intensities compared to similar facilities in similar climate zones, the City's facilities operate quite efficiently.

The current decarbonization targets are reasonably achievable – a clear, cost-effective path with current technologies exists, with one exception.

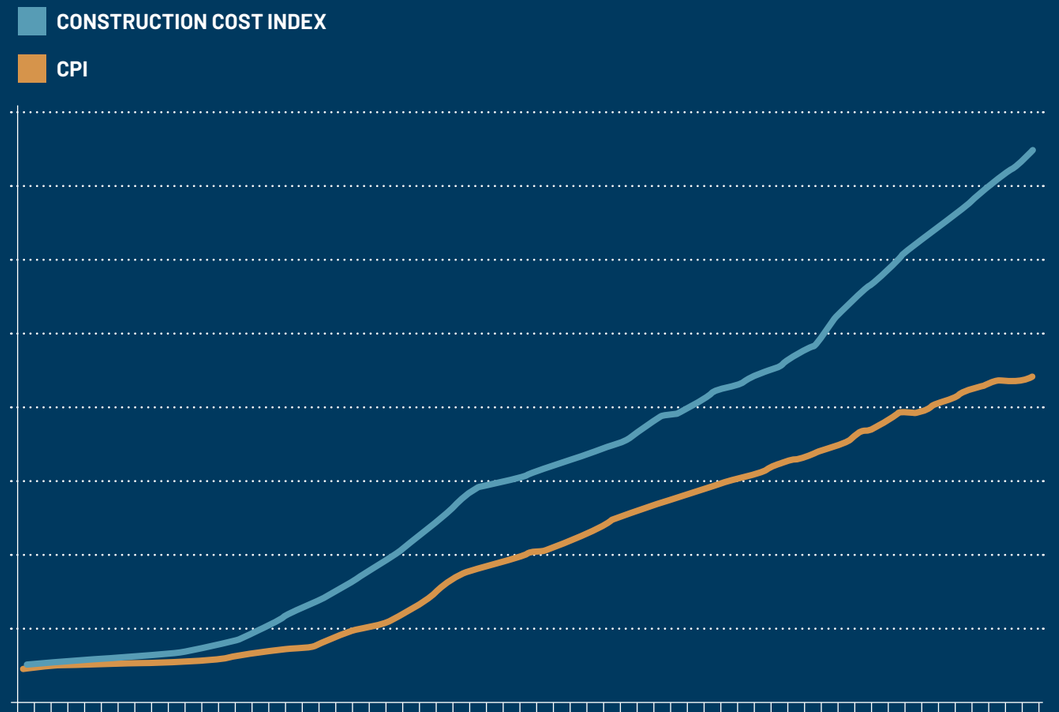
Based on detailed review of the City's facilities and required steps to decarbonize, the targets can be met within the timeframes outlined. The substantial majority of HVAC systems are due for replacement by 2030, aligning maintenance and decarbonization timeframes. The majority of decarbonization costs will be offset by operating savings and incentives, as outlined below. Needed decarbonization alternative technologies are fully available, with the exception of electric heavy equipment and trucks, discussed below.

THE BIGGEST CARBON REDUCTIONS COME FROM FLEET ELECTRIFICATION, ADDITIONAL ON- AND OFF-SITE RENEWABLE ELECTRICITY, AND ADDITIONAL WASTEWATER TREATMENT PLANT EFFICIENCY. A wholistic review of the City's carbon footprint shows that non-building loads drive its size. However, the building footprint by itself is substantial – equal to 52 homes – and thus must be attended to as well.

IT IS LESS EXPENSIVE FOR THE CITY TO PRODUCE ITS OWN RENEWABLE ELECTRICITY THAN PURCHASE IT FROM APS. Substantial opportunities exist for onsite solar, which will provide electricity cheaper than APS rates. The base 25.5% cost incentive available through the Inflation Reduction Act makes this a very attractive option for the City, in addition to other benefits such as providing a start to electric islandability and a visible expression of the City's climate commitment to visitors and residents.

REASONS TO DECARBONIZE NOW VS LATER:

- Implementing the recommended decarbonization phases vs waiting until 2029 will save the equivalent of 615 cars' annual emissions.
- A 25.5% direct solar incentive is available from the Federal government today.
- Historically, construction escalation has substantially outpaced inflation.



Roadmap recommendations

DECARBONIZE BASED ON ROADMAP. This roadmap identifies a specific program over time for the City to achieve its climate goals in the most cost-effective, strategic way possible. The core recommendation of this Roadmap is for the City to implement this program.

IMPLEMENT SUBSTANTIAL EV/SOLAR PHASE NOW TO BEGIN ACCRUING BENEFITS, CAPTURE IRA BENEFIT. This Roadmap has identified a substantial, cost-effective first phase of work which can be implemented now, which results in a ~90% reduction in fossil fuel derived energy. Implementing this work now rather than waiting has two benefits: greater reduction in climate impact over time (implementing in 2025 vs 2029 provides a benefit equal to the carbon footprint of 250 homes) and also ensures the 25.5% IRA incentive is captured while available.

AN ADDITIONAL RENEWABLE TARGET SHOULD BE ADDED TO CLARIFY AND STRENGTHEN THE CITY'S COMMITMENT TO RENEWABLE ENERGY. The City has achieved its 2025 renewable target primarily by participating in Arizona Public Service's Green Connect program. This is APS' entry level program (out of three tiers) for supporting renewable aspirations, by buying and applying preexisting, "open market" Renewable Energy Credits (RECs) to customer's electricity. While RECs are a good interim step (as followed by Sedona), obtaining on and offsite renewables which are both attributable (ie, specific systems which are owned by or contractually connected to Sedona) and additional (ie, new systems which actually convert dirty electricity to clean renewable electricity) is needed to achieve Sedona's overarching decarbonization goal, in keeping with its strategy to date. To clarify this, it is recommended that the City modify the existing renewable goal to the following:

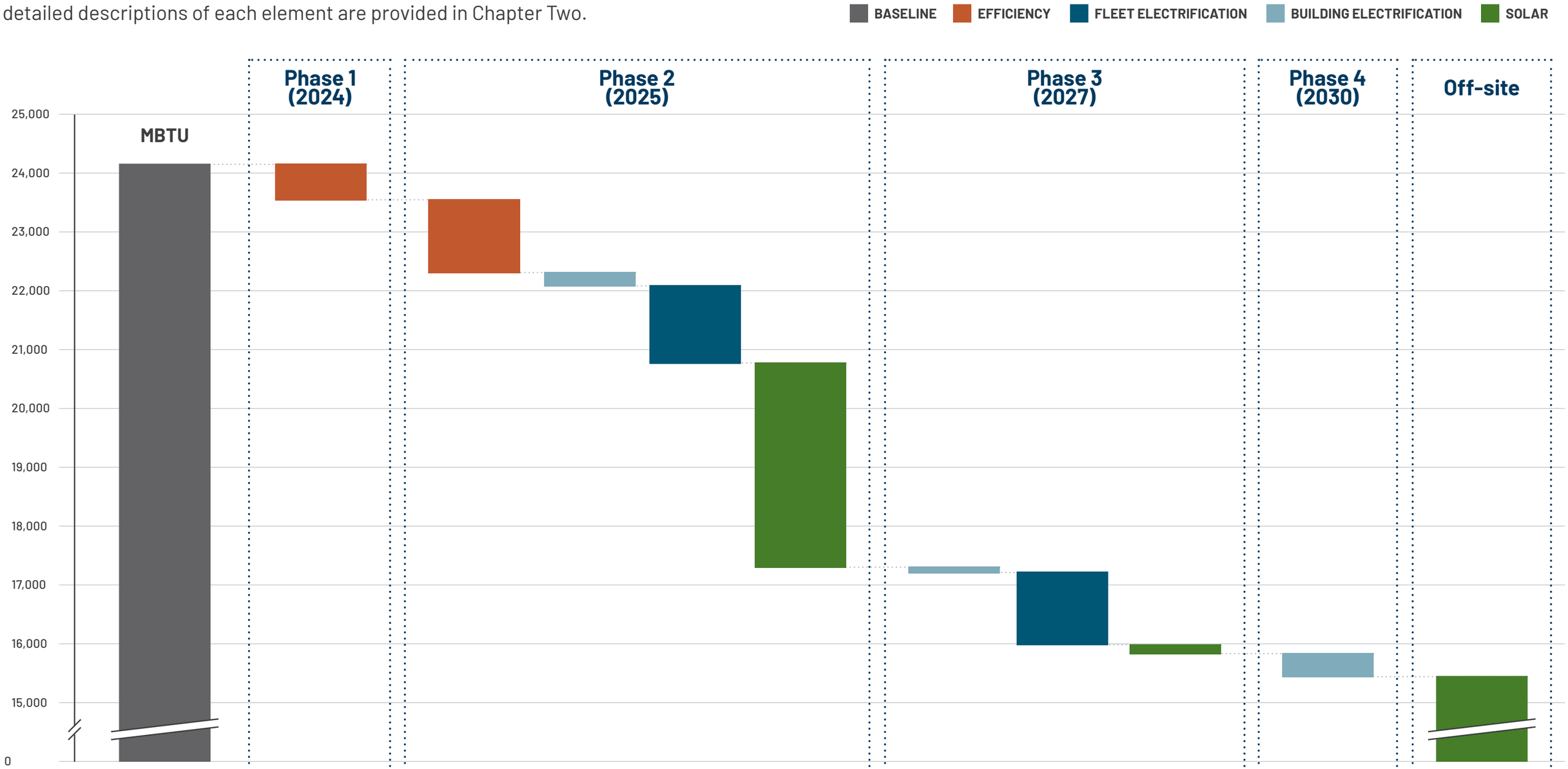
By 2025, the City will transition to consuming 100% renewable electricity for municipal operations, which may include REC purchases. By 2030, all City renewable electricity will be attributable and additional.

PUT DEDICATED FOCUS ON THE WASTEWATER TREATMENT PLANT AND ITS ASSOCIATED SOLAR SYSTEM TO ENABLE ADDITIONAL PLANT EFFICIENCY. The wastewater treatment plant has a substantial solar array that helps power its operations. The array output is large enough to nearly match the electrical use of the plant electric meter it is connected to. Dedicated attention to restructuring meters, reconsidering rate structure, and points of connection within the context of the PPA settlement agreement will likely yield a substantial financial opportunity to help underwrite the costs of improvement.

WORK WITH APS TO ESTABLISH A CITY GREEN LOCATE/COMMIT OFFSITE RENEWABLES PURCHASE (OR SIMILAR) WITH OPPORTUNITIES FOR THE BROADER COMMUNITY. As mentioned above, the City implemented a REC purchase via APS as an interim decarbonization approach. Fully attributable and additional renewable electricity is available through two of APS' programs, Green Locate and Green Commit. Given that a primary impetus for the City's municipal decarbonization program is helping lead the broader Sedona community to reduce its climate harm, this purchase could be expanded to include City businesses and residents who opt to participate.

Decarbonization Roadmap Over Time – Overview

The following summarizes the recommended steps to decarbonization over time – detailed descriptions of each element are provided in Chapter Two.



Decarbonization Roadmap Over Time – by Facility

EFFICIENCY DETAILS READ MORE ▶

BUILDING ELECTRIFICATION DETAILS READ MORE ▶

VEHICLE ELECTRIFICATION DETAILS READ MORE ▶

ON-SITE RENEWABLES DETAILS READ MORE ▶

OFF-SITE RENEWABLES DETAILS READ MORE ▶

FACILITY	EFFICIENCY/LOAD REDUCTION	ELECTRIFICATION	ON-SITE RENEWABLES	EFFICIENCY/LOAD REDUCTION	ELECTRIFICATION	ON-SITE RENEWABLES	EFFICIENCY/LOAD REDUCTION	ELECTRIFICATION	ON-SITE RENEWABLES	EFFICIENCY/LOAD REDUCTION	ELECTRIFICATION	ON-SITE RENEWABLES	APS RENEWABLES
	PHASE ONE 2024			PHASE TWO 2025			PHASE THREE 2027			PHASE FOUR 2030			
City Hall Campus	X			X	X	X		X			X		X
Wastewater Administration	X			X	X								X
Wastewater Operations	X			X	X						X		X
Posse Grounds Park	X			X	X	X					X		X
Public Works Maintenance (Contractors Road)	X			X	X	X					X		X
Brewer Road Campus	X			X								X	X
Wastewater Treatment Plant						X							
Street Lights	X			X									X

Total Lifetime Implementation Cost	**$13.0 mil**
Avoided Equipment Replacement Costs	**($2.0 mil)**
Lifetime Project Operating Savings	**($6.0 mil)**
Total Incentives (IRA & Utility Rebates)	**($1.0 mil)**
Total Net Cost of Decarbonization	**$4.0 mil**

Decarbonization action benefits and costs

The following is a high level outline of the costs to decarbonization.

- **Total lifetime implementation cost** means the full cost to implement elimination of Sedona's carbon footprint, which would appear as capital budget.
- **Avoided equipment replacement costs** means the cost of long term upkeep (such as replacing worn out heating units) that wouldn't need to be spent by Sedona because the given item (such as heating units) are replaced as part of the decarbonization process.
- **Lifetime project operating savings** are reductions in operating cost, primarily utilities, resulting from the decarbonization actions. These are aggregated over the useful lives of the improvements.
- **Total incentives** means local, State, and Federal incentives. Note that the US Inflation Reduction Act provides a very substantial 25.5% of total cost direct pay incentive for solar.
- **Total net cost of decarbonization** is total construction cost less all the avoided cost and savings/incentive streams – total net cost to Sedona.

Notes:

- Construction costs and utility savings should be considered Rough Order of Magnitude estimates with an accuracy of +- 25%.
- Incentives and grants are not guaranteed.
- Operating savings assume 30 year life expectancy for solar and EV charging infrastructure, 15 year life expectancy for HVAC components , 20 years for WWTP measures, and 15 years for other efficiency measures.
- The decarbonization solution for heavy equipment/trucks is unknown at this time; thus associated costs/benefits are not included.
- Costs of window/door replacement not included as these are primarily a long term maintenance item vs. decarbonization solution. Additional cost of offsite renewables not included since implementation date is unknown thus likely cost as well.

Levelized kwh Cost Analysis

The following table compares Sedona's current and potential electricity costs.

IT IS LESS EXPENSIVE FOR SEDONA TO IMPLEMENT EFFICIENCY AND BUILD ITS OWN SOLAR GENERATION THAN TO BUY ELECTRICITY FROM APS.

TYPE	COST	NOTES
EFFICIENCY/LOAD REDUCTION	9 cents/kWh	What is costs to save a kwh of electricity through the proposed efficiency measures. Includes incentives.
CITY-OWNED ONSITE SOLAR	9.7 cents/kWh	What is costs to generate a kwh of electricity with onsite solar generation. Cost includes solar canopies.
AVOIDED COST OF DISPLACED APS ELECTRICITY WITH REAL-TIME ONSITE GENERATION	10.3 cents/kWh	What Sedona would pay APS for a kwh at the exact time it otherwise would generate it with onsite solar.
APS CURRENT BLENDED RATE	18 cents/kWh	The average amount Sedona pays APS for a kwh, including base + demand charges.
APS OFFSITE RENEWABLE	19-19.5 cents/kWh	Blended rate + 1-1.5 cents, published APS rate for offsite renewable electricity.

Beneficial decarbonization

Looked at a certain way, climate change is an unfunded mandate being imposed on humanity by a combination of our current technologies and lifestyles and planetary physical boundaries. While the City is taking responsibility and eliminating its carbon footprint, it isn't in the business of decarbonization – its core mission is to provide governmental services to its residents and visitors.

Recognizing this, this Roadmap seeks to look broadly at the process of decarbonization and see what additional decarbonization might result in avoided cost beyond utility costs as described below. In addition, decarbonization can yield additional benefits beyond decarbonization and avoided costs – known as co-benefits. Where quantification is possible, it is provided, based on economic modeling derived from best available science. All figures assume a value stream of the roadmap horizon of 2023 - 2040.

AVOIDED CARBON EMISSIONS PENALTIES As climate change becomes an increasingly current (rather than future) reality, carbon emissions penalties are starting to be applied by leading organizations to internal operations, and by governing bodies as regulation.

AVOIDED EMPLOYEE TURNOVER The cost of employee turnover (training, lost knowledge, etc.) is significant in any organization. Employees take pride in working for organizations which have integrity in reflecting their values.

FUTURE ELECTRIC EMERGENCY BACKUP POWER Installing on-site solar as proposed for overall renewable power for the City has the added benefit of being combinable in the future with batteries to provide emergency backup power.

IMPROVED INDOOR AIR QUALITY The efficiency measures, electrification, and air sealing of City Hall will improve indoor air quality.

NET BENEFIT OF DECARBONIZATION WITH QUANTIFIED COBENEFITS: **$847,926**

Additional cobenefits

COMMUNITY DECARBONIZATION EDUCATION AND LEADERSHIP – WALK THE TALK Sedona's Climate Action Plan identified decarbonization of the City's operations as a way to lead, inspire, and educate its residents to take similar actions in their own lives.

COMMUNITY WELL-BEING Transitioning to clean energy improves overall quality of life by reducing noise pollution, improving indoor air quality, and creating safer, more comfortable living and working environments for residents and workers.

TOURISM – GREEN DESTINATION The Sedona Tourism Bureau's annual operating budget is $2.1 million, reflecting the importance of this topic to the City. Embracing sustainability and clean energy initiatives enhances the municipality's appeal as a tourist destination, attracting visitors who prioritize eco-friendly travel options and outdoor recreational activities, boosting local businesses and revenues.

DARK SKY IMPROVEMENT The LED streetlights proposed for installation as part of this roadmap will reduce nighttime glare and help allow residents and visitors to experience Sedona's glorious night sky.

URBAN HEAT ISLAND REDUCTION Sedona's 2023 CAPA Heat Watch Study found a 9.1 degree heat differential across the City, strongly correlated with heat absorption, paving materials, and shade cover. The share from proposed solar canopies will help reduce urban heat.

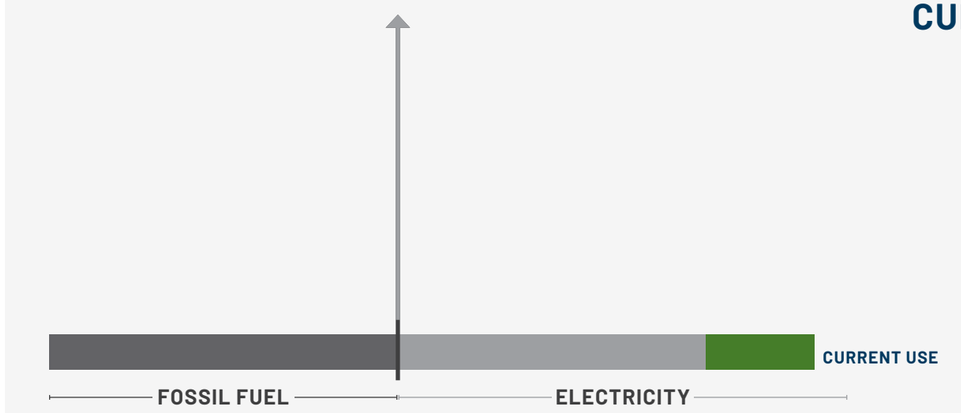
ENERGY INDEPENDENCE Decarbonizing buildings reduces reliance on external energy sources, fostering energy independence and insulating the city from geopolitical tensions or supply disruptions that could drive up costs or compromise security.

LOCAL JOB CREATION The proposed decarbonization elements will support the local economy with construction and related field work.

02

ROADMAP DETAILS BY TOPIC

McKinstry
For The Life Of Your Building



ENERGY USE AND CARBON EMISSIONS

By the Numbers: Buildings, Fleet & Infrastructure

The following outlines all components included in this Roadmap and their associated energy use and carbon emissions.

ACCURACY OF FIGURES Throughout this Roadmap, construction costs and energy savings figures are presented which are based on executed electrification, renewable energy, and energy efficiency projects McKinstry has performed for other municipal clients as well as other construction -pricing data. These should be considered Rough Order of Magnitude estimates with an accuracy of ±25%.

The baseline for each building is built averaging data from 2021 through 2023 where available; data that appeared to not represent typical or current use was excluded.

			KWH			THERMS/PROPANE GALLONS			FUEL GALLONS				
NAME	ADDRESS	SQUARE FEET		COST	CO_2e MTONS		COST	CO_2e MTONS		COST	CO_2e MTONS	TOTAL COST	TOTAL CO_2e MTONS
BUILDINGS													
City Hall Campus	102 Road Runner Dr	43,028	296,628	47,827	110.29	7,025 Therms	7,562	46	-	-	-	55,389	156.29
Wastewater Administration*	19655 W. State Rte 89A	4,000	-	-	-	-	-	-	-	-	-	-	-
Wastewater Operations*	19655 W. State Rte 89A	3,300	-	-	-	-	-	-	-	-	-	-	-
Posse Grounds Park	525 Posse Ground Rd	24,552	39,339	20,603	14.63	-	-	-	-	-		20,603	14.63
Brewer Road Campus	221 Brewer Rd	14,580	51,307	14,440	19.08	-	-	-	-	-	-	14,440	19.08
Public Works Maintenance (Contractors Road)	2070 Contractor's Rd	5,825	29,683	3,808	11.04	1,923 Therms	1677	13	-	-	-	5485	24.04
FLEET													
Passenger Vehicles	-	-	-	-	-	-	-	-	46,744	163,604	380	163,604	380
Public Transit	-	-	-	-	-	-	-	-	21,500	75,250	175	75,250	175
Construction/ Heavy Equipment	-	-	-	-	-	-	-	-	8,341	29,193	68	29,193	68
INFRASTRUCTURE													
Wastewater Treatment Plant	19655 W. State Rte 89A	-	1,822,649	283,082	435.31	4,137 Gallons	9,357	25	-	-	-	292493	460.31
Street Lights	-	-	132,784	28,572	49.37	-	-	-	-	-	-	28,572	49.37
Lift Stations	-	-	980,828	156,350	364.67	-	-	-	-	-	-	156,350	364.67
TOTAL	**-**	**87,985**	**3,765,218**	**586,214**	**1007**	**-**	**11,790**	**84**	**97,437**	**268,047**	**623**	**840,839**	**1714**

*Wastewater Administration and Operations buildings are metered as part of the larger treatment plant; thus their energy use is included in the treatment plant figures.

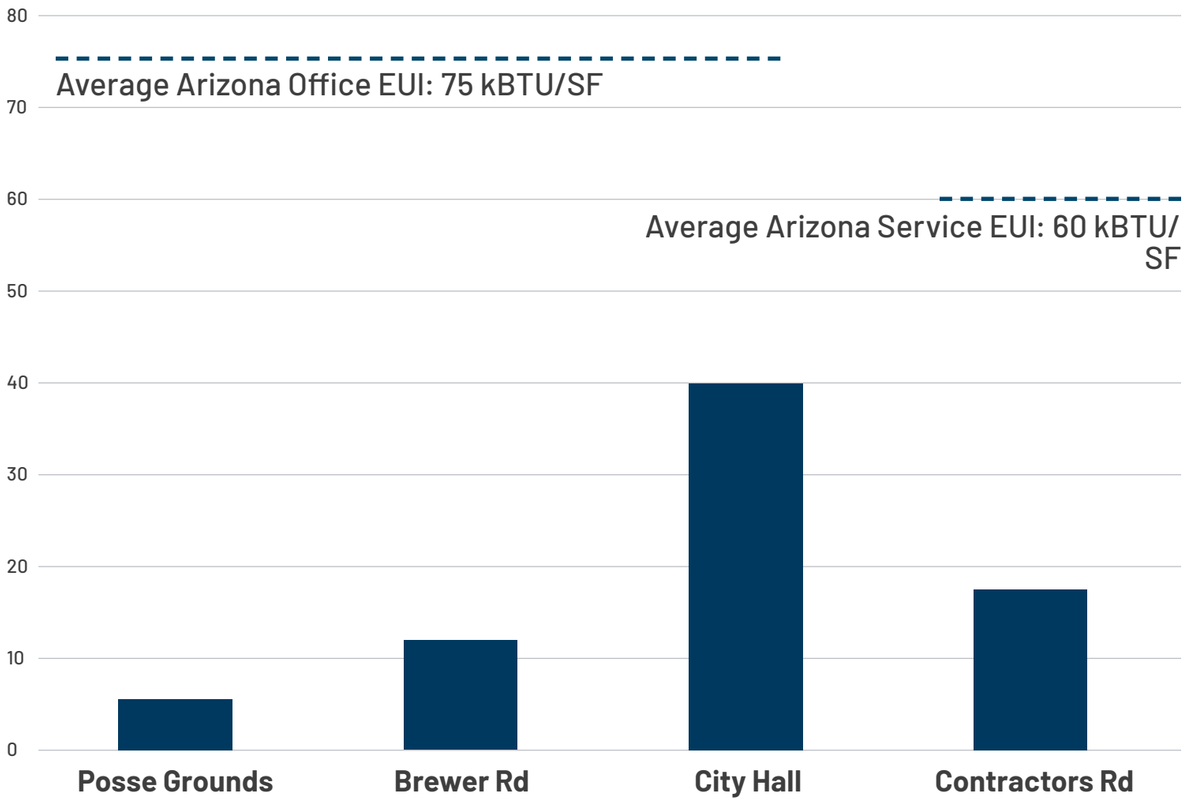
Efficiency and Load Reduction - Buildings

HOW EFFICIENT ARE THE CITY'S BUILDINGS TODAY?

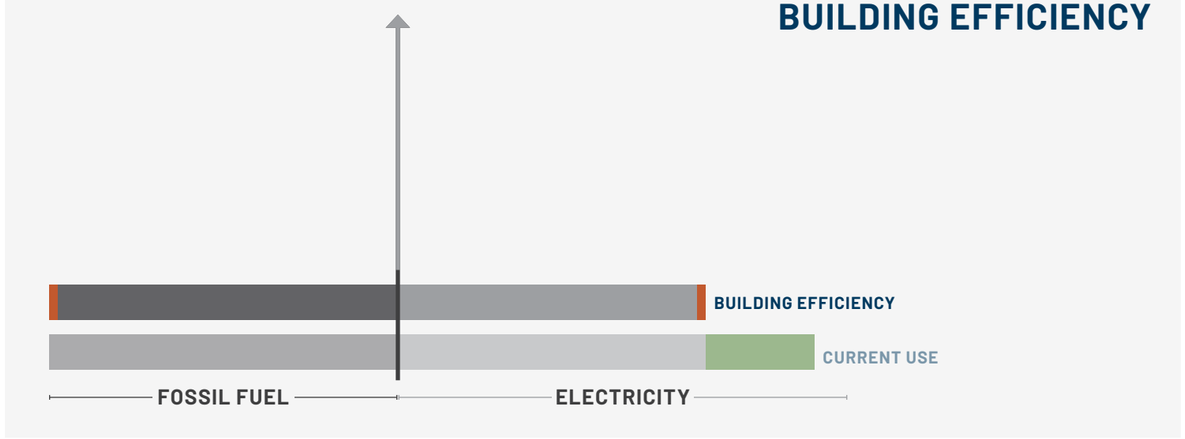
As discussed above, the City's buildings are fairly efficient today, comparing favorably to similar buildings in similar climates. This is due in part to previous efforts by the City to reduce its climate harm.

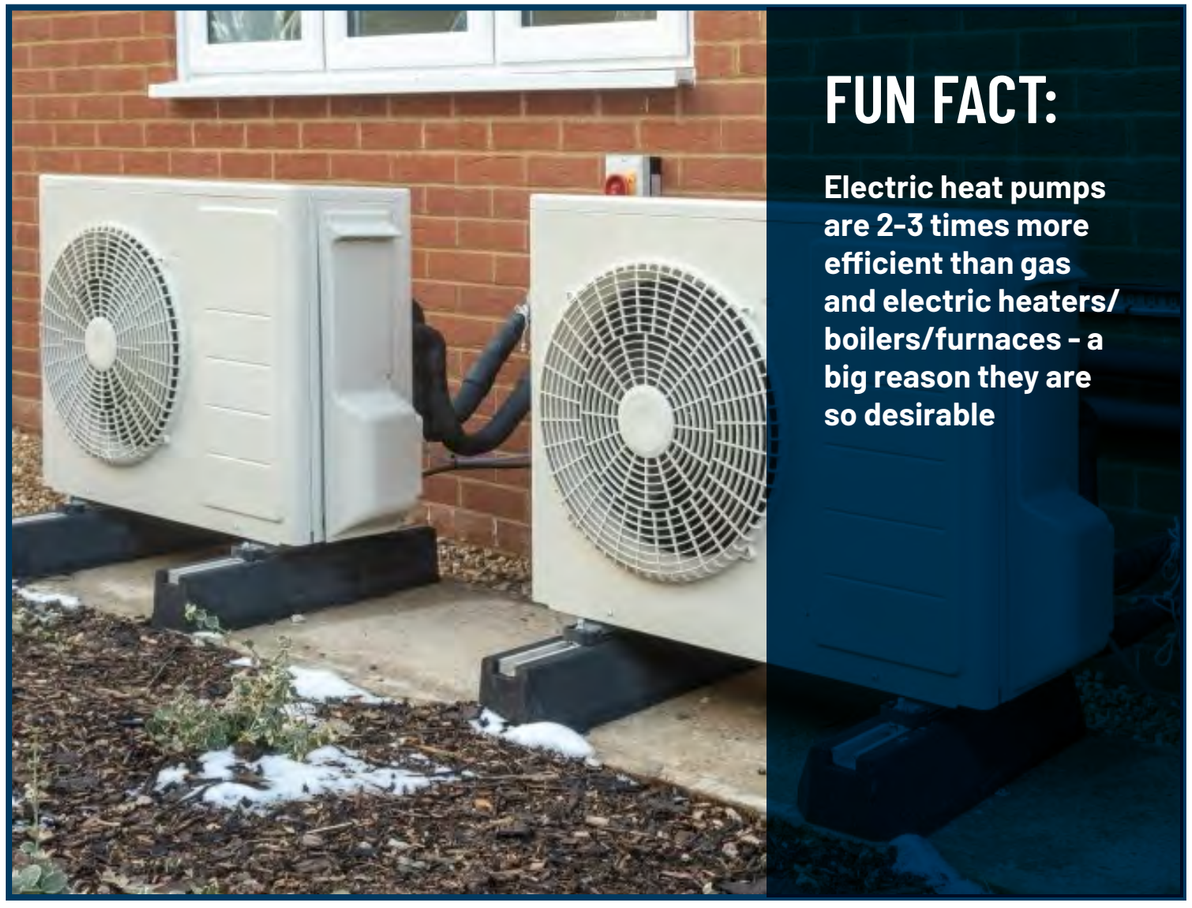
City of Sedona Energy Use Index

kBTU/SF/YEAR



Energy Use Intensity (EUI) is a common energy use metric for buildings, akin to miles per gallon in fossil fuel vehicles. In the United States, EUI is expressed as kbtu (1,000 British Thermal Units) per square foot. Note that unlike MPG, with EUI, a lower number is better/more efficient.





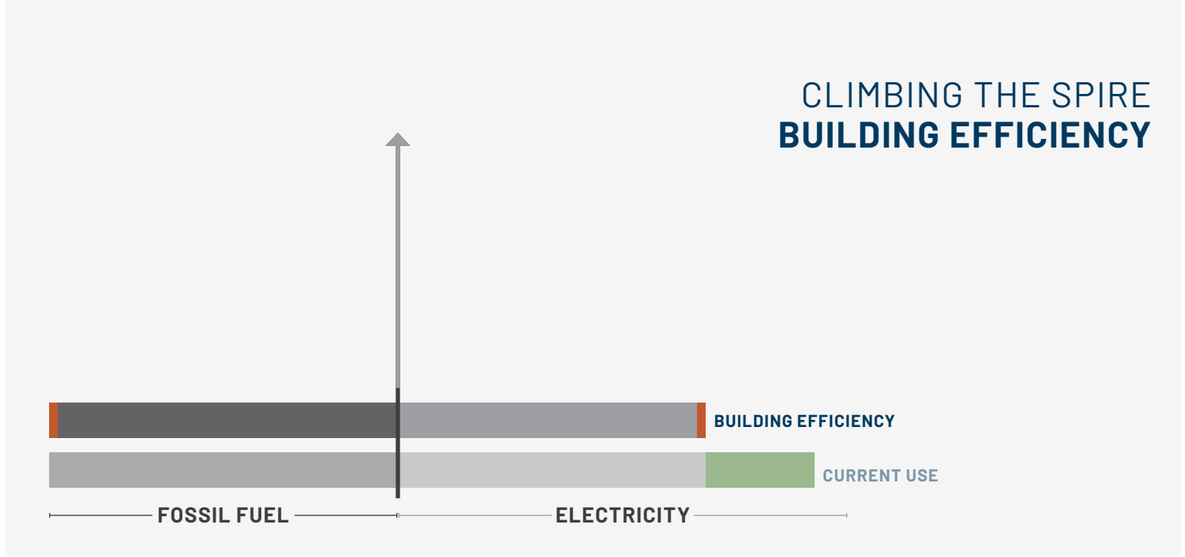
Recommended efficiency measures

Within the context of fairly efficient buildings, this Roadmap has identified a number of ways to cost-effectively reduce energy use and carbon harm. These "low-hanging fruit" are generally the most cost-effective solutions available and have immediate impacts. Subsequent decarbonization will then be achievable at a lower comparative cost with smaller peak heating and cooling loads placed on electrified equipment and less required renewable generation. Efficiency opportunities include:

HVAC AND LIGHTING CONTROLS: Many Sedona facilities currently utilize a wireless building control system from Autani. These existing systems can be expanded to incorporate lighting controls, occupancy-based HVAC control, plug-load control, and many other internet of things (IOT) / sensor based energy efficiency enabling technologies controlled from the same centralized, web-based Autani dashboard. Facilities without existing wireless control systems will be retrofit with Autani controls, complete with the added functionality discussed above.

While the City has already retrofit nearly all building lighting to LEDs, there are additional lighting savings opportunity through advanced lighting controls such as daylighting and occupancy / vacancy sensing controls, which also improve working environments. Ultimately, these implementations will allow Sedona to better control and monitor HVAC equipment, lighting, and other energy consuming systems to further reduce energy usage and carbon emissions.

RETRO-COMMISSIONING: Retro-commissioning is the process of ensuring Sedona's existing building systems are operating as intended and designed - dampers opening properly, motors working efficiently and at the right speed, flow rates correctly adjusted, etc. This regularly results in savings and improved functionality.



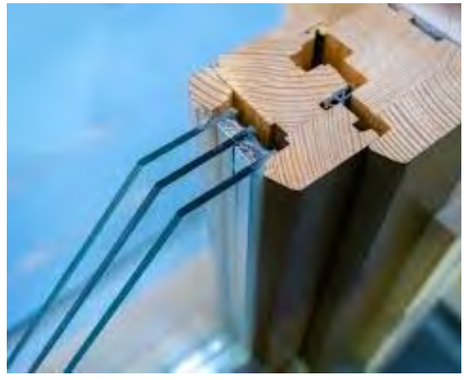
CONTROLS OPTIMIZATION: In conjunction with retro-commissioning, optimization of controls such as adjustments to zoning/scheduling, temperature setpoints, morning heat up/cool down, automatic shut offs, etc. ensure Sedona's systems operate only when needed, saving energy and reducing carbon emissions.

BUILDING ENVELOPE/DUCT SEALING: Air leakage is the uncontrolled migration of conditioned air through the building envelope, typically via sealing cracks where dissimilar materials meet. It can be caused by pressure differences caused by wind, mechanical systems, and the natural buoyancy of warm air (chimney stack effect). Strategies include sealing HVAC ductwork leaks, weatherstripping doors and windows, sealing plumbing and electrical penetrations, sealing the joint between roof deck and walls, and duct sealing. Envelope improvements also provide better air quality by sealing the interior from wildfire smoke and other outside pollutants as an added benefit.

02. ROADMAP DETAILS BY TOPIC

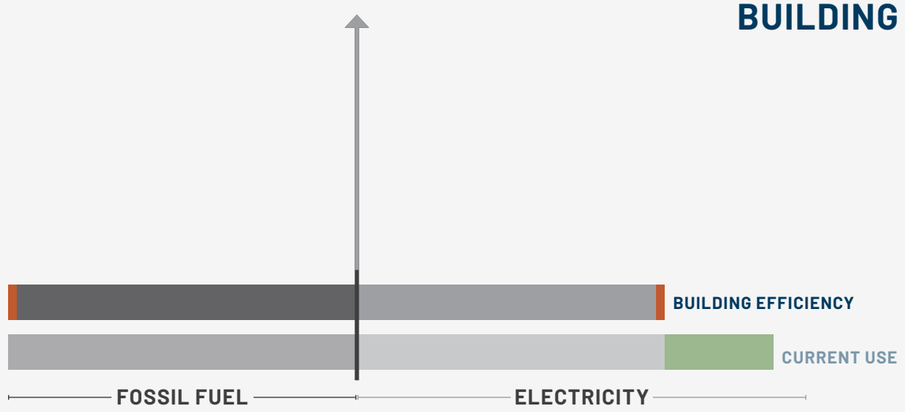
PLUG LOAD MANAGEMENT: Plug loads refer to the use of electricity through appliances and other electronics that are plugged into outlets throughout the building. Modern electronic equipment usually draws energy 24/7, even when operating in a "sleep" or "standby" mode. A five-step reduction process includes:

- Cataloguing all plug-in devices through an onsite, detailed audit
- Removing those that aren't necessary
- Replacing remaining items with highly efficient alternatives as feasible and financially sensible
- Placing heavy draw items without automatic internal shutoffs on vacancy switching (as appropriate)
- Monitoring the results and adjusting as appropriate

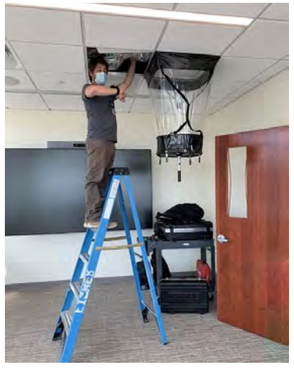


WINDOW AND DOOR REPLACEMENT (CITY HALL):
The windows and doors at the City Hall campus are outdated, energy inefficient, and due for replacement. They also are leaky and have relatively low insulation values. These should be replaced with better insulated units, potentially triple paned, with high performance frames. They should also be pressure tested at the time of installation to ensure they don't leak air.

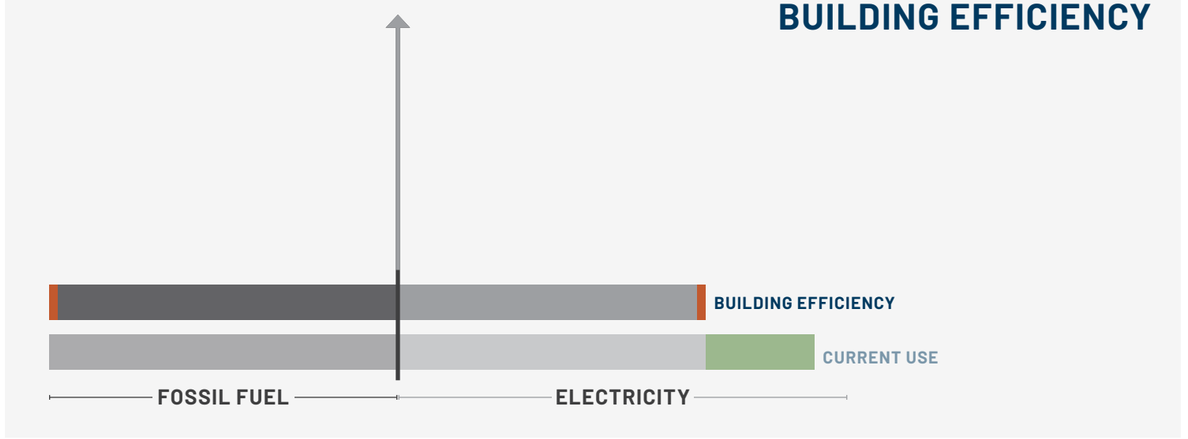
CLIMBING THE SPIRE
BUILDING EFFICIENCY



HEAT PUMP WATER HEATERS: In several locations the City has electric resistance water heaters. These should be replaced by electric heat pump water heaters, which are 2-3 times more efficient. Heat pump water heaters exhaust cold air, and come in two forms – 1) integrated, with the heat pump on top of the tank which indirectly cools its immediate surroundings, and 2) split, which separates the heat pump from the storage tank, and exhausts cold air from the heat pump section which is typically located outdoors. Given that Sedona's cooling outweighs its heating needs, it may be more energy efficient to use the integrated type, recognizing that the cold air will add heating load during the winter.

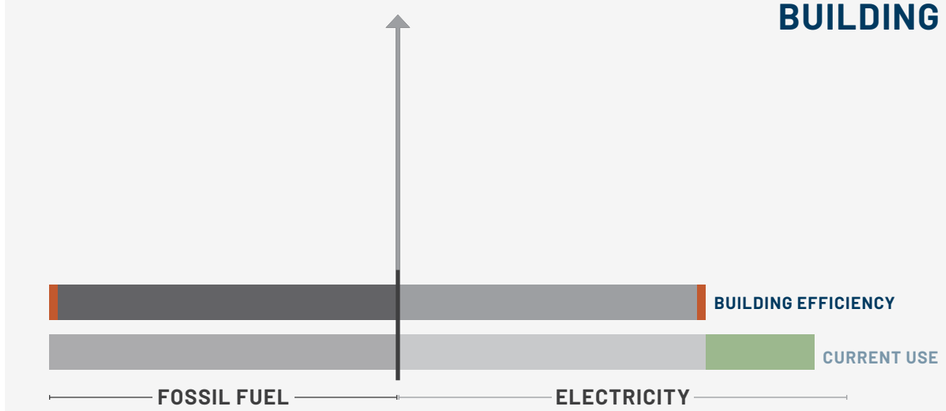


AIR-SIDE TESTING AND BALANCING (T&B): This measure ensures that existing HVAC systems operate efficiently by verifying and adjusting airflow rates to match original design specifications or new, more energy efficient designs. By implementing thorough T&B measures at the City Hall and WWTP facilities, those HVAC distribution systems can be much better at maintaining consistent temperature control wholistically, reducing the frequency of hot/cold calls from occupants. This measure optimizes overall system performance, leading to improved occupant comfort and extended useful life of the equipment. In addition, regular testing and balancing can identify and address system imbalances, ensuring long-term reliable operation.



Recommended Efficiency/Load Reduction Measures by Facility

FACILITIES	HVAC/LIGHTING CONTROLS	RETROCOMMIS-SION	ENVELOPE /DUCT SEAL	CONTROLS OPTIMIZE	WINDOW/DOOR REPLACEMENT	HEAT PUMP HW	PLUG LOADS	TEST/ BALANCE
City Hall Campus	X	X	X	X	X		X	X
Wastewater Administration						X	X	X
Wastewater Operations						X	X	
Posse Grounds Park	X		X	X			X	
Public Works Maintenance (Contractors Road)	X		X	X	X	X	X	
Brewer Road Campus	X		X	X			X	



POTENTIAL PROJECTS	EFFICIENCY MEASURE SAVINGS					
	ELECTRICITY SAVINGS (kWH)	kWh SAVINGS %	NAT. GAS SAVINGS (THERMS)	THERM SAVINGS %	PROPANE SAVINGS (GAL)	PROPANE SAVINGS %
HVAC/Lighting Controls Optimize	45,732	1.09%	1,081	6.77%	215	5.20%
Window/Door Replacement	6,977	0.17%	375	2.35%	0	0.00%
Envelope/Duct Seal	22,862	0.54%	955	5.98%	78	1.90%
Retro-commissioning Test/ Balance	0	0.00%	0	0.00%	0	0.00%
Plug Loads	5,000	0.12%	0	0.00%	0	0.00%
Heat Pump HW	0	0.00%	250	1.57%	0	0.00%
TOTALS	**80,571**	**1.92%**	**2,661**	**16.66%**	**294**	**7.10%**

Efficiency – Infrastructure

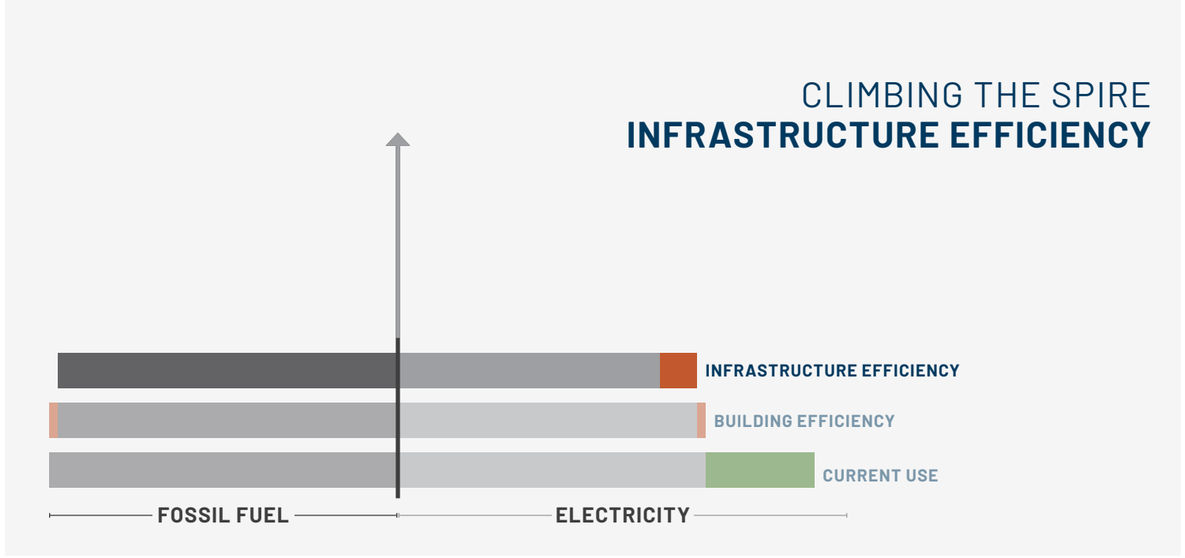
All of the City's power-using infrastructure is 100% electric – no direct fossil fuels are used, meaning efforts can be focused on efficiency and added solar rather than electrification.

WASTEWATER TREATMENT PLANT The City's wastewater treatment plant uses a lot of energy – consumes 1,821,890 kWh a year, with 1,062,222 kWh of that being offset by the existing solar PV system – and is the City's largest single energy user. This means more efficient operations, even one or two percent better, will have an outsized impact.

As part of this Roadmap, a technical analysis of plant operations by a wastewater plant efficiency expert was performed. The analysis found that given the specific plant design and flow volumes, it is being operated very efficiently.

In terms of making the plant even more efficient, several larger opportunities requiring capital investment were identified:

- The City is already upgrading the ultraviolet disinfection system. It is nearing the end of its life and being replaced with a system that should reduce electricity use through low-pressure, high-output bulbs.
- Influent equalization into the plant via an upstream sewage holding tank to regularize flows may be a cost-effective measure depending on the plant's APS rate structure and should also reduce electricity use.
- Replacing fixed speed anoxic tank mixer motors with variable speed motors will allow them to be turned down to match load.



Low cost operating efficiency strategies were also identified:

- Change digester aeration and effluent disposal schedules to occur at low electricity cost times.
- De-energize heat trace during the summer.
- Reduce plant water operating pressures.

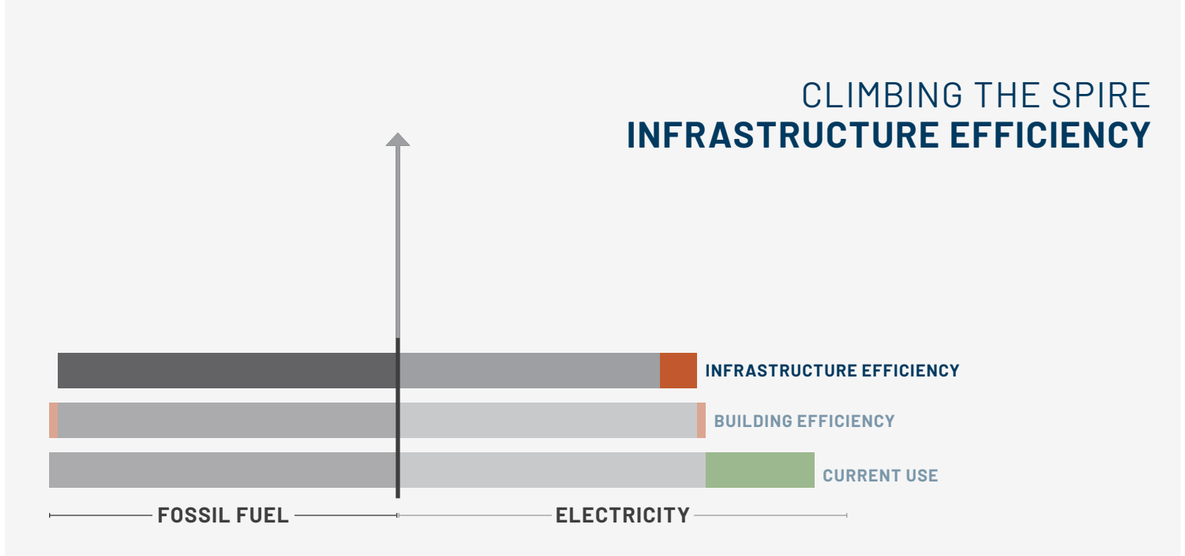
Note that a substantial barrier to cost-effective reduction of plant electricity is the existing meter structure and size of the plant's solar array. As discussed above, the City has a long term agreement to buy electricity from a third party solar array adjacent to the plant. The array is connected to the primary plant electricity meter. The plant's usage through this meter and the array's generation output curves are currently fairly closely matched. The power purchase agreement specifies that electricity not used by the plant is sold at very low wholesale rates, meaning that if the plant reduced electricity use significantly, the resulting savings would only acrue at that low rate.

While the solar is connected to the primary meter (through which ~80% of the plant's usage flows), the plant does use a substantial additional amount of electricity which flows through two other meters. Meters could potentially be reconfigured to enable the electricity from the secondary meters to flow through the primary, in turn increasing the buffer of potential full-value electrical savings (thus avoiding the wholesale electricity rate sellback) that could be gained through efficiency gains. Resolution of this complex opportunity is recommended as a first step in the development of the efficiency measures described above.

02. ROADMAP DETAILS BY TOPIC

The solar array power purchase agreement is structured to only pay the City very low wholesale electricity rates for any power it sends back to the grid. This agreement was subject to a lawsuit and settlement which established a payment structure between the array owner and the City. This roadmap has identified two substantial opportunities for reducing electricity use at the plant, but the financial benefit of implementing these measures is very low due to the wholesale rate sell-back.

WASTEWATER LIFT STATIONS The City has 17 sewage lift stations, which pump sewage over topography to reach the treatment plant. These pumps are very large, and together are 17% of the City's energy use. The City is currently replacing the pumps at three of its largest stations from fixed to variable motors, which will allow them to match actual flow, reducing electricity use. The same technical analysis for the wastewater treatment plant also reviewed the City's lift stations to find efficiency opportunities. The analysis found that providing a better software-based controls system would enable better pumping optimization, reducing energy use.



LED STREET LIGHTS The City's street lights currently use high pressure sodium (HPS) lamps. Installing new LED streetlights on the existing poles will reduce electricity use by about 60%. The City recently purchased the replacement LEDs but has not yet installed them. The analysis included for this measure assumes 149 street lights will be converted to LED.

INFRASTRUCTURE	CURRENT ELECTRICITY USE, kWh	POTENTIAL ELECTRICITY REDUCTION, kWh	POTENTIAL ELECTRICITY REDUCTION, %
Wastewater Plant	1,062,222 (Net Solar) 1,821,222 Gross	208,000	11.4%
Wastewater Pump Stations	980,828	-	-
Street Lights	132,784	80,249	60%

Electrification – Enabling Renewably Powerable Systems

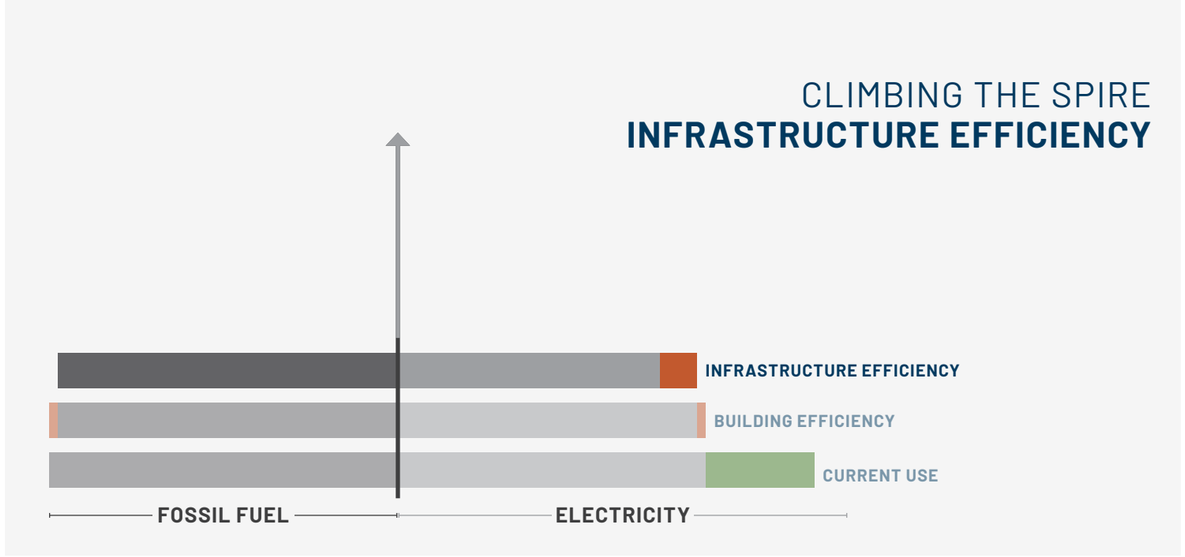
The primary source of climate change worldwide is fossil fuels. Finding alternative ways to power our needs is the core strategy for eliminating climate harm. The City uses fossil fuels directly in two ways: to power its fleet, and heat its buildings, which together account for 53% of its energy use.

While combustion-based systems can be powered with renewable, biobased combustion fuels, it is not a solution that is scalable to full societal decarbonization and is not readily available in the marketplace. Renewable electricity, on the other hand, is a mature, affordable and rapidly expanding option. Therefore, focusing on an electricity-based approach is a core element of decarbonization, working hand in hand with obtaining fully renewable electricity. The process of converting systems from fossil fuels to electricity is known as “electrification”.

Replacing fossil fuel combustion also improves local indoor and outdoor air quality and reduces the risk of carbon monoxide poisoning, among other benefits. However, widespread electrification requires adequate electric grid infrastructure to handle the increased demand - the transition must be planned and executed carefully to ensure cost-effectiveness and minimize disruption.

Vehicle electrification

As discussed above, the City has an explicit goal of replacing its fossil fuel powered passenger vehicles with electric vehicles by 2030. Plenty of electric passenger vehicle options are available in the market, and two patrol vehicles (Ford Lightning crewcab and Tesla Y) are also available, with more in the pipeline (including the Chevy Blazer, due late 2024). Related to its primary decarbonization goal, to achieve full zero carbon performance which doesn’t rely on carbon offsets, the City will also need to find a way to eliminate fossil fuel use for heavier duty vehicles. Other than transit, viable heavy electric alternatives are not yet available in the marketplace. Given the accelerated market transformation in vehicle electrification, electric heavy vehicles/machinery are likely to be available within 5-10 years. Biofuels are another possible solution for this very specific use case.

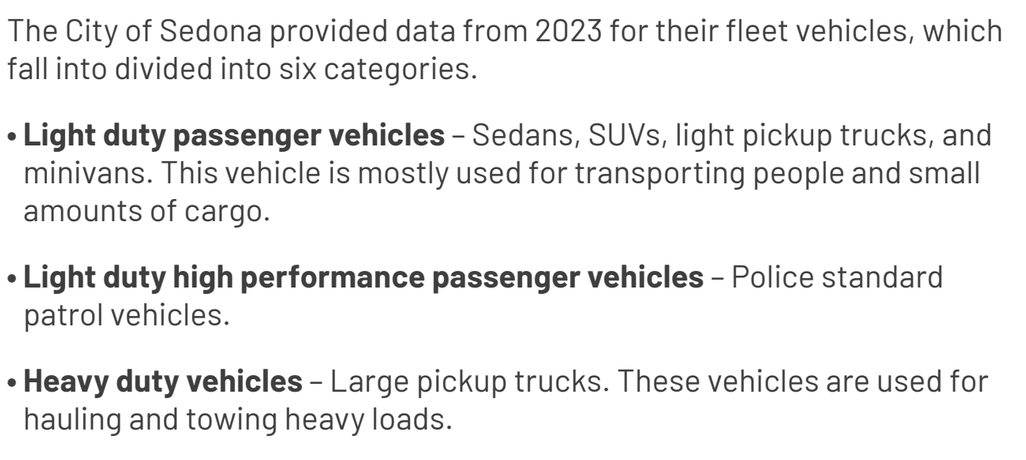


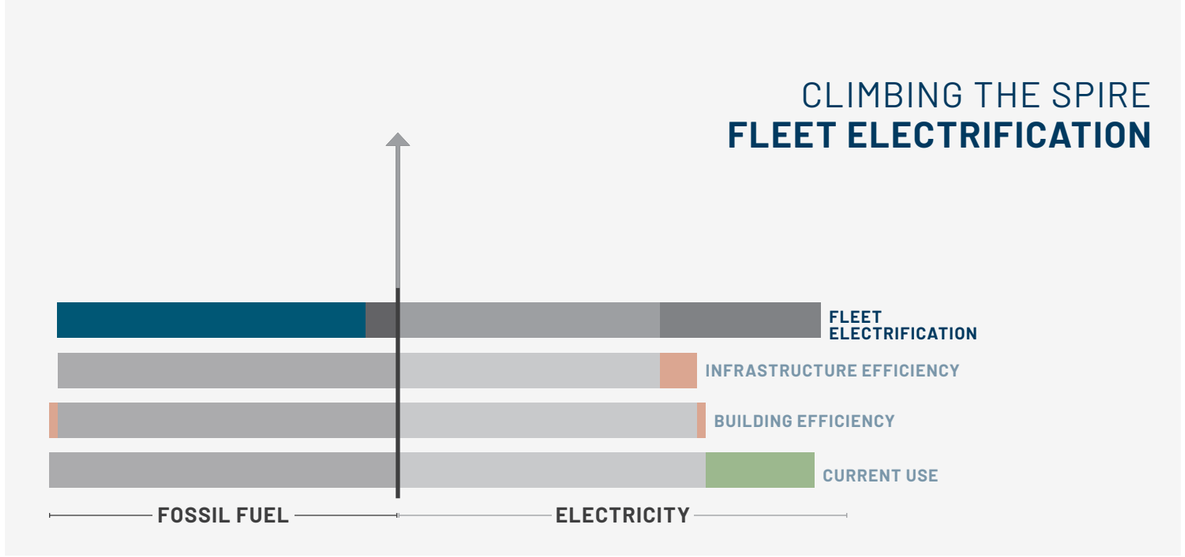
02. ROADMAP DETAILS BY TOPIC

EXISTING FLEET

The City of Sedona provided data from 2023 for their fleet vehicles, which fall into divided into six categories.

- **Light duty passenger vehicles** – Sedans, SUVs, light pickup trucks, and minivans. This vehicle is mostly used for transporting people and small amounts of cargo.
- **Light duty high performance passenger vehicles** – Police standard patrol vehicles.
- **Heavy duty vehicles** – Large pickup trucks. These vehicles are used for hauling and towing heavy loads.
- **Large heavy duty vehicles** – This category is for large snow plows, dump trucks, and street sweepers. These vehicles typically are only used seasonally and have a varying work load that is dependent on the weather.
- **Transit vehicles** – Sedona operates four transit routes.
- **Non-road construction vehicles and equipment** – These are construction type vehicles and equipment – bulldozers, trackhoes, etc. There usage is usually measured in hours of operation instead of miles.





FACILITY	VEHICLE TYPE: PASSENGER	PATROL PASSENGER	HEAVY DUTY	LARGE HEAVY DUTY	TRANSIT	NON-ROAD	TOTAL
City Hall Campus	26	24	-	-	-	1	**51**
Brewer Road Campus	3	-	-	-	-	-	**3**
Public Works Maintenance (Contractors Road)	14	-	3	-	-	10	**27**
Wastewater Treatment Plant	5	-	3	-	-	1	**9**
Shuttle Fleet - TBD	-	-	-	-	6	-	**-**
TOTAL	**48**	**24**	**6**	**-**	**6**	**12**	**93**

02. ROADMAP DETAILS BY TOPIC

There are three different types of chargers, varying by physical size and electrical capacity, resulting in substantially different charging speeds:

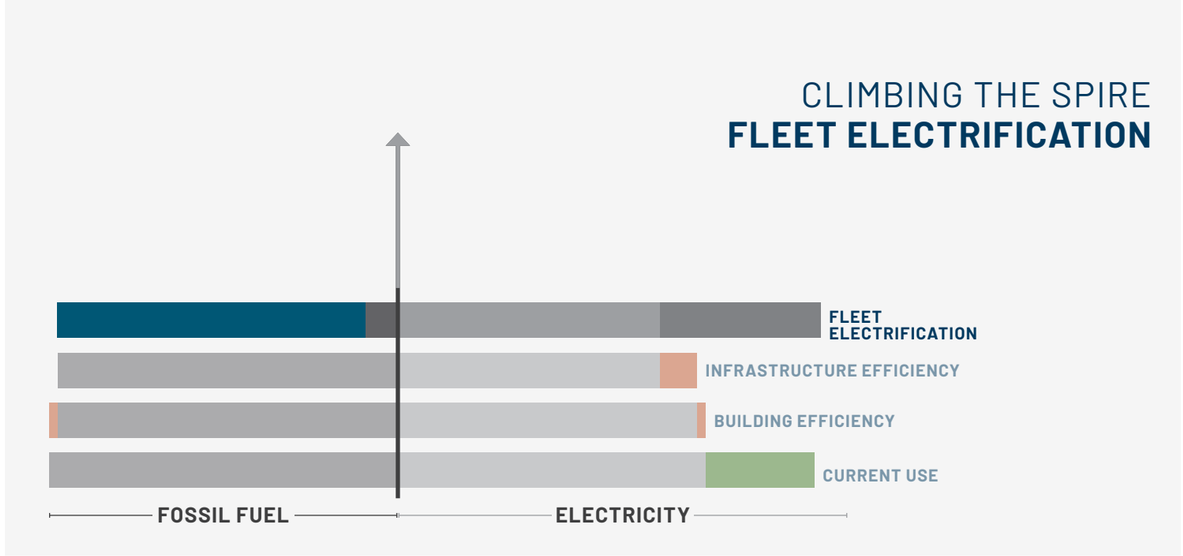
- Level 1 portable chargers are those typically provided with electric vehicles, plugging into standard 120v wall outlets. They output 1-2 kw, resulting in a charge rate of 2-3 range miles per hour. These are not suitable for long term outdoor use and do not meet safety and operational needs of typical institutional/commercial use.
- Level 2 outputs AC power from 6-20kW, adding 15 to 40 miles of range per hour depending on the vehicles type and power level. Level 2 charging requires a 208 volt or 240 volt AC service. Note the charge rate range within Level 2 charger as a category is fairly large – a typical Level 2 home charger does not have the output of more substantial commercial Level 2 chargers. For this reason, we have segmented Level 2 chargers into light, medium, and heavy categories.
- Level 3 outputs DC power at 50-350 kW and typically requires a major 480 volt AC service. Similar to Level 2, Level 3 chargers come in a range of capacities. The fastest Level 3 chargers can charge an empty long range electric vehicle in 20 minutes.

Similar to available chargers, charging needs for the City also vary:

- **Recharge after average daily trip.** The City's fleet average daily trip mileage isn't much – 43 miles/day. A lighter duty charger which can recharge this amount easily overnight or even during the day is a good baseline system to meet the need.
- **Recharge from empty.** There are certainly times when fleet vehicles are driven the ~250-300 mile range of a current electric vehicle. Enabling full recharging of these vehicles overnight is a need.
- **Fast, full recharge.** Particularly for patrol vehicles, the ability to quickly recharge or "top up" for certain situations is an operational priority.

Based on the current passenger and patrol vehicle fleet and available charging technologies, the following charging network is recommended to meet the City's vehicle electrification goal:

The majority of electric passenger vehicle charging infrastructure is recommended in the short term. Patrol vehicle electrification and associated charging is recommended in two stages – an initial pilot in conjunction with non-patrol vehicle electrification, and a future stage once further patrol vehicle electrification is deemed appropriate. In addition, because the Brewer Road public works building is currently leased, with a potential for purchase, permanent EV charging infrastructure there should await City ownership of the facility.



FACILITY	LIGHT CAPACITY LEVEL 2 (~6KW)	MEDIUM CAPACITY LEVEL 2 (~12KW)	HIGH CAPACITY LEVEL 2 (~18KW)	FAST CHARGE LEVEL 3	TOTAL
City Hall Campus	4[1]	50	4	4	**62**
Brewer Road Campus	3	-	-	-	**3**
Public Works Maintenance (Contractors Road)	6	-	8	1	**15**
Wastewater Treatment Plant	4	-	1	-	**5**
TOTAL	**17**	**50**	**13**	**5**	**85**

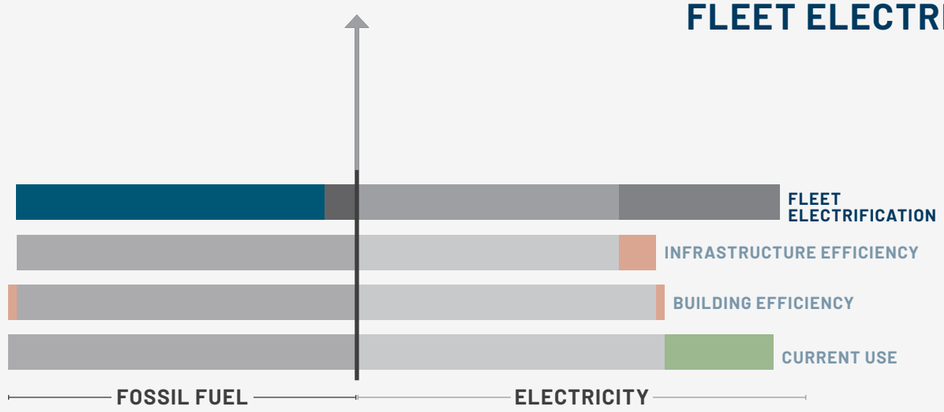
1 In addition to existing four Chargepoint light Level 2 chargers

02. ROADMAP DETAILS BY TOPIC

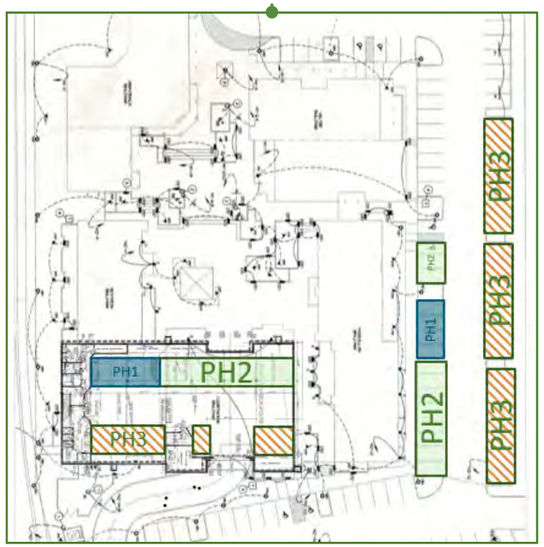
POSSIBLE CHARGER LOCATIONS BY FACILITY

These are recommended for replacement after 2030, when electrified or other non-fossil fuel using alternatives are expected to be available. Between 2030 and their replacement, appropriate carbon offsets should be obtained, per the stated municipal goal.

CLIMBING THE SPIRE
FLEET ELECTRIFICATION



CITY HALL CAMPUS



PUBLIC WORKS MAINTENANCE YARD – CONTRACTORS ROAD

BREWER ROAD CAMPUS

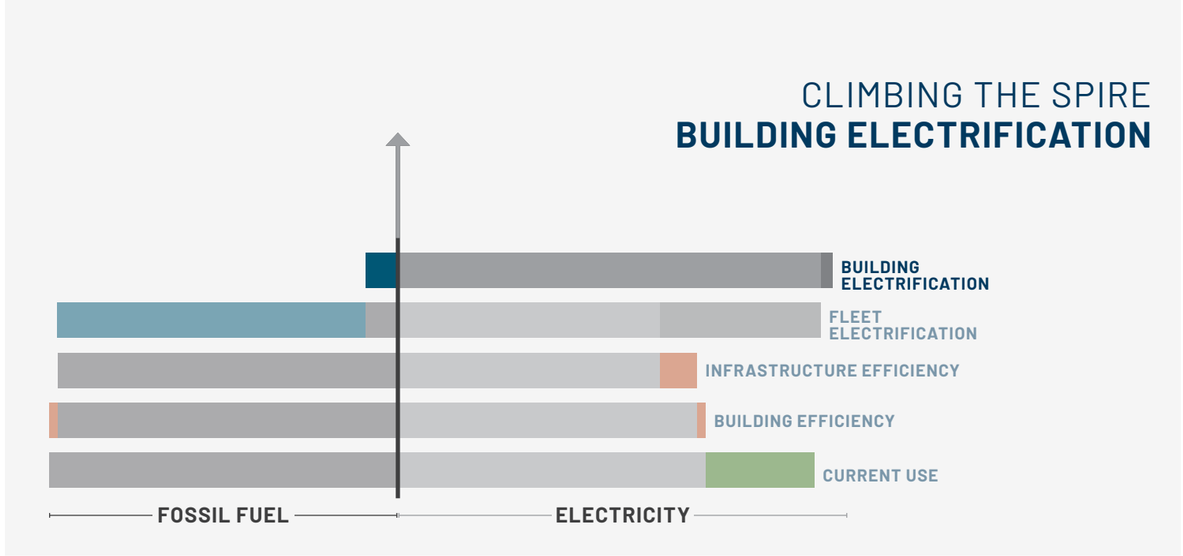
WASTEWATER TREATMENT PLANT

Building electrification

Sedona uses natural gas to heat most of its buildings, with a couple of important exceptions. The majority of its heating, cooling, and ventilation comes from rooftop devices (known as rooftop units, or RTUs) which provide all three needs.

Indoor heating can also be provided from electrical sources – either heat pumps, or electrical resistance. Heat pumps are an outstanding technology, because they generate 2-3x units of heat energy for every unit of electricity they use. It does this by capitalizing on the physical principle of highly pressurized gaseous media generating heat. Heat pumps are essentially air conditioners running in reverse – putting heat into the building while exhausting cold outside. Electrical resistance heating is typically used only in very cold climates where an air source heat pump doesn't function well due to the temperature differential it has to lift to (ie very cold outdoor air to warm indoor air).

BUILDING	EXISTING SPACE HEATING SYSTEM TYPE AND NUMBER	ELECTRIFIED SPACE HEATING REPLACEMENT	SPACE HEATING REPLACEMENT YEAR
City Hall Campus	27 natural gas/AC Rooftop Units (RTUs)	27 heat pump/AC RTUs	2025 - 2032
Brewer Road Campus	4 Ground Source Heat Pumps, 3 Electric Heat/AC RTUs	N/A – electrification complete	N/A – electrification complete
Contractors Road	2 natural gas/AC RTUs; 2 Gas Fired Unit Heaters	2 heat pump/AC RTUs; 2 Elec Unit Heaters	2023
Posse Grounds Park	6 natural gas/AC RTUs	6 heat pump/AC RTUs	2025-2030
Wastewater Operations	2 natural gas/AC AHUs; 2 Gas Fired Unit Heaters	2 heat pump/AC RTUs; 2 Electrict Unit Heaters	2032
Wastewater Administration	1 chiller, 2 heatpump/AC minisplit, 1 Electric unit heater, 2 Electric Duct Heaters	N/A – electrification complete	N/A – electrification complete



The City's RTUs include a natural gas combustion chamber as well as an air conditioner and outside air intake. These type of RTUs are easily exchangable for a heat pump/air conditioner type, which uses a single reversible compressor for both functions. An added benefit is that these systems typically do not need a substantially larger electrical service (since the service already covers the air conditioning load), which can add significant cost (see below for additional discussion).

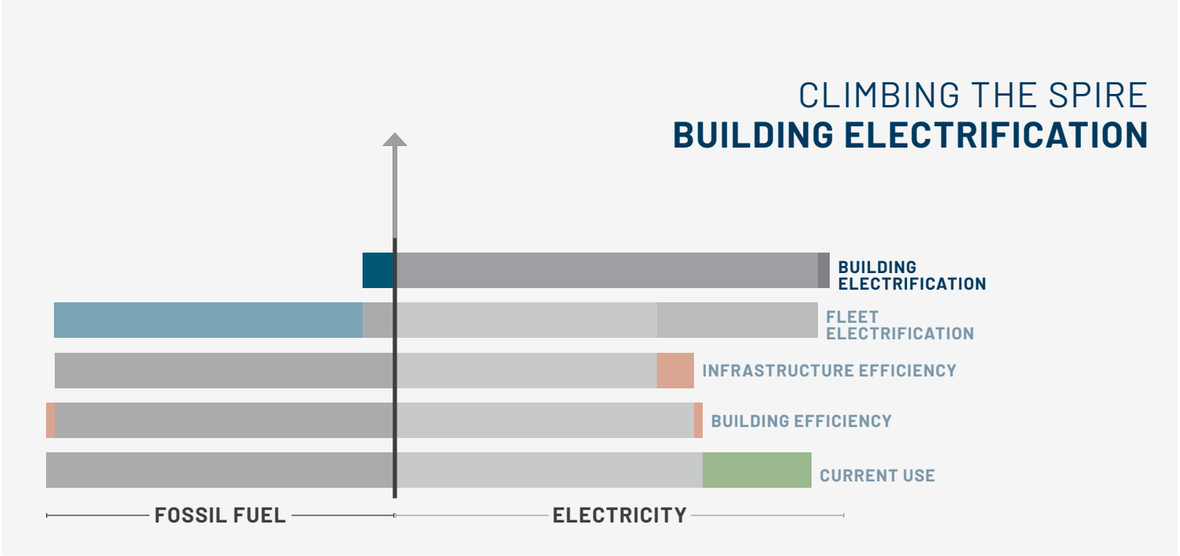
In keeping with the Roadmap's guiding principles, building electrification should occur as RTUs are worn out and need replacing. A limited number of RTUs will last beyond 2030, but these can be surplused and used elsewhere, enabling the City's overall 2030 decarbonization goal to be achieved. The chart below outlines the appropriate timing of electrification based on end of useful life of the current fossil fuel based systems.

The Brewer Road Public Works facility is heated and cooled by a ground source heat pump. This is a very high efficiency, best-in-class all-electric system which needs no further improvements to decarbonize. The Wastewater Treatment Plant Administration building is also fully electric and due for replacement, enabling the continuation of an electric heating/cooling system, but which is even more efficient.

Hot water is heated in a number of ways, including natural gas tanks, and various electric resistance tanks and point of use inline water heaters. The natural gas tanks (two at City Hall and one at Posse Grounds) should be replaced with electric split heat pump hot water heaters (such as Sanden), if feasible, due to location (ie perimeter where refrigerant piping is easily installed); if not they should be replaced with electric resistance. As discussed above, electric resistance hot water tanks should be replaced with split heat pump hot water heaters, subject to the same feasibility considerations.

ELECTRICAL CAPACITY

An additional layer in the electrification of the buildings and additional of electric vehicle chargers is whether there is enough electrical capacity at each facility to handle the increase in electricity demand. Building electrification and electric vehicle charging are both large electricity uses, and typically, adding both to a facility will outstrip its electrical capacity (such as the service transformer, main panels, and main switchgear). This roadmap has performed a preliminary assessment of the existing electrical system capacity, the existing peak electrical loads, and the additional electrification load to determine if the existing electrical system needs to be upgraded and if so, how. Any required upgrades are reflected in the total electrification costs outlined below.



The following table shows each facility where electrification is proposed and where service upgrades are required:

FACILITY	BUILDING	EXISTING SERVICE CAPACITY (kW)	EXISTING PEAK DEMAND (kW)	EXISTING PEAK DEMAND AS % OF EXISTING SERVICE CAPACITY	FUTURE PEAK DEMAND (EXISTING + MECHANICAL ELECTRIFICATION + EV, (KVA))	FUTURE ELECTRIFIED PEAK DEMAND (EXISTING + MECH + EV) AS % OF EXISTING SERVICE CAPACITY	ELECTRICAL UPGRADE REQUIRED?
City Hall Campus	Police Department (Boynton)	216.6	19.34	9%	382.61	177%	YES
City Hall Campus	City Admin (Mogollon)	144.11	31.70	22%	235.75	164%	YES
City Hall Campus	Community Development (Vultee)	216.16	27.90	13%	107.74	50%	NO
City Hall Campus	City Council/Courtroom (Courthouse)	144.11	38.80	27%	251.20	174%	YES
City Hall Campus	IT/City Attourney/Public Works (Grayback)	216.16	38.00	18%	120.00	56%	NO
Contractors Road	Main Building	48.00	22.70	47%	348.57	726%	YES
Contractors Road	Warehouse	48.00	3.56	7%	3.56	7%	NO
Posse Grounds Park	Maintenance Building	48.00	5.25	11%	24.81	52%	NO
Posse Grounds Park	HUB	96.00	25.06	26%	152.23	159%	YES
Wastewater Treatment Plant	Admin (Ops)	207.85	166.28	80%	333.42	160%	YES
Wastewater Treatment Plant	Main Electrical	2078.46	288.70	14%	544.69	26%	NO

Onsite renewable electricity

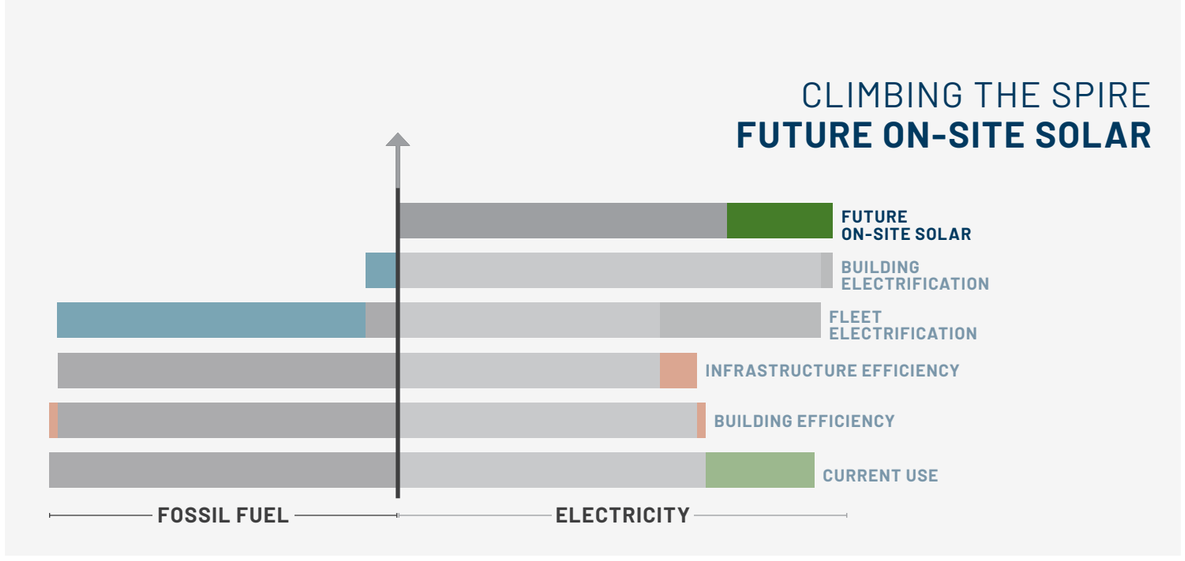
The third and final leg in the City's decarbonization comes in the form of renewable electricity – a clean, CO2-free source of power for an efficiently operated, all-electric city – enabling full carbon free operations.

Renewable electricity can come from two primary sources:

1. City owned renewable systems, and
2. renewable electricity purchased either from Arizona Public Service's Green Locate and Green Commit programs, or additional, attributable renewable electricity attributes from another third party.

Thankfully, both options are available. The question, then, is which is the best option?

SEDONA OWNED RENEWABLE GENERATION VS PURCHASED RENEWABLE ELECTRICITY - COST



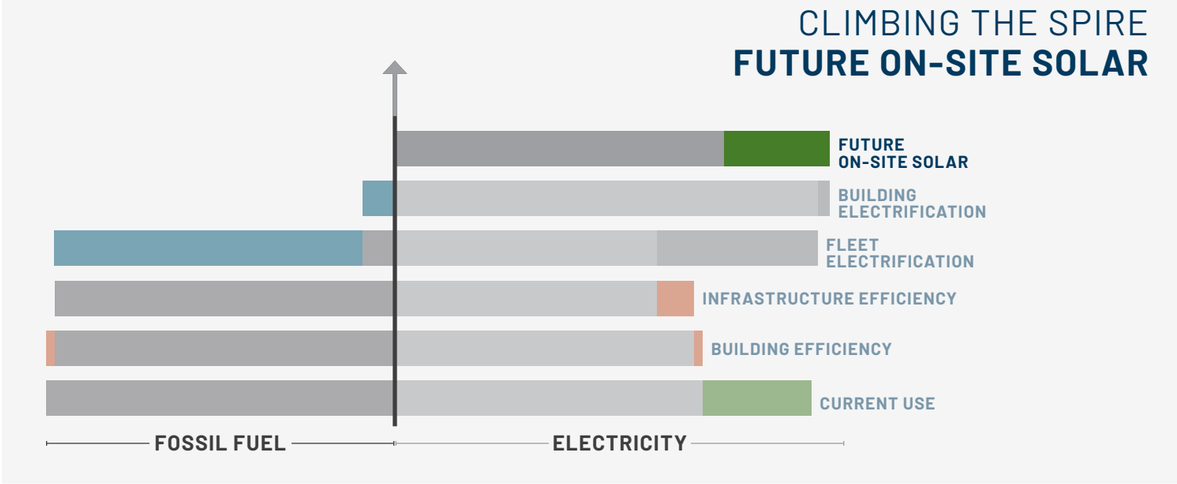
The bottom line is that given Sedona's particulars (local solar installation costs to self-generate renewable electricity, the 25.5% Inflation Reduction Act incentive, and outstanding solar access), it is less expensive for Sedona to generate a kilowatt hour of renewable electricity than to purchase from APS' renewable purchase programs. The following is based on estimates from a detailed assessment of onsite solar opportunities (wind is not adequate in Sedona for viable renewable production so was not considered):

TYPE	COST	NOTES
EFFICIENCY/LOAD REDUCTION	9 cents/kWh	What is costs to save a kwh of electricity through the proposed efficiency measures. Includes incentives.
CITY-OWNED ONSITE SOLAR	9.7 cents/kWh	What is costs to generate a kwh of electricity with onsite solar generation. Cost includes solar canopies.
AVOIDED COST OF DISPLACED APS ELECTRICITY WITH REAL-TIME ONSITE GENERATION	10.3 cents/kWh	What Sedona would pay APS for a kwh at the exact time it otherwise would generate it with onsite solar.
APS CURRENT BLENDED RATE	18 cents/kWh	The average amount Sedona pays APS for a kwh, including base + demand charges.
APS OFFSITE RENEWABLE	19-19.5 cents/kWh	Blended rate + 1-1.5 cents, published APS rate for offsite renewable electricity.

SEDONA OWNED RENEWABLE GENERATION VS PURCHASED RENEWABLE ELECTRICITY – OTHER BENEFITS

Each of these approaches have different benefits:

CITY-OWNED SOLAR BENEFITS	PURCHASED RENEWABLES BENEFITS
• Visible manifestation of decarbonization – inspire and demonstrate solar to local Sedona community. • Highest integrity – 100% clarity about renewable source. • Avoid solar sprawl at scale - avoiding aesthetic and habitat impacts to rural areas of utility scale wind and solar. • Avoid electrical energy loss due to transmitting power over long distances (average 5%). • Efficient use of roof space and land. • Dispersed renewables approach is typically grid beneficial,– most City-generated solar electrons on would be used by the generating facilities – reducing demand on increasingly electrified grid. • Enable future facility resiliency through addition of batteries and storage.	• No construction activity at City facilities. • No ongoing maintenance and management. • Enables complete City decarbonization beyond what is possible on City-owned assets only. • Potential for larger renewable purchase which could include City residents and businesses.



THE INFLATION REDUCTION ACT (IRA) is the largest investment ever made by the federal government to slow climate change and reduce reliance on the fossil fuels responsible for the climate crisis. It invests $386 billion over 10 years in clean energy spending and tax incentives, quickens deployment of clean energy technologies, lowers energy costs, delivers energy resiliency, and strengthens domestic clean-energy manufacturing.

The legislation offers a baseline 25.5% rebate for all qualified construction costs in direct pay or tax credit funding for renewables, ground source heat pumps, and other advanced decarbonization measures funded through tax-privileged financing mechanisms. Under the Inflation Reduction Act (IRA), both tax-exempt and taxpaying entities can receive federal incentives for installing clean energy technologies. Taxable entities receive tax credits, a dollar-for-dollar reduction on their end of year tax liability; tax-exempt entities receive the same value as a Direct Payment to the entity.

In addition, there are opportunities for stackable "bonus credits" of 10% each for domestically produced content in construction materials. This Roadmap assumes the District receives the base 25.5% renewables incentive but does not incorporate any of the additional credit opportunities.

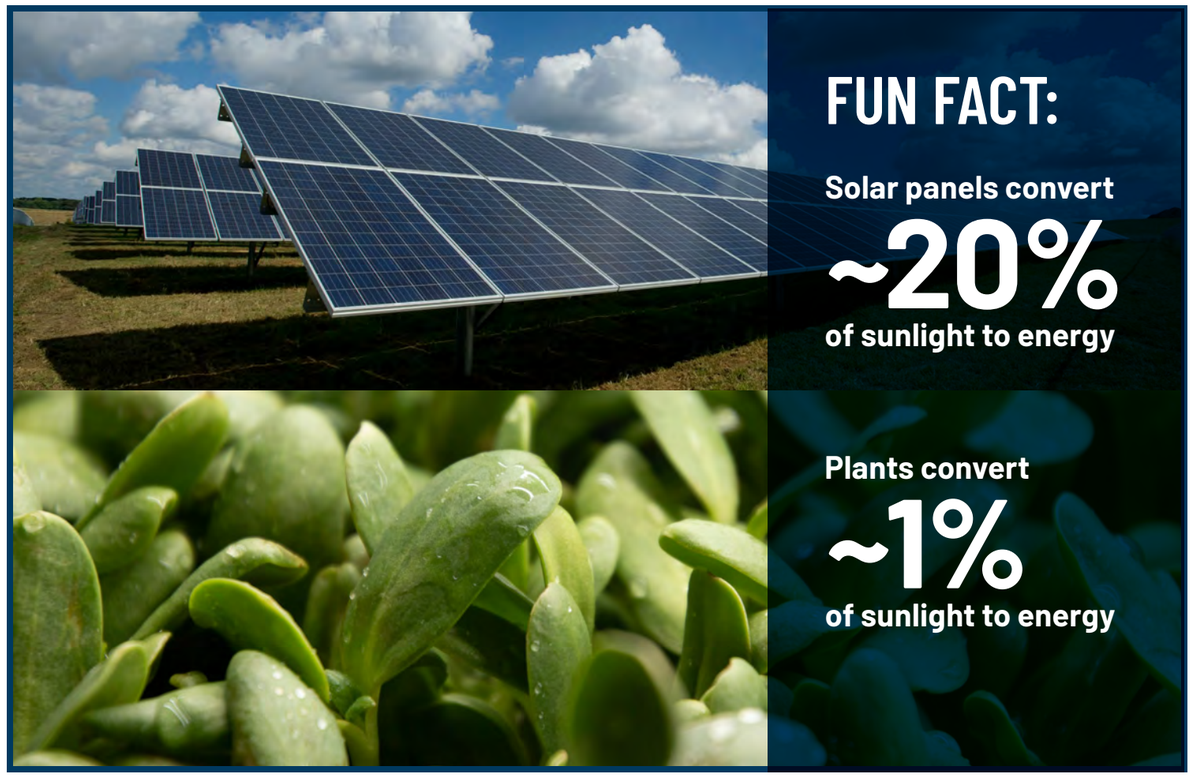
02. ROADMAP DETAILS BY TOPIC

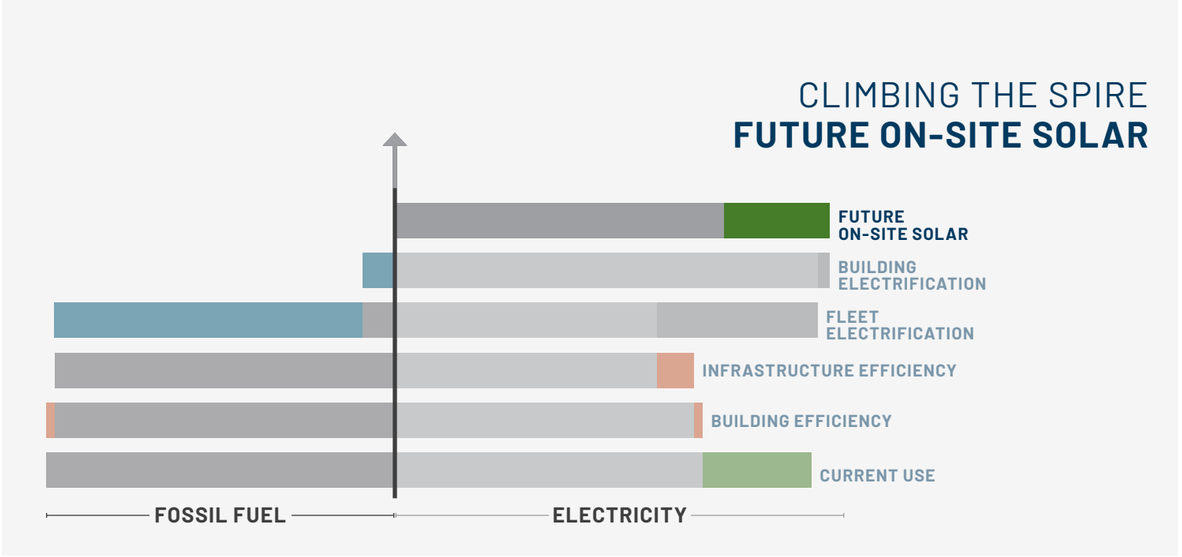
Given these considerations, it is recommended that the City obtain renewable electricity according to the following hierarchy:

1. Continue to operate and benefit from the existing solar generation at the Wastewater Treatment Plant and Brewer Road;

2. Install as much additional onsite solar that can be built at a reasonable cost, up to the amount that provides good value per kwh based on each facility's usage and APS' rate structures and solar policies/excess generation purchase rates; and

3. Identify and enter into an agreement for the balance of City electricity to be renewably generated, either from APS or from an additional, attributable renewable project (discussed below).





ONSITE SOLAR – OPTIMIZING SIZE, TYPE, AND LOCATION

As part of this roadmap, each City facility has been assessed to identify the appropriate size and location for additional cost-effective solar systems. These systems are designed to minimize cost by avoiding smaller arrays, and maximize value by not oversizing the array to the point that lower solar sell-back rates to APS are triggered. Arizona Public Service's solar net metering tariff purchases all excess production of electricity from customer owned solar at an average rate of 2.9 cents / kWh, roughly half the blended retail electricity rate. Therefore, it is financially disadvantageous to produce more electricity than the building is consuming at any given time since, without an option to store the energy for use later, the owner will not receive the full value when selling it back to APS.

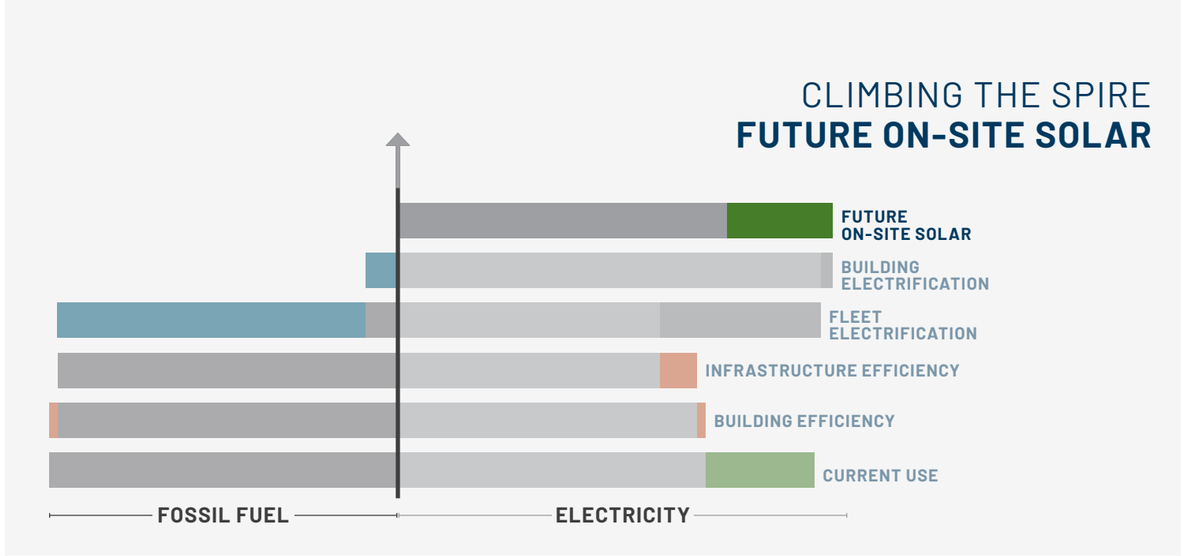
While ground and roof mount solar is typically less expensive than solar on overhead solar shade structures, these have the benefit of community visibility and reduced heat island effect.

02. ROADMAP DETAILS BY TOPIC

Recommended arrays are as follows:

- The City Hall roofs[2] have substantial scattered HVAC equipment and parapets, which would result in high solar cost and low overall output; thus shade structure solar is recommended.
- The Court and Public Works offices at Brewer Road have existing rooftop solar; additional solar is recommended to offset increased electrical load from electric vehicle charging.
- The Contractors Road Public Works Maintenance Facility roofs will likely require structural upgrades to handle the increased weight of the recommended solar.
- As discussed above, there are three electrical meters at the Wastewater treatment plant. The existing large array feeds the largest of these meters, but the two remaining meters have large loads – a substantial array is recommended to power the larger of these.

2 The existing City Hall campus arrays are not actually connected to the campus electrical system and output to the grid rather than the campus.



- Installation of solar will only occur as the electrical usage will allow optimal value to the City to avoid the APS solar excess production rate discussed above. The electric vehicle charging proposed with Phase 2025 at City Hall will provide adequate electrical use to maximize the financial benefit of the City Hall solar arrays also proposed as part of Phase 2025.

Details of solar array outputs relative to current and post-electrification demand are shown below.

CITY HALL
204.9KWDC
353,000 KWH/YEAR
SHADE CANOPIES

BREWER ROAD
18.5KWDC
32,000 KWH/YEAR
SHADE CANOPIES

CONTRACTORS ROAD
159.1KWDC
247,000 KWH/YEAR
ROOF MOUNT

POSSE GROUNDS HUB
31.6KWDC
51,700 KWH/YEAR
SHADE CANOPIES

POSSE GROUNDS CONCESSIONS
18.5KWDC
32,000 KWH/YEAR
ROOF MOUNT

WWTP
129.7KWDC
240,000 KWH/YEAR
GROUND MOUNT

Purchased Renewable Electricity

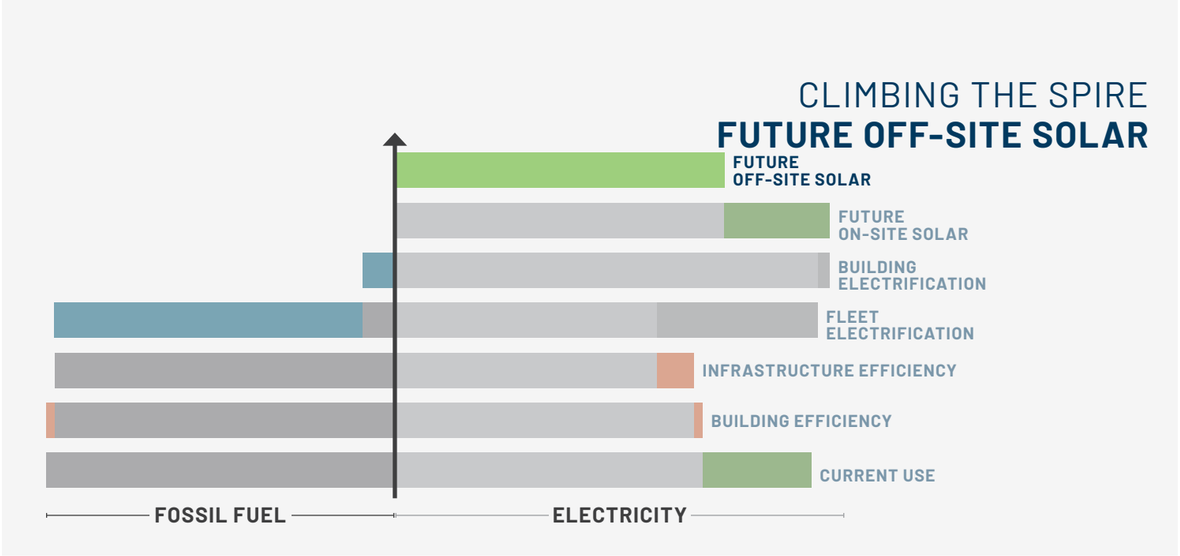
The balance of the City's renewable electricity not provided by City-owned solar (56% of total demand) can be purchased from Arizona Public Service via either its Green Locate or Green Commit programs. This will amount to 3,017,000 kwh annually at the completion of decarbonization in 2030.[3] These systems allow the City to be involved in the details of its renewable sources and potentially even involved in their development. These programs will ensure that the City will receive electricity that is truly renewable, from identifiable, attributable sources, and which are also new, additional generation. One possible opportunity with such an approach is that a purchase could be expanded to include City businesses and residents – helping amplify City decarbonization back to the community, which was the original source of the municipal operational decarbonization mandate.

These programs allow the City to work with APS to create new renewable systems that are specifically allocated to Sedona. Green Commit allows the system to be located close to Sedona itself.

There may also be an approach to obtain additional, attributable renewable electricity through participation in a utility scale renewable project which sells electricity to the open market and transfers the Renewable Energy Credits to participating members (such as the City). This type of approach is known as a "virtual power purchase agreement with unbundled renewable energy credits".

These RECs are not associated with a particular renewable system, and most importantly, their purchase will not result in significant additional, new renewable energy – considered to be part of a fully credible decarbonization strategy. Most verification and certification systems for determining full achievement of decarbonization do not recognize these type of RECs as a valid pathway.

Details of required offsite renewable purchase relative to current and post-electrification demand are shown below.



Solar Output, Operations, and Maintenance

Solar arrays represent a new asset for the City which require ongoing maintenance and replacement. Rooftop solar PV has an expected life span of 25 years, while ground mount and shade structure have expected lifespans of 30 years. However, the DC to AC inverters have a shorter expected lifespan at 15 years, and so most of the solar arrays will require yearly inverter replacement beginning in 2040. This cost is relatively minor compared to the initial installation cost but should be accounted for in long term O&M planning.

Furthermore, solar panels have an expected degradation of 0.4% to 0.5% of production per year over their lifespan. This is accounted for using a factor of 0.4% per year in this Roadmap.

Sedona can cost-effectively self-generate 44% of its post electrification electricity with solar panels.

3 Excepting heavy vehicles/equipment.

Onsite battery electricity storage

Onsite battery electricity storage can play two primary functions:

EMERGENCY BACKUP POWER

Batteries can power electrical devices when grid electricity isn't available. In addition to normal outages due to electricity grid damage, many utilities around the country have begun shutting off electricity during various types of major storms, to prevent fires or increased damage to the grid infrastructure. Batteries can provide power to critical building loads during these outages.

Typically, batteries are sized to provide service to core functions only, such as emergency lighting, communications, limited heating and cooling, etc. This is due to the cost/storage size relationship as well as prolonging the available electricity in an emergency grid shutoff event. If solar is connected to the batteries, it can provide a long term source for recharging – note that variable solar access (weather, time of day, time of year) can impact battery/solar combination's can impact consistent backup power availability depending on battery and/or solar size.

The large size of the existing Wastewater Treatment Plant array (likely enabling full daily recharge in a power outage) makes this location a prime candidate for backup electrical battery storage.

Note that fossil fuel usage for emergency generators has been excepted from this Roadmap. This is based on current guidance from the International Living Future Institute, which provides exceptions for fossil fuel generators due to lack of viable cost-effective, long term emergency power sources.

The City currently has fossil fuel powered generators at the City Hall Campus and the Wastewater Treatment Plant, some or all of which could be replaced by batteries.

EMERGENCY BACKUP POWER - BATTERY VS FOSSIL FUEL GENERATOR PROS & CONS

POWER SOURCE	PROS	CONS
Battery	• No direct fossil fuel use • Limited noise • No exhaust • Low maintenance	• Expensive per unit of electricity, particularly challenging with large demand like the Wastewater Treatment Plant • Limited long-term storage depending on battery size, associated solar array, and weather/sun access
Fossil Fuel Generator	• Lower cost • Can more easily handle higher power loads	• As long as fuel source is available, can be operated indefinitely • Require regular start up and maintenance

ELECTRICITY UTILITY PEAK DEMAND AVOIDANCE

To reduce peak grid demand, APS' rates include charges for using electricity during these times, thus avoiding the need for additional costly utility electrical infrastructure. Customers (such as Sedona) using electricity from batteries (versus the grid) at peak demand times helps avoid these charges.

Calculating savings varies site-to-site based on usage and peak demand times. Currently, battery costs outweigh lifetime demand charge operating savings. However, as utility costs increase and battery prices drop, it will become more financially feasible to invest in batteries for peak demand shaving. Based on current demand charges, a cost-effective battery would need to have a fully delivered system cost of approximately $2000/kw and $750/kwh.

Note that batteries can be used for both emergency power and demand charge avoidance; however, the same battery can't be used for both, since demand charge batteries are regularly discharged, making them unavailable for emergency power at those times.

TYPES OF BATTERIES

- **Nickel manganese cobalt oxide (NMC)** High energy density and depth of discharge. Lower cost but shorter lifespans and are less stable making them more prone to safety issues. Good for space efficiency and high energy-to-weight ratio scenarios.
- **Lithium-ion (Li-ion)** High energy density in a relatively small and lightweight package. High depth of discharge, meaning you can almost "empty the tank" before needing to recharge. Li-ion requires require sophisticated thermal management systems to prevent overheating and fire hazards (thermal runaway).
- **Lithium iron phosphate (LFP)** Quickly gaining in popularity due to their relatively long lifespans, stability, and moderate price point. However, they often have lower energy densities than NMC batteries.
- **Lithium titanate (LTO)** LTO batteries are new and cost more upfront than NMC and LFP batteries and have lower energy densities but offer the longest lifespans, fastest charge times, and the highest level of safety because they're not flammable.

Bringing it together – full Roadmap details

DECARBONIZATION PHASING IS BASED ON THREE KEY CONCEPTS:

1. Electrify buildings at the time of replacement of the existing fossil fuel based system;
2. Don't install solar until there is a matching electric load at a given facility; and
3. Within the context of 1 and 2 above, decarbonize at the earliest possible time, subject to any operational considerations, to begin accruing decarbonization benefits.

02. ROADMAP DETAILS BY TOPIC

	EFFICIENCY							HVAC ELECTRIFICATION					VEHICLE ELECTRIFICATION				ONSITE SOLAR		
PHASE ONE (2024)	THERMS ANNUAL REDUCTION	THERMS ANNUAL SAVINGS, $	PROPANE GALLONS REDUCTION	PROPANE ANNUAL SAVINGS, $	KWH ANNUAL REDUCTION	KWH ANNUAL SAVINGS, $	CONSTRUCTION COST, $	ANNUAL THERMS SAVINGS	ANNUAL PROPANE SAVINGS	ANNUAL KWH INCREASE	ANNUAL HVAC ELECTRIFICATION SAVINGS, $	HVAC ELECTRIFICATION COST, $	ANNUAL FUEL SAVINGS	ANNUAL KWH INCREASE	ANNUAL EV ELECTRIFICATION SAVINGS, $	EV ELECTRIFICATION COST, $	ANNUAL KWH GENERATED	ANNUAL SAVINGS, $	COST, $
Facility efficiency - controls optimization	1,081	$1,081	215	$485.9	45,732	$7,317.12	$275,000												
LED street light installation					80,298	$12,847.68	$225,000												
PHASE TWO (2025)																			
Facility efficiency - all other measures	1,329	$1,329	78	$176.28	287,839	$46,054.24	$467,900												
HVAC ELECTRIFICATION																			
City Hall Campus								1,390		-14,171	-$895	$1,822,277							
WWTP									626	-6,092	$406	$76,943							
Posse Grounds Park												$115,509							
Contractors Rd								988		-1,074	-$304	$183,093							
EV ELECTRIFICATION																			
City Hall Campus													21,418	-685,050	$34,209	$1,559,000			
WWTP													1,498	-51,500	$2,130	$220,000			
Contractors Rd													8,977	-487,500	$1,502	$901,000			
SOLAR																			
City Hall Campus																	353,013	$36,452	$1,265,277
WWTP																	239,886	$25,143	$621,950
Posse Grounds Park																	83,831	$12,557	$498,324
Contractors Rd																	246,927	$19,594	$717,299
PHASE THREE (2027)																			
HVAC ELECTRIFICATION																			
City Hall Campus								1,358		-13,848	-$874	$593,850							
EV ELECTRIFICATION																			
City Hall Campus													14,279	-456,700	$22,952	$1,046,000			
Brewer Road													381	-6,000	$444	$102,000			
SOLAR																			
Brewer Rd																	32,138	$4,522	$214,197
PHASE FOUR (2030)																			
HVAC ELECTRIFICATION																			
City Hall Campus								2,095		-21,354	-$1,348	$1,509,600							
WWTP									3,218	-31,332	2,087	$233,100							
Contractors Rd								706		-7,196	-$217	$55,500							
Posse Grounds Park												$333,000							
TOTAL	**2,410**	**$2,410**	**293**	**$662.18**	**413,869**	**$66,219.04**	**$967,900**	**6,537**	**3,844**	**-95,067**	**-$1,145**	**$4,922,872**	**46,553**	**-1,686,750**	**$61,237**	**$3,828,000**	**946,795**	**$98,268**	**$3,317,047**

Combined Financial Analysis

The Summary Table below shows the net costs of decarbonization for the initial Roadmap horizon (2024-2030), combining all the elements discussed above. This number is calculated by taking the gross cost to decarbonize and subtracting out what the District would spend otherwise, lifetime project savings, and incentives and grants. To avoid complicating the financial analysis of projects outlined in this Roadmap, all costs are presented in 2023 dollars with no inflationary or escalation factors applied to future dollars.

1. To avoid complicating the financial analysis of projects outlined in this Roadmap, all costs are presented in 2023 dollars with no inflationary or escalation factors applied.
2. Building Electrification can lead to increased annual utility costs due to the existing utility rate structures, where electric demand charges are high and the cost per unit energy of electricity is typically higher than natural gas.
3. The following lifecycles are used for efficiency, electrification, and solar utility savings benefit analysis:

   Efficiency: 15 years

   Electrification: 15 years

   Solar: 30 years

FINANCIAL NOTES:

YEAR	GROSS IMPLEMENTATION COST	AVOIDED EQUIPMENT REPLACEMENT COSTS	LIFETIME UTILITY SAVINGS	INCENTIVES, GRANTS, & SOLAR IRA DIRECT PAY (25.5%)	NET PROJECT COST
Phase 1 (2024)	$500,000	$0	$324,841	$0	$175,159
Phase 2 (2025)	$8,448,572	$530,950	$4,896,796	$930,854	$2,089,972
Phase 3 (2027)	$1,956,047	$395,900	$824,426	$64,259	$671,462
Phase 4 (2030)	$2,131,200	$1,024,899	$7,820	$0	$1,098,481
TOTAL	**$13,035,819**	**$1,951,749**	**$6,054,353**	**$995,114**	**$4,035,074**

Additional beneficial decarbonization detail

AVOIDED POTENTIAL FUTURE CARBON EMISSIONS PENALTIES

As climate change becomes an increasingly current (rather than future) reality, carbon emissions penalties are starting to be applied by leading organizations to internal operations, and by governing bodies as regulation. For example, Colorado recently established penalties for high Energy Use Intensity in private sector buildings. Leading private sector firms, such as Microsoft, also apply an internal cost of carbon to lower immediate emissions and begin bending decision making to anticipate a more aggressive future carbon penalty regulatory environment. The Canadian Federal government recently adopted an internal decision making price of $261 CDN$/mton, and the EPA established a draft price of $190/mton as well. While these have yet to become actual regulatory penalties, they indicate a likely direction over time as climate change worsens. The listed potential penalty stream in Chapter One is based the escalated draft EPA price for 2030-2040.

VALUE OF EMPLOYEE RETENTION BASED ON CLIMATE LEADERSHIP

This value stream assumes a 2% reduction in employee turnover due to its expressed climate leadership. City of Sedona total full time equivalent employment is understood to be 100, and cost per turnover is assumed at $23,760 (derived from previous McKinstry local government sources).

VALUE OF SOLAR FOR FUTURE ELECTRIC MICRO-GRID BACKUP

Currently, emergency power is provided by backup fossil fuel powered generators. A decarbonized alternative, with potentially even greater resiliency, is electric batteries fueled by on-site solar. The cost of batteries for such systems is currently cost-prohibitive, but likely to drop in the future. Installing on-site solar as proposed for overall renewable power for the City has a dual benefit of helping enable future electrical islandability. The value of this is assumed at 10% of the overall cost of proposed on-site solar.

VALUE OF IMPROVED EMPLOYEE HEALTH AND PERFORMANCE

The efficiency measures, electrification, and air sealing of City Hall will improve indoor air quality. Outside air dampers are currently not working correctly. Elimination of natural gas combustion removes any risk of noxious combustion gasses (NOx, SO2, CO) from malfunctioning exhausts, etc.. Air sealing the buildings has the added benefit of excluding smog and wildfire smoke, as well as reducing mold. Finally, City Hall currently has very poor temperature control, with overheated and colder work areas. The new electrified and rezoned system will enable more comfortable work temperatures there.

THANK YOU

THANKS TO THE MANY CITY STAFF WHO SUPPORTED THE CREATION OF THIS ROADMAP

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A note on beauty and art

The Sedona-area night sky images on the cover and page 13 were taken by Mike Gross, McKinstry Project Director who led technical development of the Roadmap.

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CITY OF SEDONA

This Roadmap was prepared by McKinstry, a national firm specializing in cost-effective decarbonization, efficiency, and green energy solutions.

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