2030 Climate Action Plan Development Update & Financial Analysis Options

Attachment D

Economic Analysis Memorandum

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May 12, 2023
Project No: 20-09336

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Via email: gwong@countyofsb.org

Subject: 2030 Climate Action Plan (CAP), Climate Action Planning Economic Analyses

Dear Garrett Wong:

The CAP functions as a high-level roadmap which identifies the key strategies and actions for reducing GHG emissions and meeting the County's emissions reductions target of carbon neutrality. The strategies included in the CAP have been developed to balance between the required GHG emissions reductions, cost savings, and feasibility. To support the adoption of priority actions within the CAP, targeted economic analysis has been completed on several key strategies including new and existing building electrification, building performance standards, vehicle electrification and VMT reduction programs. These analyses are summarized in the Economic Analysis to Date section of the memo and attached for reference. However, these analyses do not provide an exhaustive look at the costs specific to the County of Santa Barbara as building to building or vehicle to vehicle differences can be substantial and depend on a wide range of variables. The analysis provided to date provide high level guidance on the potential cost ranges as well as options for funding and financing of those programs. To conduct additional analysis would require a much higher level of cost modeling and analysis that could provide more detailed cost numbers but take considerable time and resources to complete.

The intent of this memorandum is to provide the County with additional information on the nuances of identifying specific costs associated with a high-level strategy document as well as provide options for enhanced economic analyses to assist the County with its climate action planning efforts. The following provides a description of what economic analysis has already been conducted and what are the other options the County has for additional analyses, either as part of this Climate Action Plan (CAP) Update or after CAP adoption.

Economic Analyses Completed to Date

The following are economic analyses that have already been completed as part of the 2030 Climate Action Plan Update.

Building Reach Code Cost Effectiveness Summary

In 2021, Rincon Consultants developed a memorandum highlighting the current state of reach codes in California and the associated costs of building all-electric in the County of Santa Barbara. This memorandum summarizes the cost effectiveness studies conducted by the Local Codes and Standards program and demonstrates that every building type has an all-electric construction package that reduces both construction costs and on-bill costs.

Financial Strategy Memorandum

In February 2023, Hatch developed a Financial Strategy Memorandum that evaluated the potential costs of implementing four actions that involve the development, adoption, and enforcement of County ordinances that would require: the replacement of natural gas appliances, establishment of a building performance standard, transportation demand management programs for large employers, and the phase out of light duty gasoline and diesel-powered offroad equipment. The memorandum lists both the community cost variables and the cost to the County government. Case-studies are provided to demonstrate where jurisdictions have taken similar actions and, as feasible, the success, costs, and funding and financing for each was described. Accompanying the memorandum is a funding and financing pathways resource that describes 50 different funding pathways that the County could utilize for each of the four actions. Each funding opportunity includes information about funding tools, funding sources, funding management, specific funding pathways, case studies, key benefits, key drawbacks, typical municipal uses and restrictions, and key considerations.

Types of Costs and the Complexity of Pricing Climate Action

For each strategy included in the CAP, the "cost" can vary widely depending on both the type of cost being referenced as well as case specific cost variables. Consider building electrification. Many articles and studies have been completed that put the costs of building electrification as high as $34,000 per housing unit resulting in billions of dollars to electrify a large city like San Francisco.[1] However, this analysis assumes all existing appliances would be removed and electric appliances would be installed all at once. In practice, equipment would be replaced over time as new equipment is needed. At this time, the cost difference between gas and electric appliances is minimal and with rebates, electric appliances can even be lower cost. This change in approach and definition of cost can result in a "cost estimate" which varies by billions of dollars. Variables like the difference between marginal and full costs (like this electrificaiton example) are why it can be challenging to analyze the cost impacts of Climate Action. Additional cost variable which are important to consider are included here:

Upfront versus Lifecycle Costs

When discussing how much a strategy or action costs it is important to differentiate between the upfront costs, the cost of an LED light bulb, versus the lifecycle costs of purchasing, operating, maintaining, and ultimately disposing of that lightbulb. While LED lightbulbs may be more expensive up front when compared to an incandescent bulb, the lifecycle costs of owning an LED lightbulb are significantly lower, providing a significant return on investment.

Incremental or Marginal Costs

When discussing costs, it is important to specify the difference between how much a strategy costs overall and what the incremental or marginal cost is. The incremental or marginal cost is the difference in cost between the new action and the old or standard action. For example, purchasing a new electric vehicle could cost $30,000 which should be considered a high cost. However, the marginal cost of purchasing an electric vehicle versus purchasing a new internal combustion vehicle may be zero or near zero because of reduced long-term operating and maintenance costs including no fluids to

[1] https://www.instituteforenergyresearch.org/fossil-fuels/gas-and-oil/electrifying-homes-could-cost-san-francisco-5-9-billion/

replace, fewer moving parts like transmissions, and less brake wear. It is important to consider what the incremental/marginal costs are for each strategy by keeping in mind what the alternative costs are. In many cases, the difference is negligible.

Financing

One of the major financial tools available to make large investments into infrastructure, vehicles, or buildings is financing. Financing allows us to leverage the time value of money and put future expected money flows to use today. For example, a solar array may cost $20,000 and result in an energy bill that is $200 less per month. The cost of the solar array could be considered high. However, the loan for the solar array requires a monthly payment of $150 dollars, resulting in a net monthly savings of $50 dollars. Under this scenario the solar array does not carry a high cost, rather it provides overall savings. The ability to finance can make seemingly high-cost investments low to no cost over time.

Understanding the ranges of cost savings and revenue streams, and how those costs and revenues accrue over time into a payback or ROI calculation, are prudent factors to structuring partnerships, engaging stakeholders, and making optimal financial decisions. For example, energy efficiency retrofits can generate cost savings of more than 30% for 15 to 20 years. If external partners are involved, such as with an energy savings performance contract (ESPC), cities may not need to provide any upfront capital, but the project's cost savings would accrue with a private third party and be lost by the County. An anaerobic digester may need $5M to $10M in upfront capital but could also generate $1 to $2M annually in natural gas delivery revenue over 20 years, which can be an attractive financial investment for a jurisdiction. Jurisdictions must consider the estimated return on investment (ROI), how project costs and revenues balance out over the useful life of the project, and whether they are willing to forego long-term cost savings or revenue generation capacity by partnering with a private third party.

Complex Cost Variables

Providing more detailed costs for strategies like building electrification or EV adoption can be challenging due to the variables involved in each individual project. Some buildings may need a panel upgrade or wiring while others don't, and the cost of electricity changes every hour of the day meaning a detailed on-bill cost estimate requires a complex time of use model to complete. Additional variables like the interest rate for vehicle financing and miles traveled per year can have non-trivial impacts on overall cost effectiveness. Increasing the detail of the cost estimates for some strategies can ultimately require significant additional analysis.

The Cost of Doing Nothing

Finally, it's also important to keep in mind that doing nothing to prepare for and mitigate climate change will also carry a cost. The strategies which the County can employ to reach carbon neutrality are limited and the alternative to implementing these strategies is not zero cost. One immediate example is the cost to install conduit and panel capacity for electric vehicle chargers for all new construction. While this action increases upfront construction costs by a few hundred dollars, doing that same work after the building is completed can be an order of magnitude higher (~$3,000). Given the move towards electric vehicles, the cost of not installing EV infrastructure today could cost the community significantly more in the future. In a similar vein, adaptation strategies will cost the County and the community today. Planting trees, installing microgrids, and setting up cooling centers all have upfront costs. However, it's imperative that we weigh these costs against the costs of a future without these adaptive strategies given what we know about the climate. Research published in the journal

Nature predict the cost of not decreasing emissions to carbon neutrality by mid-century could range between $149.78 trillion to $791.98 trillion by the end of the century.[2] That same study found that if we globally mitigate climate change and achieve carbon neutrality by mid-century the world could see a $127 to $616 trillion dollar economic benefit after considering the cost of mitigation. The humanitarian impact is also significant. The Red Cross and Red Crescent Societies estimate that the number of people in need of humanitarian aid each year could double to $200 million annually by 2050 due to climate change costing $20 billion per year.[3]

Additional Research-based Analyses Options

The following analyses describe additional economic analyses that can be conducted to support the adoption and implementation of the CAP if more detailed cost estimates are desired. These analyses would utilize a research-based approach and no new community specific data would be generated. In other words, information for these analyses would depend on direct information from County staff, County stakeholders, case studies, and the expertise of professionals in the industry.

Complete County Government Cost Analysis

Timeframe to complete the analysis: 6 – 8 months

Cost range: $45,000 - $60,000

One major consideration for communities is how much should government entities budget on an annual basis to ensure there is enough staff capacity and resources for government staff to implement the CAP. An analysis that evaluates costs to the County government would include confirmation of key indicators tied to costing such as total capital investments, annual operating expenses, staffing costs, potential shared costs with partner jurisdictions or private entities, among others. This analysis would build on the Financial Strategy Memorandum and use unit cost methodology, where applicable, to estimate the underlying costs of all 12 measures and supporting actions that are in the draft CAP. The analysis would also provide an order of magnitude estimate of both one-time and ongoing costs to the County.

The methodology for deriving existing or recent costing information for actual or relevant projects with the County would involve using industry standard tools such as RS means, direct interviews with relevant County departments and staff, and internal review from the consultant team's energy, transportation, water, and climate change mitigation representatives to understand prevailing costs.

The purpose of this analysis would be to provide a scale comparison and not a precise cost estimate of each measure or action because of the precise nature of the associated projects stemming from the CAP will change over time from its initial conception. Ultimately, the costing would inform the

[2] Wei, Yi-Ming et al. Nature Communications. 2020. Self-preservation strategy for approaching global warming targets in the post-Paris Agreement era. Accessed at https://www.nature.com/articles/s41467-020-15453-z. Accessed June 9, 2021.
[3] International Federation of Red Cross and Red Crescent Societies. 2019. The Cost of Doing Nothing: The Humanitarian Price of Climate Change and How it Can be Avoided. Accessed at https://reliefweb.int/report/world/cost-doing-nothing-humanitarian-price-climate-change-and-how-it-can-be-avoided. Accessed June 9, 2021.

selection and prioritization of measures and actions for the County and provide insight into their annual budgeting.

Complete Community Cost Analysis

Timeframe to complete the analysis: 2 – 3 months

Cost range: $25,000 - $35,000

In order to make significant progress in decreasing GHG emissions, most CAP actions will require technology and behavioral changes of Santa Barbara community members. Some of these changes will cause new costs and benefits (such as cost savings). Each community is unique, specifically in terms of existing infrastructure, technology, and behaviors and small changes to implementation strategy can cause substantial cost differences. To better understand potential general community costs associated with the CAP, a high-level evaluation of probable costs considerations attributable to the community would be conducted. This community cost evaluation would build on the Financial Strategy Memorandum and provide cost ranges based on information derived from the consultant team's past projects, case studies, and available research. Case studies, where applicable, would also be included. The accuracy of costs evaluated would be dependent on the level of detail for each CAP measure and action.

Green Economy and Employment Analysis

Timeframe to complete the analysis: 2 – 4 months

Cost range: $35,000 - $55,000

CAPs and their associated projects and initiatives have the potential to support equitable economic outcomes, including economic growth and job creation. Ensuring that equitable outcomes result from investments in climate action planning is a critical piece of climate action planning. Decision makers and their communities can benefit from an understanding of the sectors and industries that are positioned for growth, and how growth can create employment opportunities that connect with historically under-represented, under-served and under-resourced members of the community. Therefore, a Green Economy and Employment Analysis would evaluate community-related costs and develop recommendations for CAP-related economic development. A Green Economy and Employment Analysis would include the following:

- **Understanding the Local and Regional Economy** would involve examining the proposed CAP 2030 focus areas, measures, goals, and actions in the context of the existing local and regional economy. This will help the County understand which sectors and industries are projected to experience growth generally today.
- **Defining green economy** would form the foundation of the analysis and ensure the County has a robust definition that captures the entirety of the green economy in Santa Barbara.
- **Sizing the green economy** would involve identifying sectors and industries that are part of the County's green economy now and in the future. The analysis would highlight which sectors and occupations might be affected by CAP 2030 implementation— positively and negatively—and the size of those sectors currently. The resulting analysis would estimate the number of "green" jobs expected to be generated per million dollars spent based on five priority measures.

- **Recommendations** to ensure the growth of jobs and a strong, inclusive economy in the future. This would include a vision for the economy, targets, and specific economic development initiatives.
- **Highlight existing "green jobs"** that are ready to take advantage of these in-field and ancillary opportunities and evaluate related workforce benefits and needs by occupation, including typical wages and salaries, skills, formal qualifications, and workforce demographics.

Additional Analytical Analyses Options

To provide the County with more refined economic analyses than the research based scopes described above, in-depth analytical studies would be needed to evaluate the variety of costs and benefits such as electrification of existing buildings, increased public transportation infrastructure, electrical vehicle adoption, and grid resilience. Below is a discussion of the most common analysis being conducted, which is an existing-building electrification study.

Existing-Building Electrification Study Example

Timeframe to complete the analysis: 12 – 14 months

Cost range: $150,000 - $250,000

Due to the impact building electrification has on decreasing emissions, existing-building electrification analyses are expected to do be the most common climate action analyses that communities will undertake in addition to their CAP. Some examples of communities that have completed or are in the process of completing existing-building electrification studies include City of Berkeley, City of Sacramento, City of Santa Cruz, and City of San Mateo. Additionally, any reach code[4] related to energy efficiency must be proven to be cost-effective.[5] Therefore, an existing-building electrification study is the first steps towards developing an existing-building electrification ordinance. These studies analyze the economics and carbon impacts of the electrification of residential uses and water heating both with and without demand flexibility[6]. These studies require substantial data and analyses to determine a variety of different costs, savings, and GHG emission reductions (e.g., net-present, fixed, short-term marginal, average, and long-term marginal) based on several community-specific factors such as energy rates (standard and time of use), appliance types, existing fuel sources, and climate zone/weather changes.

Conclusion

These analyses are the current state-of-the-practice for climate action planning cost analyses. The type and timing of these analyses are dependent on the needs of the community and their decision-makers. Typically, analytical analyses associated with the development of an ordinance are developed after the adoption of the CAP and are one of the first steps of CAP implementation. However, there is no

[4] A reach code is an ordinance adopted by a local government that requires something in addition to the requirements of the state's building code.
[5] To be cost effective, the money saved from the reduced energy costs needs to be enough to cover the initial cost within a reasonable period of time.
[6] Ability to shift energy consumption in time to support grid needs.

need to wait to conduct these analyses if the County would like to expediate their climate action planning efforts.

If you have any questions about the information provided in this memorandum, please don't hesitate to contact our team.

Sincerely,
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