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The following methodology will be used to determine the cost effectiveness for scientific laboratories to allow gas for space conditioning systems.

Step 1: Incremental Construction Costs

The following documentation may be required to support construction costs:

- Define the proposed gas space heating system for the exempt system. Specify the relevant state code-minimum baseline for a gas system, as well as mission-specific functions or capabilities of equipment and the need for the capabilities.
- Define the equivalent electric space heating system that would otherwise be installed. Briefly describe why the electric system is appropriate alternative to the proposed gas system (for example, an electric-resistance space heater may be the only appliance that can achieve necessary temperatures, as opposed to a heat pump).
- Identify the incremental cost components listed under materials and installation labor below. Only include design components that must be changed when switching between the State and San Carlos code-minimum electric baseline and proposed gas system. For each cost point, provide the source of the data (i.e., the vendors or cost estimator) with narrative justification for why these costs are not outliers. Two separate cost data points are preferred.
- Examples of incremental cost components to be considered for applicability to the building space heating system are listed below. Design labor and specifications development should not be included:

    - Materials
        - Equipment: Include appliances as well as relevant piping, ducting, fittings, sealing, insulation, etc.
        - Controls: Both the sensors/points as well as any upgrades necessary for the controller
        - Gas and electrical infrastructure connected to the site, such as gas main piping or laterals or on-site secondary transformers.
        - Structural (e.g., upgrades for heavier equipment).
        - Electrical (wiring, panel, utility service, etc...). Gas system installation must include costs for electric ready retrofits and pre-wiring.
        - Plumbing (meter, distribution, etc...)
        - Maintenance costs
        - Mark up for overhead and profit.

    - Installation labor
        - Trade – Identify trade(s) necessary
        - Time – Number of hours per trade

        - Rate – ($/hour) typical
        - Type – Categories of labor included as applicable: proper installation, testing/commissioning, maintenance (including when incurred), and replacement (including when incurred)

- Subtract the costs of the baseline electric system from the proposed gas system to determine the incremental construction costs of the electric system. A negative value suggests that the electric system is more costly compared to the gas system. In other words, if the electric system cost is higher than the gas system, then the incremental cost of the proposed gas system is negative. If the all-electric system costs less than the gas system, then the incremental cost is positive.

Step 2: Incremental Operational Time Dependent Valuation (TDV) Costs/Benefits

The following documentation is required to support TDV costs/benefits:

- Develop building energy simulations of both the baseline electric and proposed (gas) systems to attain annual 2019 Compliance Results for Space Heating Performance (Annual TDV Energy Use, kBtu/ft2-yr). This is the annual TDV energy used per-square-foot for space heating.
- For both the gas and electric space heating, multiply the TDV/ft2-yr by the square footage of the conditioned floor area (CFA), and by $0.089/kBtu. This represents the net present value (NPV) of TDV energy usage. A simple example of the calculation is shown below

    1. Simulate annual TDV kBtu/ft2-yr for space heating
        - Gas: 10 TDV kBtu/ft2-yr, Electric: 9 TDV kBtu/ft2-yr

    2. Calculate square footage CFA (ft2)
        - Gas: 10,000 ft2, Electric: 10,000 ft2

    3. TDV kBtu/ft2-yr x ft2 = TDV kBtu usage
        - Gas: 100,000 TDV kBtu, Electric: 90,000 TDV kBtu

    4. TDV kBtu usage x $0.089/kBtu = NPV of TDV energy use
        - Gas: $8,900 NPV of TDV, Electric: $8,010 NPV of TDV

- Lastly, subtract the NPV of TDV electric value from the gas value. This represents the TDV benefit (or cost) of the electric system. In the example above, the TDV difference is $8900 - $8010 = +$890.
- $0.089/kBtu represents 15-year net present value per kBtu in nonresidential buildings, per 2019 Time Dependent Valuation of Energy for Developing Building Efficiency Standards, February 2017, Table 13 TDV Conversion Factors, NPV $/kBtu. Available at: https://efiling.energy.ca.gov/getdocument.aspx?tn=216062

Step 3: Cost Effectiveness Calculations

The following documentation is required to support cost effectiveness calculations:

- To demonstrate the cost effectiveness exception, add the incremental construction cost of the electric system (per Step 1) to the on-going TDV impact of the baseline system to the proposed system (per Step 2). This will determine the NPV of the electric system.
- For example, if the incremental cost of the electric system is determined to be $1,000 more than the gas system in Step 1 (and thus a negative number), then the NPV of the electric system would be -$1,000 + $890 = -$110 NPV.
- If the NPV is positive, then the electric system is cost-effective. If the NPV is negative, the electric system is not cost-effective.