

Staff Report

**ANALYSIS OF PROPOSED SIX BIG MOVES AND
ASSOCIATED ACTION STEPS FOR
THE CLIMATE ACTION PLAN**

November 15, 2022

BACKGROUND:

The City Council has placed a high value on promoting environmental sustainability. To address this goal and to decrease Ames' carbon footprint, the City Council approved issuing a Request for Proposal in December of 2020 seeking a consultant to develop a Climate Action Plan (CAP). That plan included two phases: 1) Establishing a community carbon reduction goal, and 2) Developing a relevant, achievable, and cost-effective strategy, timeline, and metrics to track progress toward achieving the goal.

Due the importance of the CAP and its potential impact on the community, the project structure included naming the Ames City Council as the CAP Steering Committee and appointing 27 residents as sector representatives to provide feedback through the CAP Supplemental Input Committee.

Sustainability Solutions Group (SSG), a climate action consulting firm with offices throughout North and South America, was hired by the City Council on April 27, 2021. The consultant began meeting with the City project and technical teams, the Steering Committee/City Council, and the Supplemental Input Committee. As part of the robust public input requirement of the contract, SSG developed a CAP website, created public input surveys, and facilitated the first Town Hall Meeting on Oct. 25, 2021.

Based on emissions identified in the Greenhouse Gas Inventory, which had been completed in 2020 as the first step in creating a CAP, SSG presented the CAP Steering Committee with several options for carbon reduction targets ranging from a 1) 83% reduction by 2030 and net-zero by 2050; 2) Net-zero by 2050, 3) 45% Reduction by 2030 and net-zero by 2050, and 4) No Predetermined 2030 target until after modeling was complete (Evidence-Based). **On Dec. 21, 2021, the City Council voted for the target to reduce emissions by 83% by 2030 over 2018 levels and to reach net-zero by 2050.**

This net-zero target by 2050 is in line with global best practices for reducing emissions, so communities do not significantly contribute to exceeding a 1.5 degree Celsius increase in global temperature. The 2050 target also accounts for global inequality, based on the acceptance that communities in wealthier countries have a greater capacity than those in less wealthy countries to address climate change, and they have a responsibility to aggressively address emissions because they have benefited from greenhouse gas emitting actions in the past.

With the City Council's goal decided, SSG analyzed the Greenhouse Gas Inventory, met with City staff and Iowa State University officials, and identified the path needed

to achieve the goal of reducing the carbon emissions in our community by 83% by 2030 as well as net-zero by 2050. With such an aspirational target, the path to achieving carbon reduction in the timeframe identified requires bold moves, substantial investment, and significant policy changes. SSG outlined the path forward in a document entitled the “Six Big Moves,” which separated carbon reduction into six concentration areas with 29 carbon reduction action steps.

Attachment A reflects the net cost, amount of carbon emission reduction, and the dollar cost for every ton of carbon reduced for each of the 29 action steps.

Attachment B condenses this same information in accordance with each of the six Big Moves.

The following table provides the grand totals for the carbon reduction targets for 2030 and 2050 as they relate to the community and city projects.

	Net Cost (using discounted rates and recognition of savings)	Total Amount of Emissions Reduction	\$/Ton of Carbon Reduction (Average)
Year 2030			
City	\$ 142,247,923	314,000 Tons	\$453
Community	<u>\$1,283,420,711</u>	<u>2,601,000 Tons</u>	\$493
Total	\$1,425,668,634	2,915,000 Tons	
Year 2050			
City	\$58,275,920	2,859,000 Tons	\$20
Community	<u>\$838,957,455</u>	18,468,000 Tons	\$45
Total	\$897,233,375	21,327,000 Tons	
GRAND TOTAL	\$2,322,902,009	24,242,000 Tons	

This report summarizes City Staffs’ analysis of the consultants’ recommended Six Big Moves and carbon reduction action steps through eight criteria. Staff utilized data from the financial dictionary developed by SSG as well as City records and resources.

Since it might not be feasible to accomplish all of the 29 action steps suggested by the consultants, it is hoped that the Staff analysis will assist the City Council in identifying the highest priority action steps for an implementation plan.

ANALYSIS OF THE PROPOSED SIX BIG MOVES AND ASSOCIATED ACTION STEPS

The “Six Big Moves” are:

1. BUILDING RETROFITS
2. NET-ZERO NEW CONSTRUCTION
3. RENEWABLE ENERGY GENERATION

4. REDUCING VEHICLE EMISSIONS
5. INCREASE ACTIVE TRANSPORTATION AND TRANSIT USE
6. REDUCE WASTE EMISSIONS

The eight criteria offered by the Staff for this analysis are:

1. Cost – cost of investment; gain on investment; marginalized abatement cost
2. Amount of Administrative Effort Needed
3. Feasibility of Achievement
4. Legal Feasibility
5. Funding Sources
6. Impact on Residents in Terms of Property Taxes, Utility Rates, etc.
7. Impact on Inclusion
8. Cost Compared to the Tonnage of Carbon Reduced

BIG MOVE 1 – BUILDING RETROFITS

A building retrofit can include replacing windows, doors, adding additional insulation to walls, attic, and the building's exterior. Retrofits also include the replacement of heating and cooling systems with more efficient systems. It can also include reconfiguring the building's interior or the placement of windows and doors to maximize the use of sunlight, airflow, and thermal comfort.

Included in this move are retrofits related to residential homes, industrial, commercial, institutional, and municipal buildings. The exact retrofits for a home or individual building may vary depending on current building conditions and needs.

ACTION STEPS

- 90% or 15,621 of residential buildings retrofitted by 2035
- 90% or 1,067 of industrial, commercial, and institutional buildings retrofit by 2035
- 30% energy savings below Business As Usual scenario through process efficiency in industrial buildings by 2030
- All 17 municipal buildings retrofit by 2030
- Add 26,691 air-source heat pumps for all buildings by 2040
- Replace 19,338 hot water heating systems with electric by 2040

Amount of Administrative Effort Needed:

The retrofit process for residential, industrial, commercial, and institutional buildings including the action steps of adding air-source heat pumps and hot water heaters will require an additional four FTE's in the Inspections Division at approximately \$360,000 per year. These employees will be responsible for program oversight and tasks include clerical, data entry, marketing, enforcement, and inspections. Inspections' existing software and materials should be able to handle the process, though additional space may be needed for the expansion of staff.

For the municipal building retrofits, a consultant will need to be hired to do a detailed study of each building with recommendations for implementation. These recommendations will then have to be designed, bid, and constructed with oversight from the current staff.

Feasibility of Achievement:

The Inspections Division can manage the retrofit process with the additional FTE's. Existing software and materials are anticipated to be able to handle the process, but additional space may be needed for the employees. This could pose a problem as we are running out of available space in our existing city buildings and it will be costly and inefficient to decentralize staff in a rented facility.

For municipal buildings, the time needed for a study, design, and construction for all municipal buildings is extensive and will take time beyond the 2030 target. Additionally,

construction costs continue to rise which could exceed the projected costs in the consultant's analysis.

Legal Feasibility:

Currently state law requires municipalities to follow state building codes, therefore, the City could not legally mandate retrofits in residential, industrial, commercial, and institutional buildings. Conversely, the City can determine retrofit requirements for the municipal buildings it owns and operates.

Funding Sources:

Funding for retrofits could come from issuing General Corporate Purpose bonds that will require a 60% voter approval referendum or by increasing our General Levy up to the \$8.10 tax rate. Increasing the General Levy to \$8.10 would generate an additional \$8,791,471 annually based on our current tax rate and valuation and a result in 26% increase in property taxes. The City could also consider funding the total retrofit action step with utility backed revenue bonds. However, the electric utility rate increase required to repay the bonds is projected to be 356%.

In terms of adding air-source heat pumps and hot water heaters, the City of Ames Electric Services can play a supporting role by offering rebates and possibly rate incentives. Customers will be more likely consider a replacement of their furnace or hot water heater at the time of failure, not when everything is functioning fine. With the typical appliance life of 15 years, it will take a 15 year cycle for nearly all customers to have a "moment" when they must consider replacement.

These incentives could be included in Electric Services Demand Side Management budget at \$250,000 per year and increase if there is a desire to increase saturation.

For municipal buildings, most expenses are charged to a department's operating budget of a department or division. Funding would then be up to each department to program within their budget. Of the 17 municipal buildings, eight, plus a portion of City Hall, are funded through the General Fund. The estimated increase to the General Fund would be \$2,362,500.

Impact on Residents in Terms of Property Taxes, Utility Rates, etc.:

Increases in property taxes and utility rates to fund residential and non-residential retrofits would be significant and would impact residents and businesses.

If heat pumps and hot water heaters are installed at the time of current appliance failure, this is for the most part "fuel switching." Customers' natural gas bills for water heating and building heating will go down while electric usage will go up. There will be a reduction in summer electric load as air conditioning through a heat pump is more efficient than a standard air conditioner. Additionally, utility benefits can be achieved by adding electric water heaters to the Prime Time Power program where Electric Services can take steps to provide economical off-peak electric rates to shift the electric load.

Impact on Inclusion:

Low- and middle-income residents would be significantly impacted by the rate increases required to fund the retrofit project. There is a concern that most of these residents will not be able to pay the rate increases required and may be forced to move or look for more affordable methods of heating and lighting homes such as portable generators, wood or corn stove, or movable kerosene heaters.

Offering rebates and incentives on replacement hot water heaters and air-source heat pumps will assist residents with making these purchases. The impact of electric rates will be dependent on how much in the way of incentives that the City Council wishes to offer for retrofits.

The increases in utility rates and related expenses for retrofitting municipal buildings would be passed down to residents in the form of user fees, rental fees, and program fees for City services.

Big Move 2 – Net-Zero New Construction

Net-zero new construction is described as creating ultra-efficient residential, commercial, and municipal buildings by utilizing integrated design and building techniques that generate on-site energy, using clean renewable energy resources in a quantity equal to or greater than the needs of the buildings. Net-zero new construction would not utilize natural gas as a fuel source for any activity. The result is a decrease in energy costs to the building owner and a reduction in greenhouse gas emissions.

Net-zero can be thought of as setting an electric budget for a home based upon what level of renewable energy could be generated on site to offset its usage, but the renewable energy source is not installed at the time of construction. Passive building design is specific rigorous design approach for a whole systems approach of design and energy efficiency sets a maximum usage per sq. ft. for a building.

Net-zero energy ready buildings are designed to be ultra-efficient with the goal of being net zero energy at some point in the future.

ACTION STEPS

- All buildings constructed in 2026 and after will be net-zero ready
- Linear increase 2023-2026
- Passive house standard by 2030 in residential and commercial buildings
- All new municipally-owned buildings to be net-zero energy ready beginning in 2023 and passive building by 2025

Amount of Administrative Effort Needed:

The review of a house or other structure would go through the same review process as currently exists and would not add to the work of the existing staff as it is already part of the review process.

If the City were to create an incentive program or a training program there would be some additional staff time needed, but without a scope of program it is hard to estimate staff time needs. Additionally, it would be assumed administration of this program and the retrofit program would have some synergy. For example, the Inspections Division noted the need to add 4 FTEs to help administer a retrofit program. These additional positions could also service the new construction action step.

Feasibility of Achievement:

Currently there is a lack of expertise in the community for implementing this type of standard. The steps to adopt a standard would be relatively easy but ensuring there is a contracting community available with expertise to meet the standards is unknown. Hopefully, as trends for construction change based upon experiences in other markets, those techniques will filter to Ames and become more commonplace.

This action step might require the City of Ames to institute or support a training program to building a knowledge base, but that does not ensure that those that are trained would be available or do work in Ames.

Legal Feasibility:

Legal feasibility has multiple facets. Locally adopted buildings codes are unlikely to be able to require net-zero ready homes or passives homes if they are viewed as exceeding the requirements of the State’s adopted energy code.

Iowa Code prohibits local governments from prohibiting the sale or use of natural gas. Additionally, outright limitations on the use of natural has are not permissible under Iowa law.

However, this action step differs from the retrofit feasibility, because it addresses new development and the City may be able to employ other measures beyond building code standards. For example, the City could negotiate with developers at the time of annexation or through contract rezoning a commitment to net-zero readiness and passive home design. In addition, the City could establish new zoning standards for specific design features of a building that support both being net zero ready and passive building design.

Funding Sources:

There is no funding anticipated to be needed as costs would likely be included with current fees. The promotion of training sessions and working with trade groups could be done at minimal costs and possibly with the assistance of outside resources.

Impact on Residents in Terms of Property Taxes, Utility Rates, etc.:

Increases in property taxes would be no different on a net-zero home than that of a conventionally built home. Utility rates are not impacted, but the actual monthly bill would be a savings for the resident.

Impact on Inclusion:

For single family home construction there are no new homes constructed at a price point that is considered affordable to low-income households. Reduced monthly energy bills would be beneficial, but it is unknown if rent or mortgage payments would be higher and offset the saving on energy bills.

BIG MOVE 3 – RENEWABLE ENERGY GENERATION

Ames Electric Services serves 90% of the electric load within the City limits and is powered from a mix of renewable and non-renewable sources. Adding additional renewable energy such as wind and solar can significantly decrease emissions in the community. Investing in individual and community wind and solar power will decrease emissions from homes, businesses, electric vehicles, etc.

Adding home scale battery storage can help the system in two ways.

- First, if there is an overabundant amount of solar/wind energy being produced during the day, then this excessive renewable energy can be used at night when there is no solar and wind may be low. The key with this operation is there will need to be control signals sent to each of the battery systems to insure they are storing energy “when” it’s available. Failure to do so could create new strains on the system.
- Second, the battery could be used to charge at night when the energy cost is at its cheapest. Then when the energy is its most expensive, the homeowner could pull energy from the battery. This can be encouraged with a proper rate design.
- In addition a battery storage system can help customers during power outages.

The key is to create the right level of rate incentives/disincentives together with some form of utility control to achieve the best balance of customer needs and utility needs.

ACTION STEPS

- **Max out rooftop solar potential (220 MW)**
- **Add 50 MW solar farm by 2025, additional 50 MW by 2030, and an additional 200 MW between 2035-2045**
- **Add 20 MW wind farm by 2026**
- **Add Tesla power walls or other home scale battery storage to every home when an electric vehicle is acquired**
- **Local production moved to electric 2024 and renewable natural gas 2030 (NOTE: Due to technology not being readily available, this action step is to be determined at a later date.)**

Amount of Administrative Effort Needed:

Rooftop Solar

Like the building retrofitting action step, implementation of a more extensive rooftop solar program on private property will be labor intensive. With the increased workload, it is estimated that at least one new position totaling \$100,000 annually will be needed to work with customers through the interconnection agreement process, to spend time with equipment manufacturers on equipment setting, and to monitor final system acceptance

testing. Along with the new position in Electric Services, additional FTEs might be required in the Inspections Division and Planning and Housing Department to administer a more robust rooftop solar program. It should be pointed out that none of these additional personnel costs were factored into the consultant's analysis.

Additional Solar and Wind Generation

In addition to being one of the most cost-effective action steps to reduce carbon, it poses the least impact on staffing requirements if the primary strategy involves a Request for Proposal process resulting in a Power Purchase Agreement(s) for energy from a private entity. If this is the case, it is anticipated that the existing staffing levels from the City Attorney's Office, the Purchasing Division, and Electric Services Engineering Division will be sufficient to accomplish this action step.

With the recent signing of the federal Inflation Reduction Act, ownership by the City now might prove to be a cost-effective option. The bill allows municipals to gain the same credits that previously have been afforded to taxable entities. However, if the City wishes to be an owner of any new generation facilities, staff support will increase significantly in order to operate and maintain a city owned facility.

Tesla power wall or other home scale battery storage

Assuming this is a rebate program, no additional staff would be required. However, if a City incentive is offered for this action step, it is important that there is a requirement that the power wall is charged during off-peak periods.

Feasibility of Achievement:

Rooftop Solar

One of solar generation's greatest needs is space. Making use of our customers' roofs will provide needed space with minimal impact to the surrounding area. Currently, Electric Services does provide incentives in the form of a rebate (\$300 per kW at time of system peak) and a net metering program for private rooftop solar systems. There are 165 approved systems, with 11 proposed projects in-the-queue. Since the program's inception in 2010, Ames' customers have added 1.2 MW through rooftop installations.

Staff believe that by increasing the installation incentive to \$1,200/kW, the average cost to a homeowner for rooftop installation of \$30,000 can be mitigated. The City incentive would cover \$12,000, and with a \$10,000 federal tax credit, the homeowner would only be responsible for \$8,000.

While increasing the installation incentive should prove more enticing to a building owner, Staff believes it is highly probable we will not be able to achieve this action step of 220 MWs of rooftop solar systems because of the lack of the needed amount of solar panels, a lack of needed private installers, and the lack of available rooftop square footage to accomplish the goal.

Additional Solar and Wind Generation

The action step to add a 50 MW of wind or solar farm by 2025, an additional 50 MW by 2030, an additional 200 MW between 2035-2045, and an additional 20 MW of wind by 2026 is relatively straight forward in concept. The intent is to build renewable generation to replace energy which would have otherwise been produced from fossil-fuel generation.

As you know, the Staff has experience with this type of action step and have successfully entered into Purchase Power Agreements for wind and electric energy. Therefore, assuming there are private vendors willing to develop these renewable resources at the magnitude suggested by our consultants, the Staff will be able accomplish this action step to a level that the Council is willing to raise electric rates to finance.

Tesla Power Wall or battery storage

The feasibility of achievement of this action steps will depend upon the financial level of rebates the City is willing to offer and the number of electric vehicles our residents ultimately purchase.

Legal Feasibility:

Rooftop Solar

There are no legal impediments to the City continuing the current voluntary rooftop solar program.

Additional Wind and Solar Generation

The two entities that have the most control over the accomplishment of installing this much renewables are the Iowa Utilities Board and MISO. A generating plant, greater than 25 MW, must be submitted to MISO for interconnection review and transmission overload studies. Otherwise, there does not appear to be any legal impediments to pursuing these action steps under the Renewable Energy Generation Big Move.

Tesla power wall or other home scale battery storage

There are no legal impediments to offering a rebate program for this action step.

Cost:

Rooftop Solar

If the City funds all of this on 100% of the rooftops, the estimated cost of \$432 million or an average of \$17 million annually. This additional \$17 million represents a 28% increase in Electric Services budget for this action step alone. In addition while the individual customers will see savings on electric bills, Electric Services will lose revenue from the reduction in the sale of energy. In order to make up the loss in revenue to pay for debt incurred to pay for rooftop installations, electric rates will need to be increased accordingly.

Additional Generation

It is difficult to determine the projected cost for adding more renewables until it is determined through a competitive bidding process. In the recent past, 20 year contracts

were being signed in the \$20-30 per MWh range for wind and \$42-55 per MWh range for solar. The City is seeing current contracts inflated by 10-50% due to supply chain issues.

Tesla power wall or other home scale battery storage

Home scale battery storage units can range in cost between \$10,000 - \$20,000 depending on type and size. It is estimated that a Tesla Power Wall costs \$12,000 per home.

Funding Sources:

Rooftop Solar

This program is currently funded through electric utility rates. As noted in the Cost analysis, an average of \$17 million annually would be needed to fund 100% of the rooftops. This additional cost represents a 28% increase in electric rates to fully cover the lost revenue.

Wind and Solar Generation

The funding for the Purchase Power Agreement(s) would come from user revenues generated from electric user fees (Energy Cost Adjustment).

Tesla power wall or other home scale battery storage

A rebate program for these battery storage units would be funded through the electric utility's Demand Side Management program which is funded through electric rates.

Impact on Residents in Terms of Property Taxes, Utility Rates, etc.:

In general, for every 50 MW of wind or solar installed, staff believes that customer rates will go up approximately 5% from today's rates. Keep in mind that solar is nearly twice as expensive as wind, but you only receive half the energy for the same amount of generation built. Therefore, the additional 320 MW would require a 32% increase in today's rates. (NOTE: This projected rate increase is in addition to any other rate increase needed to finance the operating and capital improvement budgets.)

For the home scale battery storage, the increase in electric utility rates will be dependent upon the size of the incentive, number of rebates offered, and the number of electric vehicles purchased. A rebate program would benefit the electric vehicle owner the most, but the cost of such a program would be spread amongst all customers through the electric utility rates.

Impact on Inclusion:

Any utility rate increases will have a disproportionately higher impact on low to moderate income residents.

BIG MOVE 4 – REDUCING VEHICLE EMISSIONS

Under this area there would be a shift from gasoline and diesel fueled vehicles toward alternatives such as electric vehicles and additional uses of biodiesel. In addition, car share and pooling programs can help decrease overall vehicle miles traveled.

ACTION STEPS

- All light and medium duty vehicles sold in 2030 are zero emissions vehicles
- All heavy duty vehicles sold in 2030 and after are electric
- Between 2023 and 2030 proportion of biodiesel use increasing by 5% each year
- Transit Electrification

Amount of Administrative Effort Needed:

There is no additional staffing or administrative effort needed to purchase new all-electric vehicles and increase the use of biodiesel fuel.

Feasibility of Achievement:

Currently most all-electric vehicles have demand higher than production, so the feasibility achievement will be hampered by the availability of vehicles. For example, it appears larger vehicles like trucks, fire trucks, etc. needed for our work might not be available for a number of years.

In the first year of the B100 biodiesel pilot project, the City used approximately 10,500 gallons of B100. In year two with additional vehicles, we used approximately 23,000 gallons. This means that we would need to use an additional 675 gallons in the following year and increasing from there. Currently we are projecting that we will meet that increase without additional vehicles.

In 2021 the City installed systems on 7 more snowplow trucks that will use B100. This will be a significant step in the amount of B100 used. Staff is also exploring more heavy trucks in the fleet for possible use of B100.

Feasibility would be impacted by being able to install systems on heavy duty or transit vehicles that allow for the use of B100. Recently the City went from 5 to 12 snowplow trucks that can use B100. Fleet staff also works with departments to use a blend of B100 in vehicles that don't have a system installed in the summer when there is not a chance of issues from cold weather.

Legal Feasibility:

There are no legal obstacles with the City's pursuit of all-electric vehicles and increased usage of biodiesel fuel.

Cost:

City staff worked on estimating the cost of having each vehicle in the fleet go to an all-electric option based on the remaining lifecycle. This estimate only includes the vehicles, not construction equipment. The cost of sedans were estimated with the current cost of the Chevy Bolt. Light duty vehicles were estimated to be 30% more, medium duty 40% more and heavy duty was estimated to be 50% more. An assumption was made that current technology would be the basis for future replacements. This means in areas of snow removal, utility work, and Police that extra vehicles would be required to provide twenty-four-hour coverage as needed. **These costs would be placed in the yearly escrow for replacement at an increase of \$705,000 annually.** This includes the cost for additional vehicles for snow plowing, utility work and Police.

There would also be additional infrastructure costs for electric vehicle charging. Estimated costs for chargers, assuming 2022 costs, is approximately \$3,450,000. This includes Level II chargers for regular use City vehicles and Level III (fast chargers) for City vehicles used 24 hours such as snowplows and Police vehicles. **There would be an additional \$600,000 needed to upgrade electrical services at several of the City buildings in order to accommodate these additional chargers.**

Funding Sources:

Currently for vehicles, escrow is charged to the department budget depending on how they distribute the cost of the vehicle. This means that department budgets would need to assume the cost of the increase. This would have a larger effect on departments that have heavy trucks and would need additional vehicles.

Impact on Residents in Terms of Property Taxes, Utility Rates, etc.:

This action step will lead to an increase in property taxes and utility rates to cover the increased costs.

Impact on Inclusion:

Increases in property taxes and utility rates would adversely impact limited income households

BIG MOVE 5 – INCREASING ACTIVE TRANSPORTATION AND TRANSIT USE

Active transportation refers to more sustainable modes of transport including walking, cycling, carpooling, and public transit. Reducing car usage in favor of active transport and public can decrease traffic congestion, promote active and healthy lifestyles, and complement mixed-use developments while decreasing emissions.

ACTION STEPS

- By 2050 10% of trips in the city completed using transit
- 17 buses replaced with electric by 2027; then replace at end of lifecycle for remaining buses
- By 2050 40% of trips under 1.25 miles completed by walking, 25% of trips 1.25 miles – 3 miles completed by bicycling - **The City is currently underway with a Bicycle and Pedestrian Master Plan. The outcomes of that plan will be used to develop and implement safety mechanisms, path connectivity, and improved wayfinding.**
- Car and bicycle share programs – **These programs in conjunction with exploring micromobility options will be considered and developed based on outcomes from the City’s Bicycle and Pedestrian Master Plan**
- Reduction in vehicle miles traveled

Amount of Administrative Effort Needed:

Completed City Trips Using Transit

To effectively manage this, many FTE’s would need to be added across all CyRide divisions, along with an expansion in buses and facilities. Once CyRide operates 100 or more buses at peak times, federal oversight increases significantly, requiring further administrative FTE’s to ensure the organization is fully compliant with appropriate regulations.

Bus Replacement

Moving to all Battery Electric Buses (BEBs) is costly and not achievable under the current funding through the State of Iowa bus replacement program. CyRide staff would need one additional FTE to apply for Federal discretionary grants, as indicated under “Cost” below.

Completed Trips by Walking/Bicycling and Car/Bicycle Share Programs

The City is currently underway with a Bicycle and Pedestrian Master Plan. The outcomes of that plan will be used to develop and implement safety mechanisms, path connectivity, and improved wayfinding.

Feasibility of Achievement:

Completed City Trips Using Transit

To achieve 10% of trips using transit in the city by 2050, CyRide ridership would need to rise to about 20 million trips per year, a five-fold increase over current levels. It's important to note that approximately 95% of CyRide's ridership is Iowa State University students.

Bus Replacement

A previous consultant analysis concluded that the transit system could effectively operate up to 17 battery electric buses, given the existing route configuration and facility infrastructure constraints. CyRide has Transit Board approval to fund eight BEBs, aiming to ultimately operate seventeen of these buses by 2050. This plan has been developed to allow the vehicles to operate allow for the buses to be purchased gradually as supplemental funding sources become available.

Legal Feasibility:

The Transit Board is responsible for overseeing CyRide operations and there are no known legal impediments with the Completed Trips and Bus Replacement action steps.

Cost:

Completed City Trips Using Transit

This type of growth will require heavy investments in multiple areas of the organization, including additional and expanded bus routes, higher frequency service, rolling stock purchases, additional facilities, and increased FTE's to operate and administer the service.

Bus Replacement

The BEB buses are approaching \$1 million per vehicle when configured to CyRide's specifications (almost twice the cost of a traditional diesel 40' bus), and they also require specialized charging infrastructure.

CyRide will likely need to recharge more than once a day for up to several hours, depending on how much battery life is left in the vehicle. CyRide would need to explore installing charging stations and on-route charging stops. **These stations can cost upwards of \$50,000, not including the added utility costs of the electricity they would use.**

Building Expansion

All of the ridership growth needed to meet the City Council's goal would require an expansion in facilities to house, maintain, and manage the enlarged transit fleet. The cost for this expansion is projected to be \$60,000,000 in today's dollars.

Funding Sources:

Completed City Trips Using Transit

In Iowa, the primary source of transit funding is a local property tax levy, which is capped by statute at .95 cents per \$1,000 dollars of assessed value. As of FY 2022/23, Ames residents pay about .60 cents per \$1,000 dollars, which provides about \$2 million in local funding for CyRide. **Even at its cap, this funding source would not be sufficient to support the extensive expansion. Additionally, there are limitations in the state and federal funding allowed for transit, which may also add challenges in finding alternative sources beyond the existing funding partners agreement.**

Bus Replacement

Federal and state sources help CyRide procure buses with about 80% or more of the purchase price supported through grant funding. The local funding partners bear the remaining cost. It is hoped that the price disparity between conventional buses and BEBs will decrease over time as availability increases and technology improves. Additionally, there are challenges with purchasing BEBs due to the structure of the State of Iowa bus purchasing program. This system only permits purchasing standard 40' heavy-duty diesel buses. If CyRide were to stop purchasing diesel vehicles, this major source of capital revenue would become unavailable.

High-performance batteries are running between \$250,000 and \$400,000. Vendors are expecting battery replacement to be needed about every six years. The useful life of a bus is around 12 years, but CyRide historically operates its buses for much longer than that. If trends continue, it may be necessary for CyRide to replace batteries at least twice during the lifetime of a bus, posing additional expenses to the budget with some offset in other maintenance costs.

Impact on Residents in Terms of Property Taxes, Utility Rates, etc.:

Completed City Trips Using Transit

Given the above funding source, there is expected to be a significant impact on property tax rates. There would also be direct operational costs to replace lost farebox revenue and expand service to support a zero-fare transit system. Assuming cost-sharing levels between the funding partners are consistent, staff expects a need to significantly increase the transit tax levy to support these projects.

Bus Replacement

There are significant costs associated with a rapid fleet transition to BEBs. Assuming cost-sharing levels between the funding partners are consistent, City staff expects a need to increase the transit tax levy to support these efforts.

Impact on Inclusion:

Depending on the type of incentives offered to encourage utilization of the transit system, there could be significant benefits for inclusion, but this could be offset by any increases in property taxes that are required from property owners or indirectly from renters to subsidize CyRide to a greater level.

BIG MOVE 6 – REDUCING WASTE EMISSIONS

Reducing waste at the source, such as purchasing less, can play a significant role in reducing emissions as will enhanced recycling and composting programs that will divert waste away from the landfill and waste-to-energy system.

ACTION STEPS

- Waste decrease by 20% per household at the source by 2030; 50% per household at the source by 2050 below Business As Usual scenario
- 50% of commercial waste is diverted at the source by 2030 below the Business As Usual scenario
- 90% of organic/food waste is diverted by 2028
- 90% of glass, metal, and paper, cardboard, and other paper products are recycled by 2028
- New Waste To Energy System

Amount of Administrative Effort Needed:

Staff estimates adding 1.5 FTEs for education and awareness programming as well as contract oversight for the action steps included under this big move.

Feasibility of Achievement:

Waste Decrease by Household and Commercial Waste Diversion

The feasibility of achieving this action step is based on the acceptance and participation of the residential and commercial communities in making changes their buying, consumption, and disposal habits.

Organic and Food Waste Diversion

This extremely aggressive goal. Story County currently generates approximately 52,000 tons of waste per year of which 20% is organics, so the volume of organics to meet this goal is 9,360 tons per year or 180 tons per week. To achieve this action step, organics diversion would depend on the acceptance by the residential and commercial community to change their handling of organic waste and the level of incentives that the City is willing to provide. Furthermore, currently in Iowa, there are less than a handful of vendors handling commercial food waste composting, and none that have the capacity to handle an additional 180 tons per week.

The more organics that are composted in households' backyards reduces the amount that would need to be collected and transported to a compost facility. The EPA reported in January 2022 that 6.3% food waste generated was composted in 2017 the most recent reporting year. The action step of 90% diversion would be challenging to meet based on national trends and lack of statewide infrastructure to handle the volume of organics generated.

Recycling

Recycling is a widely recognized program and has support within both the residential and commercial communities. The national average for recycling reported by EPA for 2018 is 23.6%. The more that post-consumer recycled material is used in products, the more consistent and sustainable the markets should be.

Legal Feasibility:

While the City government has the legal authority to take certain actions to incentivize or financially penalize to assure our residents help achieve this action step, we do not have the legal authority to control waste collections throughout Story County.

Cost:

The estimated cost of the additional FTE's and supporting material is \$160,000. Since there is currently no vendor in Iowa that could handle this quantity of organic waste, it is difficult to assign cost to this. Utilizing a recycling type system to model for collection and processing of organics the anticipated price would be \$15 to \$20 per household per month if there was a compost site in central Iowa. In terms of recycling, there would be an anticipated price of \$10.50 per household per month if a recycling vendor is used in central Iowa. For both services, commercial accounts would be charged by the vendor for the volume that is collected.

Funding Sources:

Funding for waste decrease by household, commercial waste diversion, organic food waste diversion, and recycling would come from increases in the per capita property tax subsidy from our residents or from the tipping fees charged to the haulers which will be passed on to their customers.

Impact on Residents in Terms of Property Taxes, Utility Rates, etc.:

Waste Decrease by Household and Commercial Waste Diversion

An increase of approximately 6% in tipping fees would be needed to cover the additional costs. And as the amount of waste tonnage decreases, the fee would have to be raised an additional 6% to offset the 50% reduction in waste volume. This would be approximately a 12% increase in tipping fees at current rates without any inflation increase.

Organic and Food Waste Diversion

An increase of approximately 5% in tipping fees would be needed to cover the additional costs. There would be a decrease in the amount of tonnage so that fee would have to be raised to 9% to offset the 90% reduction of the organics in the waste volume. This would be approximately a 14% increase in tipping fees at current rates without any inflation increase.

Recycling

There would be an increase of approximately 2.5% in tipping fees to cover additional costs. As the amount of tonnage decreases due to increase recycling of materials, the fee would have to be raised to 5% to offset the 90% reduction of the recycling in the waste volume. This would be approximately a 7.5% increase in tipping fees at current rates without any inflation increase.

Impact on Inclusion:

All of these fee increases will place a burden on our low income families.

STAFF SUMMARY COMMENTS

A Community Climate Action Plan

It should be emphasized that the Climate Action Plan is a carbon reduction strategy for the total community, and not just for the City organization. As such, the City is not expected to fund every action step, but rather also provide support to achieve the actions in other forms such as education and guidance.

Incentives

The total net cost reflected in consultant's analysis is \$1,425,668,634 to achieve an 83% carbon reduction by 2030 and an additional \$897,233,375 to achieve net-zero by 2050, for a total of \$2,322,902,009, does not indicate who will pay for the action steps related to the "community."

Therefore, the City Council will need to decide what level of incentives, if any, should be paid by the City. The less incentives that are offered, the greater the savings that will be realized by the City. However, the more incentives that are provided by the City, the greater are the chances for voluntary participation in our carbon reduction action steps.

For example, if the cost to retrofit a single-family home is estimated to be \$60,000; should the City offer grants of \$15,000 (25%), \$30,000 (50%), or \$45,000 (75%) in order to attract the property owners to participate in the action steps?

You will remember that a question on SSG's public engagement on-line survey addressed this issue. The results from this self-selected survey revealed that approximately 47% of the respondents would need "partial" financial support and approximately 26% of the respondents would need "full" in order to entice them to make the necessary changes to their homes. Unfortunately, we did not clarify what "partial" meant.

Rooftop Solar On Private Property

Our current program to encourage rooftop solar systems on private properties, involves an incentive of \$300 per kW for installation. In addition, Electric Services purchases the excess energy at a rate of \$.075/kwh under a net metering program. **It is important to note that the rooftop solar program prevents the utility from collecting enough**

revenue to pay for the fixed costs of serving the customer such as for transmission, transformers, distribution, and labor. Therefore, the remaining customer base is subsidizing the property owners who install rooftop solar systems.

Rather than providing the \$0.075/kWh net metering incentive, the City Council could consider increasing the \$300/kW rebate to \$1,200/kW (or some other amount) from the Electric Service's Demand Side Management budget and eliminate the net metering incentive. This change will allow the property owner to realize savings much earlier and, therefore, hopefully incentivize more installations.

New Construction

In regards to new building construction, the State legislature has negated the City's ability to establish requirements that exceed the State's adopted Energy Code or prohibiting the sale or use of natural gas. However, for new construction, the City could negotiate with developers at the time of annexation or through contract rezoning a commitment to net-zero readiness and passive home design. In addition, the City could establish new zoning standards for specific design features of a building that support both being net zero ready and passive building design.

Along with grants or forgivable loans in some pre-determined percentage as suggested with retrofit action steps, the City could create a new tax abatement program to incentivize the owners to install the needed carbon reduction improvements with new construction projects.

Increasing Solar and Wind Generation Owned By The City

Adding more ground mounted solar and/or wind generation to our Electric Services portfolio is the least complicated, least labor intensive as it relates to staffing needs, and least cost in terms of effectiveness in carbon reduction. Furthermore, the Staff has previous experience successfully negotiating Purchase Power Agreements for wind and solar energy.

The consultant's analysis indicates it will take 320 MW of these renewable energy sources to meet the 2030 and 2050 goals. When reviewing this action, the following must be considered:

- It should be remembered that renewable generation from wind and solar is produced when the "fuel source" is available. Oftentimes, this does not match up with how the City's electric customers use the energy. One alternative would be to install battery storage capacity of sufficient size to store the energy, which is not included in this analysis. Current battery storage costs are approximately \$1 million per MW.
- While renewable generation produces the clean energy needed, it does not replace the generation "capacity" required. The existing installed generation Ames has today must be maintained to meet its capacity obligation within MISO.

- Depending on the amount of generation and the location, siting and operating the generation will be subject to MISO rules.
- Given the significant amount of acreage that will be needed for these renewable systems, it should be understood that they might have to be sited outside of Story County or outside of Iowa.

Electric Utility Rates

Many of the action steps suggested in the SSG's analysis will rely of revenues from the Electric Services to pay for incentives to accomplish improvements to private or other governmental entities, or to finance improvements to Electric Services infrastructure.

As the City Council considers an implementation plan, a general rule would be that for every \$500,000 in additional expenditures in the electric utility, a 1% electric rate increase will be needed.

Community Participation

Absent any government mandates, the key to success will be through voluntary participation from the "community." For purposes of this report, community includes other electric utilities within the Ames city limits; other local, state, and federal entities within the Ames city limits; and private homes, commercial buildings, and industrial buildings. Approximately 91% of the net costs needed to meet the City Council's climate action goals are associated with these community entities.

An important next step will be for the Mayor to create a Community Climate Action Task Force with leaders from the primary "community" groups in an effort to reach agreement regarding how each entity will commit to reaching the City Council's goals.

Inclusion

The City Council has expressed two important values; environmental sustainability and inclusion. It is clear that the addition of financial incentives for community entities, expenditures for Electric Services infrastructure, and improvements to the Municipal buildings and fleet will result in significant increases in electric rates and property taxes. While these increases will have the greatest impact on our lower income residents, these costs will affect all of our residents. Therefore, as we piece together the implementation strategy for our Climate Action Plan, it is important that the City Council attempts to balance their two values. If we are unable to find this balance, the cost of living in Ames could become prohibitive.

Priorities For The Initial Implementation Plan

After considering the \$2.3 billion estimated price tag, the lack of adequate technology needed for some of the action steps, and the legal obstacles that impact our ability to pursue all of the 29 action steps at this time; it would seem prudent to develop a more relevant, achievable, and cost effective carbon reduction strategy to initially implement our Climate Action Plan.

After reviewing data provided by SSG in Attachment A and the Staff's additional analysis based on the 8 evaluation criteria, the City Council might want to consider an initial implementation plan that includes:

1) **Increased Wind and Solar Generation As Part Of Electric Services Portfolio**

This step reflects a low cost per ton of carbon removed, achieves the greatest percentage of carbon removed from all of the proposed action steps, requires a minimal administrative burden on the existing staff, and involves a project in which the Staff has previous experience.

2) **Waste to Energy Improvements/Reducing Waste Emissions**

The Staff is already working with a consultant to develop alternatives to burn our refuse in a separate boiler thereby significantly reducing the amount of gas that must be burned in our Power Plant. Options will be presented to the City Council in December 20, 2022.

In addition, the City Council has directed staff to explore an Organized Garbage Collection system that would facilitate the collection of organic foods, yard waste, and recyclables as well as reducing the number of truck trips and associated emissions.

3) **New Construction**

The City Council could consider 1) changing our Zoning Ordinance to include specific design features of a building that support both being net-zero ready and passive building design, 2) requiring net-zero ready and passive design as part of annexation and contract rezoning, and/or 3) implementing a new tax abatement program to incentivize new construction to be net-zero ready and reflect passive building design.

It should be noted that the City Assessor has indicated that retrofitting existing buildings with more energy efficient features does not add to the assessed value. Therefore, a new tax abatement program to promote retrofitting would be an ineffective incentive.

4) **Retrofitting Existing Buildings – Pilot Program**

SSG's analysis indicates that the action steps related to retrofitting existing buildings actually generate a net saving because the improvements will reduce the energy consumption for the individual property owners. However, assuming that Electric Services will have to borrow funds to incentivize property owners to participate in this action step, the electric utility might have to increase its rates further to pay off the debt.

While this remains an important action step, it might be prudent to move slowly until it is determined how much of an incentive is needed to attract voluntary participation. **One possible initial action step would be to implement a pilot**

program to incentivize retrofitting existing buildings by focusing on smaller older homes in Ames Electric Services territory. We will be able to learn a lot from this initial pilot program and at the same time focus on homes that are most likely the least energy efficient and owned by lower income residents. In this way the Council's values of sustainability and inclusion can be addressed.

5) Retrofit Municipal Buildings

For the municipal building retrofits, a consultant will need to be hired to do a detailed study of each building with recommendations for implementation as well as a long-range capital improvements plan for these projects.

6) Electrify the Municipal Fleet (Non-CyRide)

When available and capable of meeting the needs of the required work, the staff will purchase electric vehicles. However, this action step excludes CyRide. Given the excessive cost of electric buses, over \$1 million vehicle, the CyRide Board has committed to purchasing 17 of the 95 buses in the fleet by 2050 but is hesitant to commit to more at this time.

7) Create a Mayor's Climate Action Plan Leadership Task Force

This task force, comprised of primary "community" leaders from the various public and private entities that are crucial to meeting the City Council's carbon reduction goals, should come together to share their own climate action goals to calculate what we can expect to accomplish as a community by 2030 and 2050.

ATTACHMENT B

	Cumulative Emissions Reduction (kt CO2eq)	Proportion of Total Reduction	Net Spending	Marginal Abatement Cost (\$ / t CO2eq)	Cost of Investment	Gain of Investment	Notes
Building Retrofits	3,141	15%	926,986,172	295	1,620,926,941	-693,940,769	
Net-Zero New Construction	578	3%	179,565,851	311	285,905,584	-106,339,733	
Renewable Energy Generation	10,009	47%	847,578,735	85	1,317,317,818	-469,739,083	
Reducing Vehicle Emissions	933	4%	-957,260,759	-1,027	190,579,122	-1,147,839,881	
Increase Active Transportation and Transit Use	662	3%	-301,531,856	-455	20,770,850	-322,302,706	
Reduce Waste Emissions	726	3%	0	0	0	0	No costs were included for waste reduction or diversion
Non Big Six:							
Low Carbon DE system at ISU	1,807	8%	31,427,976	17	80,807,514	-49,379,538	
MISO grid decarbonization plans	2,502	12%	0	0	0	0	
Replacing Building Natural Gas Use With Renewable Natural Gas	969	5%	170,467,256	176	170,467,256	0	