Energy Commission

ACTION CALENDAR
April 28, 2020

To: Honorable Mayor and Members of the City Council

From: Energy Commission

Submitted by: Cate Leger, Chairperson, Energy Commission

Subject: Recommendation to Prepare a City Ballot Measure to Create a Climate Action Fund, in response to the Fossil Fuel Free Berkeley referral

RECOMMENDATION

The Commission recommends that the City Council develop a referendum and seek approval for it on the 2020 ballot to create a Climate Action Fund, which would support actions to achieve the Berkeley Climate Action Plan, to become Fossil Fuel Free, and to respond to the Climate Emergency.

FISCAL IMPACTS OF RECOMMENDATION

Development of the referendum would involve work time of staff and City Council members, plus members of the public. The Council should survey voters about fundraising options, as part of polling on ballot measures. Adoption of the referendum by voters would result in a new Climate Action Fund of $5 million to $10 million per year to be spent on measures to reduce carbon pollution.

CURRENT SITUATION AND ITS EFFECTS

On June 12, 2018, the Council adopted a goal of creating a “Fossil Fuel Free Berkeley” and a “Declaration of a Climate Emergency,” which together reinforced the Council’s desires to make Berkeley a global leader on reducing the threat of climate change.

Rising greenhouse gas concentrations in the atmosphere are leading to rising global average temperatures and greater incidence of drought, wildfire, extreme weather events, and other impacts. Berkeley is a significant contributor to greenhouse gas emissions, due to heavy reliance of its citizens on gasoline and diesel vehicles, natural gas in homes and businesses, consumption of goods with high levels of “embedded emissions” from manufacturing and distribution, and other sources. New technologies, along with changes to infrastructure and human behavior, offer significant potential to cut fossil fuel use and carbon emissions in Berkeley.

The Energy Commission submitted to Council “Recommendations for a Fossil Fuel Free Berkeley” in January 2019, in response to the Council’s Fossil Fuel Free Berkeley proclamation and Declaration of a Climate Emergency. In that report, the Commission recommended, among other things, that the Council put a referendum on the November

2020 ballot that "would include binding mandates and specific priorities for emissions reductions." This recommendation provides further ideas about the content of that referendum.

At its meeting of February 26, 2020, the Energy Commission voted to recommend to the City Council that a referendum be placed on the ballot to ask voters to create an ongoing funding stream for carbon reduction activities, called a Climate Action Fund, with annual revenues of $5 million to $10 million. (Moved by Paulos, second by Stromberg. Ayes: Zuckerman, Bell, Weems Paulos, Stromberg, O'Hare; Nays: None; Abstentions: None; Absent: Schlachter Leger, Gil; 6-0-0-3).

The key issues for Council to explore are 1) how to raise revenues for the Fund, and 2) how to spend the funds. The Council should initiate a public process to explore funding and spending options. The Commission recommends the following principles: Revenues for the Fund should be raised in accord with the "polluter pays principle," such as by imposing a higher price on fossil fuels, and as progressively as possible, with reduced burdens on low-income citizens. Preliminary ideas for funding sources include:

- An increase in the Utility Users Tax (UUT) for natural gas consumption, along with a reduction in the UUT for electricity, to encourage switching from a fossil fuel to renewable electricity;
- A tax on "transportation network companies" like Uber and Lyft, who have caused a drop in transit use and an increase in carbon emissions and traffic congestion, and on delivery services and fleets;
- Taxes aimed at internal combustion vehicles, such as a tax on gasoline and diesel fuel, vehicle registration fees, oil changes and smog inspections; and
- An increase in parking fees and a tax on privately-owned parking lots.

Funds would be administered by City offices with input from current Commissions or a new expert panel, similar to the panels that guide funding for the Sugar-Sweetened Beverages Tax and Measure O. The Fund would be spent on activities that reduce climate emissions, as described in the Berkeley Climate Action Plan. Funds would be used to fill gaps in regional, state, and federal policy, and leverage local, state, federal, philanthropic, and private-sector funds. Proposals for funding would be accepted from businesses, non-profits, and government agencies, and scored based on a) their effectiveness at reducing carbon emissions, b) equity benefits, c) cost effectiveness, and d) local economic benefits. Funds would not be used to backfill existing City budgets. Some potential areas for funding could include:

- Electric mobility and charging infrastructure;
- Renewable energy in homes and businesses;

- Accelerated deployment of bicycle, micro-mobility and pedestrian improvements, such as protected bike and micro-mobility lanes, and safer street crossings; and
- Building electrification and energy efficiency.

Funding allocation strategies would be reassessed annually. Berkeley would join other communities with similar voter-approved funds, including Boulder, Colorado; Athens, Ohio; and Portland, Oregon.

BACKGROUND

The City of Berkeley adopted the Climate Action Plan in June 2009. While the City has made good progress in some areas, it has lagged overall and is behind schedule in achieving interim goals. In addition, many of the gains have been caused by state and federal policy and market and technology developments, rather than by City actions.

One impediment to greater progress on the Climate Action Plan is the lack of dedicated funding for it. While City departments sometimes implement measures that cut carbon emissions, their budgets do not have line items for climate action, and rarely are actions prioritized solely because of the carbon reduction benefits. Instead, the City's sustainability programs are often forced to seek support from outside funding sources, such as state and philanthropic grants.

Having a dedicated funding source would give the City greater ability to be proactive; to take advantage of local opportunities and create more local benefits; to expand upon or fill in gaps left by state, regional and federal policies; and to leverage outside funding opportunities.

ENVIRONMENTAL SUSTAINABILITY

These recommendations are intended to accelerate citywide reductions in greenhouse gases and reduce the impact of global warming.

RATIONALE FOR RECOMMENDATION

Creation of a Climate Action Fund would increase the City's ability to meet the goals of the Climate Action Plan, the Fossil Fuel Free Berkeley declaration, and the Climate Emergency declaration.

ALTERNATIVE ACTIONS CONSIDERED

The Commission's report to Council on the Fossil Fuel Free Berkeley and Climate Emergency resolutions explored many options. The idea for a climate referendum was included as a "fast track proposal." This memo supplements the previous Energy Commission recommendation.

CITY MANAGER

The City Manager takes no position on the content and recommendations of the Commission's Report.

CONTACT PERSON
Billi Romain, Energy Commission Secretary, (510) 981-7432

Attachments:
1: Fossil Fuel Free Berkeley Report of the Berkeley Energy Commission, January 23, 2019

ATTACHMENT 1

Fossil Free Berkeley Report

Berkeley Energy Commission January 23, 2019

Council Referral

On June 12, the Berkeley City Council passed item 30 “Fossil Free Berkeley” which refers “to the Energy Commission and Transportation Commission consideration of the proposed resolution or similar action to further implement the Climate Action Plan and establish the goal of becoming a Fossil Fuel Free Berkeley, and further consider:

> Establishing a date by which we are committed to being a Fossil Fuel Free City;
>
> Opposing further transportation of oil, gas, and coal;
>
> Fully implementing Berkeley Deep Green Building, raising the citywide LEED certification requirement above the current LEED Silver, and applying the same requirements to newly constructed city facilities, and major renovations;
>
> Requiring all future City government procurements of vehicles to minimize emissions, and establishing a goal and plan for transitioning the city’s vehicle fleet to all electric vehicles;
>
> Establishing a goal and plan for transitioning to 100% renewable energy for municipal operations and a community wide goal of 100% reductions by 2030;
>
> Formally opposing the recent expansion of offshore drilling by the Trump Administration; and
>
> Calling for region-wide solutions to carbon emissions, including rapid adoption of renewable energy sources, affordable densification of cities and low-emissions public transportation infrastructure.”

On June 12, the Berkeley City Council also passed item 49 “Declaration of a Climate Emergency” which refers “to the Energy Commission to study and report back to Council on **a** path for Berkeley to become a “Carbon Sink” as quickly as possible, and to propose a deadline for Berkeley to achieve this goal” ideally by 2030.

This Report is the Energy Commission’s response to Council’s June 12 referrals.

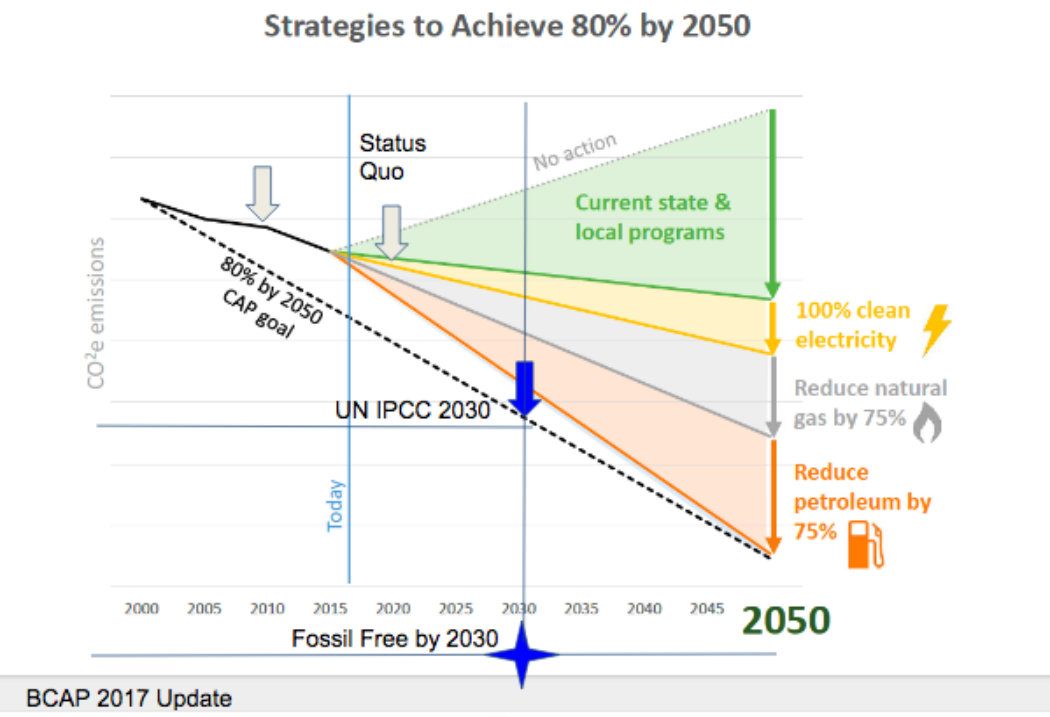
Executive Summary

The City Council's Climate Emergency Resolution lists record breaking climate related catastrophes and urges 'out of the box' thinking for solutions.

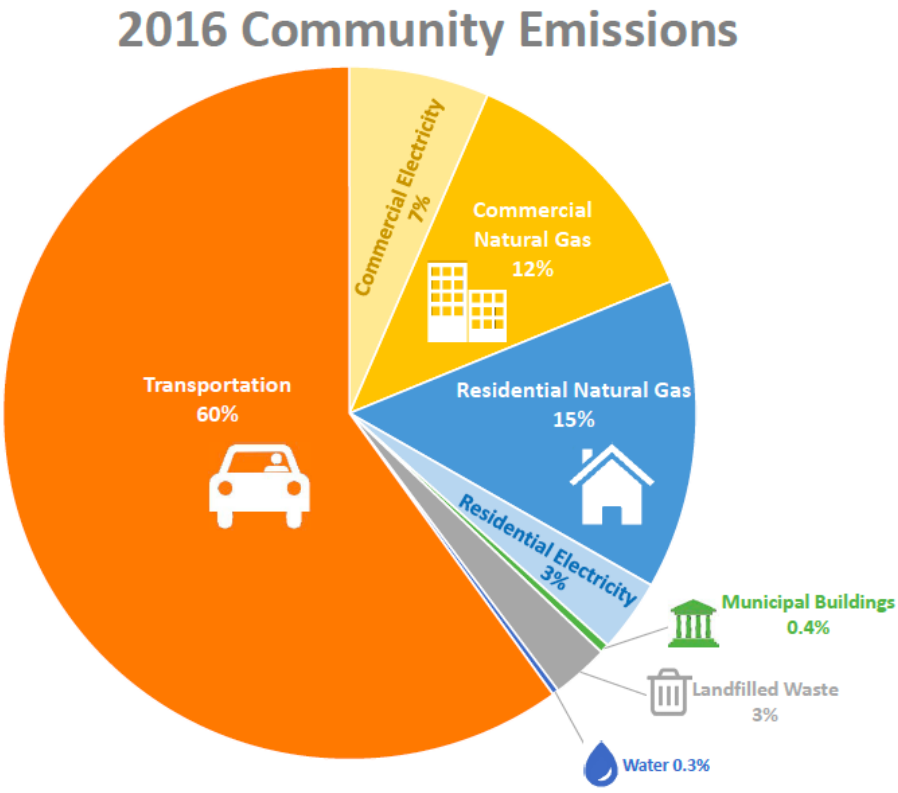
As if intended to support the Council's climate emergency declaration, the UN IPCC issued a heart rattling Special Report (IPCC-SR15, 10/9/2018) noting global temperatures are rising faster than predicted an myriad of cascading effects are happening sooner, and reiterating a worldwide goal to keep warming to no more than 1.5 °C. It asserts Greenhouse pollution must be reduced 45 percent from 2010 levels by 2030 and 100 percent by 2050.

The trajectory of the Berkeley Climate Action Plan's 2020 emission reduction targets, extended to 2030, is roughly in line with the IPCC-SR15 goal. However, according to the city's 2018 Annual Progress Update Berkeley is significantly behind in achieving the Climate Action Plan 2020 reduction goals, let alone extending that trajectory through 2030 as recommended by IPCC-SR15, or doubling down to become 100% fossil free by 2030 as to be considered in the Fossil Fuel Free Berkeley Resolution Council adopted in June.

IPCC and Fossil Free by 2030 goals superimposed on 2017 CAP update



Clearly in order to meet any of these 2030 goals we need a sea change in commitment. Specifically, we must exert the will to honestly accept and meet the challenge we face. The 2018 CAP Update shows where we need to act:



Given statutory limitations on specific authorities held by the City, the Energy Commission is not able to determine a date by which Berkeley could be completely fossil fuel free. However, aiming to be fossil fuel free by 2030 to the fullest extent possible is a compelling goal. Urgency prompts the Commission to recommend aggressively prioritizing options with high early impacts. Lastly, Berkeley will only become a carbon sink if it is also virtually fossil free. The City has little capacity to sequester carbon.

Four Fast Track Proposals

- Opt all East Bay Community Energy accounts to 100% renewable electricity in 2019. This would result in an immediate 10% reduction in GHGs.
- Integrate greenhouse gas (GHG) reduction goals into the objectives and responsibilities of every city department. Amend funding priorities to support this initiative.

- Develop an updated Climate referendum to put before the voters that doesn't soft pedal very challenging proposals and why they are necessary. A successful referendum campaign would provide the platform for massive public education and support Council decision making. This referendum would be submitted to the voters in November 2020 and would include binding mandates and specific priorities for emissions reductions.

- Lead a regional effort to make changes to the Utility Users Tax structure in order to assess taxes on natural gas usage separately from electricity usage. Once complete, the City should submit a referendum to voters that would raise the tax on natural gas usage and dedicate the funds to decarbonization efforts.

Summary of Recommendations

Citywide Transportation

1. Accelerate infrastructure changes to support walking, biking, and small electric and human powered vehicles.
    a. Build all high priority projects in the city's bicycle, pedestrian, and BeST plans including tier 1 projects in the bike plan by 2025.

    b. Re-prioritize road and sidewalk capital expenditures to accelerate changes in favor of walking, human powered vehicles, and other low carbon footprint mobility alternatives.

    c. Add 3 FTE to the Transportation Division to expedite implementation.

2. Adopt financial incentives and disincentives to reduce transportation carbon emissions such as: free transit passes for youth, restricted vehicle access to certain streets, and additional parking fees. Funds raised would be used to support fossil fuel free transportation programs.

3. Explore developing Berkeley shuttle services similar to the Emery Go-Round using EVs.

4. Develop effective communication and education strategies. Continue to expand programs that encourage residents to shift to fossil fuel free modes of transport.

Residential and Commercial Buildings

1. Opt all accounts in Berkeley up to 100% renewable EBCE electricity with a policy of no added cost for CARE customers and an outreach campaign to enroll all eligible customers in the CARE program. This is the most significant immediate thing the city can to do reduce greenhouse gas emissions. A ton of GHG gases eliminated in 2019 is far more impactful in slowing climate change than a ton eliminated in 2025 or even in 2020 because of the impact of positive feedback loops.

2. Expand BESO and include electrification along with energy efficiency. Consider instituting more triggers that require an energy audit, more detailed energy

audits, not allowing the seller to transfer the audit to the buyer, and required implementation of some of the measures recommended in the energy audit.

3. Stop expansion of natural gas infrastructure by prohibiting gas cooktops and dryers in new residences. Place a moratorium on new gas hook ups if possible.

4. Funding options for electrification and energy efficiency upgrades:

    a. Sales transfer tax rebates, similar to the seismic rebate but tied to implementation of BESO recommendations.

    b. A new, very low interest revolving loan fund.

    c. Strategic relaxation of the Planning Code, such as density and/or parking requirements, or accelerated review in exchange for electrification and energy efficiency measures.

5. Develop an effective communication and education strategy that reaches the Berkeley community at large. This strategy should include updating the City's website to reflect the City's prioritization of electrification, and low carbon footprint and low toxic construction. Updated green building information should be easily found on the Permit Service Center home page. The City's website needs to offer clear guidance reflecting the urgency of the climate crisis.

Regional Action

1. Lead a regional effort to make changes to the Utility Users Tax structure in order to assess taxes on natural gas usage separately from electricity usage. The City Council adopted a resolution in favor of this change and is awaiting support from other cities in the region to share the fees PGE would charge to modify the billing. It is time to look aggressively for the necessary funds and initiate the process. Once complete, the City should submit a referendum to voters that would raise the tax on natural gas usage and dedicate the funds to decarbonization efforts.

2. Encourage the Bay Area Air Quality Management District (BAAQMD) to adopt rules with future effective dates to prohibit sale of gas powered appliances. It has used the authority in the past to prohibit the sale of polluting products like high VOC paints and to restrict installation of wood burning fireplaces. Prohibiting sale of gas powered appliances would support electrification.

3. Increase regional and support state efforts to expand availability of low global warming potential refrigerant heat pump space and water heaters for the retrofit markets.

4. Initiate regional policy consistent with fossil free goals for ride hailing services and the introduction of autonomous vehicles. Support state programs that restrict the use of fossil fuel by ride hailing services and autonomous vehicles. Regulate these services to reduce overall per capita VMT.

5. Explore viability of reducing R-1 zoning to increase housing availability, opportunities for home ownership and improve transit access through increasing densification. Such transit oriented development can be adopted

throughout the region to reduce development pressure on open spaces, provide more housing near jobs, and provide the density to support expansion of regional transit.

Analysis

I. Establishing a date by which we are committed to being a Fossil Fuel Free City

Recommendations

1. Consider a new ballot initiative for updating the Climate Action Plan in order to engage Berkeley residents in the comprehensive and ambitious efforts that will be needed.

2. The City should take aggressive, immediate, and sustained action to achieve the goal of a fossil free Berkeley to the fullest extent possible while simultaneously calling for necessary and immediate complementary emergency actions by other local, regional (e.g. MTC/ABAG, BAAQMD, RayREN) state and federal governmental bodies.

Discussion

The Energy Commission believes that the Berkeley Residents who initiated "Fossil Free Berkeley" intend it to apply to the entire city, not just municipal operations. Our comments reflect this point of view.

The two Council items 30 and 49 taken together suggest a goal of 2030 for Berkeley to become fossil free. It should be noted that this is far more ambitious than recommendations by the IPCC and recently adopted state laws[1] which taken together would suggest a goal of 50% reduction of greenhouse gas (GHG) emissions by 2030.

In some ways, Berkeley is better positioned than many cities to take the initiative to make accelerated and meaningful reductions in fossil fuel consumption.

- Unlike many other GHG emissions sectors, techniques for eliminating building GHGs--specifically improving energy efficiency, electrifying remaining energy uses, and using renewably generated electricity--are all commercially available, and can improve comfort and safety and offer property owners economic savings over time. Energy efficiency programs have been around for decades and the city's unique BESO energy audit program helps property owners prioritize efficiency upgrade spending. Because of recent developments in heat pump technologies making electric heat pump space and water heating more than 3 times as efficient as their gas equivalents and the dramatic

[1] SB 100 commits state utilities to provide 60% renewable electricity by 2030, and zero carbon electricity by 2045.
AB 3232 charges the California Energy Commission with assessing how to reduce emissions from the state's building stock by 40 percent below 1990 levels by 2030.
SB 1477 will expand the accessibility of clean heating technologies by promoting them in the market with incentives and training.
Executive Order B-55-18 commits California to economy-wide carbon neutrality by 2045.

increase of renewables on the electricity grid, all electric homes, even without solar panels, can produce substantially less GHGs than natural gas powered ones.

- Berkeley's size, density, mild and dry climate, and mass transit infrastructure make it ideally suited for an accelerated reduction in transportation related GHGs. The recent commercial introduction of vehicle sharing programs and proliferation of small electric vehicles such as electric bikes, scooters, and tricycles solve two of the main long time challenges to rethinking the transportation picture in Berkeley. They dramatically reduce costs of electric transport and offer small scale power assisted options, particularly for hills residents.

  According to the 2017 Bicycle Plan a "2015 survey of Berkeley residents showed 90 percent of Berkeley residents already bicycle or would consider bicycling if the right bikeway facility or roadway conditions were available. That is a larger percentage than any other city that has conducted a similar study, including Portland…."

- Finally, residents voted overwhelming in favor of the Berkeley Climate Action plan in 2006 and are likely to support new targeted programs to accelerate reductions in GHGs.

The challenges to accelerating GHG reductions cannot be overstated. They are technological, political and social. And, the more ambitious the reduction goals the greater the challenges. While Berkeley is better set up to meet a goal of 100% reduction by 2030 than many communities, it is still a very difficult task.

- The vast majority of buildings rely on natural gas for operation. Every one of them will need to be shifted from gas to all electric operation. Every fossil fuel operated vehicle on the roads will need to be eliminated. How do we motivate ourselves to electrify our buildings and give up our fossil fuel vehicles?

- As much as a quarter of Berkeley's past GHG reductions are a result of state programs such as the renewable fuels portfolio standard. To push ahead with an accelerated GHG reduction goal, the city will need to rely on local programs.

- There are real technological hurdles that need to be solved before complete electrification of the California or US economy can occur. It is hoped these problems will be solved by 2030 or much sooner. While they do not prohibit Berkeley from being fossil free by 2030 as an isolated entity, they do drive up the cost for some of the needed technologies, particularly in relationship to vehicles and battery storage. In addition, regional and state governments will be reluctant to set goals without confidence that the technologies are in place to meet them, so Berkeley will likely be out of step with others the more aggressively it pursues accelerated GHG reductions.

Finally, the urgency of the climate crisis requires use of the simplest, cheapest and most available tools at hand to achieve high early results. A ton of GHG gases eliminated in 2019 is far more impactful in slowing climate change than a ton eliminated in 2025 or even in 2020. Because of positive feedback loops, the effects of GHG emissions are amplified. For example warmer, dryer forests burn more which releases more CO2 which contributes to more forest fires. Establishment of new manufacturing facilities and a city scale power company would take decades. It will be far more effective to work with existing programs such as East Bay Community Choice Energy, BESO, and the Berkeley Bicycle Plan.

II. Opposing further transportation of oil, gas, and coal

Recommendations

1. In order to put the brakes on the transport of refinery feedstock and refined products traveling though Berkeley, call for a plan to a responsibly wind down all Bay Area refineries as California demand wanes.

2. Consider a ban on the storage and transport of coal within the City

Discussion

It should be noted that the City of Berkeley has already adopted a more specific position in opposition to transport of oil, gas and coal: joining neighboring communities in September in calling for a ban on coal shipments through East Bay Communities.

Unfortunately, the Federal Government has jurisdiction over rail transport limiting the City's options for preventing travel by rail through Berkeley.

Eliminating transport of fossil fuels would require the shutdown of all Bay Area oil refineries, because their products are trucked to and through Berkeley for cars, trucks, planes and trains operating in the Bay Area. It would also mean that all ground vehicles, including trains would have to be converted to run on 100% carbon-free electricity, and air transport be fueled by bio-fuel or by imported fossil fuels.

Regarding the shutdown of local refineries, Communities for a Better Environment has drafted a California Refinery Study and will soon launch a campaign to responsibly wind down all California refineries by 2035, by requiring annual emission reductions of 5% beginning in 2020. Mayors of Benicia and Richmond, home to the Valero and Chevron refineries, are already making public statements in support of winding down Bay Area refineries. As California electrifies it vehicles, we must ensure refineries are not permitted to maintain or increase refining activities such that fossil fuel exports increase and frontline communities remain subject to the health consequences of this dirty, outdated industrial sector.

III. Fully implementing Berkeley Deep Green Building plan, raising the citywide LEED certification requirement above the current LEED Silver,

and applying the same requirements to newly constructed city facilities, and major renovations

Municipal Buildings Recommendations

1. Immediately convene a citywide departmental summit including Public Works and Planning and Development to establish a timeline and budget for electrifying all city owned buildings and installing solar plus storage at City buildings wherever possible.

2. Review and re-prioritize all funds currently earmarked for capital improvements to facilitate rapid electrification of municipal buildings.

3. Work with East Bay Community Energy to secure grants for solar with storage.

4. Use the 2 x 2 process to coordinate with BUSD in establishing a fossil fuel free goal and providing BUSD with technical and policy assistance to achieve it.

5. Set higher goals for municipal buildings related to indoor air quality, lowered carbon footprint, and all electric as outlined in Berkeley Deep Green Building and Healthy Building Network's HomeFree Spec guidance.[2] In addition to developing expertise that can be shared with Berkeley residents and property owners, these changes would have health, environmental, and economic benefits. The City can decide the standards which municipal buildings must be built or remodeled to. It is our understanding that currently, there is no requirement beyond meeting minimum state building codes.

Residential and Commercial Buildings Recommendations

1. Develop options for expanding the coverage of the current LEED requirements to other areas of the City including mandatory points in certain sections.

2. Strategically relax the Planning Code, such as density and/or parking requirements or accelerated permit review in exchange for electrification and energy efficiency measures.

3. Place moratorium on natural gas cooktops and dryers in new residences or on new gas hook ups if possible.

4. Institute a transfer tax rebate for energy efficiency upgrades and electrification at time of sale.

5. Ensure every plan checker is trained in methods of electrification, and instructed to present that information to property owners at the beginning of the permit application process. In this way, every interaction with property owners becomes an opportunity to educate them on their options for home energy efficiency and

---

[2] https://homefree.healthybuilding.net/reports

electrification and their importance. Building owners need to understand the importance of reducing energy consumption and electrification and to switch out fossil fuel appliances for electric whenever possible.

6. Expand BESO and shift focus to include electrification along with energy efficiency. To be considered are: instituting more triggers that require an energy audit, more detailed energy audits, not allowing the seller to transfer the audit to the buyer, and required implementation of some of the measures recommended in energy audit.

7. Develop an effective communication and education strategy that reaches the Berkeley community at large. This strategy should include updating the City's website to reflect the City's prioritization of electrification, and low carbon footprint and low toxic construction. Updated green building information should be easily found on the Permit Service Center home page. Many architects, builders and homeowners begin the design process online, making key decisions based on information found online. It is critical the City's website offer clear guidance reflecting the urgency of the climate crisis.

8. Work with PG&E to develop a plan for eventually shutting down natural gas service in Berkeley. Priority should be given to areas most vulnerable to the effects of climate change and earthquakes and those where infrastructure has not yet been upgraded to plastic. Funds that would be spent on upgrading gas infrastructure can instead be used for electrifying buildings and under-grounding electrical lines.

9. Consider the development of a long term funding plan such as a very low interest revolving loan fund to assist property owners to decarbonize their buildings.

10. The City should work with the BAAQMD to adopt rules with future effective dates to prohibit sale of gas powered appliances.

11. Increase regional and support state efforts to expand availability of low global warming potential refrigerant heat pumps space and water heaters for retrofit markets.

Discussion

The Berkeley Deep Green Building (BDGB) initiative, adopted by the City Council in 2017, outlines best practices for green building including zero net energy and all electric construction, low carbon footprint and low toxicity building materials, and water conservation. City staff has provided a detailed analysis and review of progress in implementation. See the Energy Commission Agenda from 4-25-18 for copy of this review.

Energy efficiency measures including: low toxic, low carbon footprint insulation, air sealing, and replacing incandescent with LED lights, have long been recognized as important to greenhouse gas reduction. BDGB argues in addition that going all electric is foundational to achieving fossil fuel free goals. Historically energy efficiency standards and incentive programs have been based on the assumption that natural

gas appliances have lower environmental impacts than electric appliances. However, this is no longer the case. The dramatic increase of renewables in supplying electricity and the development of heat pump technologies for space and water heating, which are more than 3 times as efficient as their gas equivalents, have turned this balance around. If the significant fugitive emissions from gas infrastructure and their concomitant climate changing and indoor air quality impacts are added to the equation, the scale definitely tips in favor of all electric buildings.

Natural gas is also a safety issue in Berkeley. The recent gas line explosions around Lawrence Massachusetts are only the most recent in a long line of such incidents. Even though PG&E is working to upgrade existing infrastructure, rising sea levels in West Berkeley and the overdue earthquake on the Hayward fault threaten Berkeley. Electricity infrastructure has its safety issues as well. Money saved on gas infrastructure could be used on improving the safety and reliability of electric power.

One of the stumbling blocks to a fossil free California is energy storage. All electric, energy efficient buildings can be key in addressing this problem by reducing overall energy demand and drawing energy for space and water heating in the middle of the day when it is most abundant and storing it for use in the evening after the sun goes down. As a quarter of all energy used in the home is for water heating, state policymakers and manufacturers are already working on ways to incorporate tanked electric water heaters into energy management programs.

Heat pump space and water heaters are commercially available and can be economical. Recent studies of homes by Rocky Mountain Institute and NRDC[3] have found that all electric construction can be cost effective, especially in new construction where there are significant savings from not installing natural gas plumbing and infrastructure. All electric construction can also be economical in remodels in cases were natural gas equipment is older and needs replacing and where electrification is coupled with solar PV installation.

As the city is largely built out, construction tends to focus on remodels and new construction of high rise apartment buildings. Every effort needs to be made to guide these projects to be all electric. Currently it appears the economics for high rise residential buildings in Berkeley favor electric heating and air conditioning paired with central gas heat for water. Though adding significant cost to construction, some developers will run natural gas to individual units for the perceived increased value of a gas cooktop. It should be noted that building owners who install natural gas heating and appliances now will be left with stranded assets as society is quickly shifting to all electric operation.

---

[3] https://rmi.org/insight/the-economics-of-electrifying-buildings/
https://www.nrdc.org/experts/pierre-delforge/new-report-heating-next-clean-energy-frontier-ca

The biggest challenge in Berkeley is electrifying existing buildings -- particularly where no work is anticipated or no permit is obtained for the work. This is a major source of greenhouse gases in our city and across the state. Several state level assistance programs can help property owners with improvements. However they generally fall short of amounts needed and currently rebates are not available for switching gas appliances to electric.

California has been a leader in improving energy efficiency and expanding renewable electricity generation. Several state laws from 2018 will continue that effort:

- SB 100 commits state utilities to provide 60% renewable electricity by 2030, and zero carbon electricity by 2045.
- AB 3232 charges the California Energy Commission with assessing how to reduce emissions from the state's building stock by 40 percent below 1990 levels by 2030.
- SB 1477 will expand the accessibility of clean heating technologies by promoting them in the market with incentives and training.
- Executive Order B-55-18 commits California to economy-wide carbon neutrality by 2045.

While California has been a leader in improving energy efficiency, state laws and regulations have been slow to guide and in some cases act as barriers to the transition to all-electric construction. Many of these barriers are obscure and buried deep in regulatory policy:

- 3 prong test. The 3 prong test is policy established in the early 1990s originally intended to ensure fuel switching did not occur that caused adverse effects on the environment. At the time it generally meant discouraging shifts from natural gas to electric. However the policy assumptions continue to serve the same purpose even as the climate impacts of the two fuels have completely changed places. This policy is the core of why PG&E will not provide energy upgrade rebates when changing gas to electric heat.
- Title 24 assumptions. Title 24 is the shorthand name for the energy efficiency standards of the California Building Code. These are updated every 3 years and currently include several assumptions that favor gas heating and air conditioning over electric.
- Energy rate structure. Retail prices for natural gas do not reflect the GHG emissions of gas compared to electricity, or the grid benefits of flexible electric loads like tanked electric water heaters.

Of these barriers, only the assumptions in title 24 have begun to shift in PG&E territory. The standards that will go into effect in 2020 will no longer penalize use of

heat pump water heaters in low rise residential construction. However many other assumptions within the new standards will continue to support use of natural gas such as the climate benefits of electricity in the TDV and the lack of credit given to tanked electric water heaters for energy storage.

At the regional level, BAAQMD has the authority to regulate air pollution including GHGs. It has used the authority in the past to prohibit the sale of polluting products like high VOC paints. It could prohibit sale of gas powered appliances to support electrification and elimination of GHG emissions.

Working within state level constraints, planning staff have developed and pushed policies that improve the energy efficiency of buildings in Berkeley and encourage a shift to all electric, carbon free operation. Policies they have developed unique to Berkeley include:

- New non-residential construction and additions in the downtown area need to be LEED Gold or equivalent.
- Free advice and consultation on green building design and strategies.
- Building renovation and new construction over 10,000 square feet needs to have an energy analysis and a completed green building checklist.
- Under the BESO program, at time of sale for residences and more frequently for commercial properties, owners must complete an energy audit of the building.

City staff are pursuing many additional efforts:

- Reviewing the BESO program to improve effectiveness. Scope of review to include requiring energy audits sooner for more properties, expanding the triggers that require an audit to include remodeling, more detailed energy audits including electrification, elimination of the option of allowing the buyer to perform the audit, and implementation of some of the upgrades recommended by the energy audits.
- Expanding heat pump water heater availability through collaboration on BayRen's mid-market expansion grant program.
- Pursuing "reach" building codes for the 2020 building codes that give regulatory advantage to all electric construction. The most important priority for this effort is new multi-unit high rise apartment buildings and major remodels.
- Advocating for state level policies that allow building owners to receive energy efficiency rebates when switching fuels.

- Advocating for removal of all biases against electrification within the state building energy codes including Total Daily Value (TDV) and computer modeling assumptions.

Care should be taken that solutions do not create additional problems. Many building materials are coming under increasing scrutiny for their long trail of environmental and health impacts, such as polystyrene and PVC plastics and organo-halogenated materials. Others have such a high global warming footprint, such as certain foam plastic insulations that their use minimizes the GHG reduction benefits of the projects. The refrigerants commonly used in most heat pumps in the U.S.A. also have very high global warm potential. While heat pumps still have dramatic energy saving benefits over other options, phase out of these chemicals under state Air Resources Board programs will improve their GHG benefits.

IV. Requiring all future City government procurements of vehicles to minimize emissions, and establishing a goal and plan for transitioning the city's vehicle fleet to all electric vehicles

See V. for discussion and recommendation concerning 100% renewable energy for municipal vehicles.

V. Establishing a goal and plan for transitioning to 100% renewable energy for municipal operations and a community wide goal of 100% reductions by 2030.

See III. for discussion and recommendation concerning 100% renewable energy for buildings.

Municipal Transportation Recommendations

1. Assess the city's transportation vehicle needs and develop an aggressive timeline for transitioning to all electric.[4] This assessment would include consideration of: 1) Switching to lower carbon transport options such as electric carts or bicycles where possible and 2) the timing of technology development and commercialization for car batteries.

2. Immediately switch diesel vehicles to run on renewable diesel in the interim until fossil fuel free options are available for the tasks they perform.

---

[4] Ref: San Francisco Ordinance 115-17 Administrative Code Section 4.10-1:

> c) By December 31, 2022, all light duty vehicles in the City fleet must be Zero Emission Vehicles in compliance with Environment Code Section 404, unless there is a waiver. exemption, or applicable exception. detailed in Environment Code Chapter 4.

Citywide Transportation Recommendations

The Energy Commission would like to coordinate recommendations with the Transportation and Public Works Commissions to accelerate a reduction in fossil fuel vehicles in Berkeley. To begin the process, the Energy Commission makes the following recommendations:

1. Re-prioritize road and sidewalk capital expenditures to accelerate changes in favor of walking, human powered vehicles, and other low carbon footprint mobility alternatives. The Council should amend funding priorities to reflect the climate emergency.

2. Adopt financial incentives and disincentives to reduce transportation carbon emissions such as: free transit passes for youth, restricted vehicle access to certain streets, and additional parking fees. Funds raised would be used to support fossil fuel free transportation programs.

3. Develop and implement a transit plan in support of the Climate Action Plan. The transit plan could include detailed accountability metrics such as required dates for identified new routes, dates for replacement of fossil fueled busses and shuttles with electric busses and shuttles, and smaller intra-neighborhood subsidiary transit (shuttles). The city should explore developing its own shuttle services similar to the Emery Go-Round using EVs as part of the transit plan.

4. Add 3 FTE to the Transportation Division to expedite implementation of the city's bicycle, pedestrian, and BeST plans.

5. Build all high priority projects in the city's bicycle, pedestrian, and BeST plans including tier 1 projects in the bike plan by 2025.

6. Develop a communication strategy to inform residents of fossil free and lower carbon footprint personal mobility options and the desirability of prioritizing these options.

7. Continue to develop and expand programs that encourage residents to shift to fossil fuel free modes of transport, such as electric bike and scooter sharing, Waterside Workshop, and Safe Routes to School.

8. Work with State authorities to prohibit operation of autonomous vehicles within city limits unless they are electric vehicles.

9. Use the 2x2 process to encourage the BUSD to develop a plan for phasing out fossil fuel vehicles and supporting families to safely get to and from school without cars.

10. Lobby and work collaboratively with public and private transportation providers and the commercial sector to convert all vehicle fleets to electric power.

11. Support state programs that restrict the use of fossil fuel vehicles by ride hailing services such as Uber and Lyft.

Discussion

One of the greatest challenges we face is how to eliminate emissions from transportation. By far the most promising way to make transportation renewable is with electric vehicles.

The vast majority of fossil fuel powered vehicles operated in the city are owned by individuals and companies and government entities outside of the city simply driving through the city or entering the city for business or pleasure. For the purposes on this report, the fossil fuel free goal will be focused on reducing fossil fueled vehicular traffic on city streets. It should be noted that for Berkeley to be truly fossil free, all ground vehicles, including trains, must be converted to electric power. We recognize the City has no independent way to get Amtrak and freight trains off fossil fuels.

The Commission believes that the goal of 100% emission reduction from vehicles is most likely to happen using batteries. Fuels other than electricity are possible but less likely to be adopted. Biofuels have a limited role because of lack of feedstock availability without associated environmental damage (the food vs. fuel problem).

Electric automobiles are quieter and more economical to operate than gas cars. Although only 2% of new car sales in the United States in 2018 were electric, that represented an 81% increase in sales over 2017. Electric auto sales were about 6% of new cars in California in 2018, and reached 10% in December. Because of their lower operating and maintenance costs, electric cars are competitive in lifetime costs of ownership. Residents of homes without garages (of which there are many in Berkeley), and apartments without charging stations, face a serious challenge to find a place to plug in. We encourage further city action on this.

Another option is hydrogen. To be emission-free the hydrogen has to be produced from renewable electricity or directly from sunlight with a catalyst. The problem is that hydrogen storage is very expensive either as a liquid or as a high pressure gas, both because it is energy intensive and because the container is expensive. Furthermore, the likelihood of leakage is much higher than, say, natural gas and the likelihood of explosive ignition in the presence of oxygen is also much higher than natural gas.

One biofuel that can play a useful role in Berkeley as bridge to electrification is renewable diesel. Renewable diesel though made entirely from vegetable oils is not biodiesel. It is processed to meet the exact performance specifications required for diesel motors. It does not void manufacturer warranties and can be used in any diesel vehicle. The emissions are much cleaner, the carbon footprint is lower and it is cheaper than diesel. While its use should be minimized because of the potential food vs fuel concerns, it can be used immediately in all city diesel vehicles until they can be replaced with fossil fuel free alternatives.

The city already has advocated walking, human powered vehicles, electric vehicles and mass transportation accessibility to all in its 2009 Climate Action Plan. In achieving a fossil fuel free goal, there are important timing issues. Several significant transportation changes are just over the horizon that will dramatically reshape our city street experience including:

- Expanded ride hailing operations such as Uber and Lyft, especially as autonomous vehicle operation is perfected;
- Docked and undocked ride sharing vehicles; and
- Proliferation of varied electric vehicles including electric golf carts, bicycles, tricycles, stand-up scooters, hoverboards, Segways, and wheelchairs.
- Breakthroughs in battery technologies that will dramatically lower the cost and improve performance of electric vehicles.

The city should be careful about engaging in longer term contracts and that decisions be revisited regularly as new technologies mature and the economics change for different transportation modes.

VI. Formally opposing the recent expansion of offshore drilling by the Trump Administration

Offshore Drilling Recommendation

Formally endorse California laws intended to block offshore drilling if it has not done so already.

Discussion

The State legislature has passed and the Governor has signed SB 834 (an act to add Section 6245 to the Public Resources Code, relating to state lands) and SB 1775 (an act to add Section 6245 to the Public Resources Code, relating to state lands). Both Sections are entitled State lands: leasing: oil and gas. These new laws are intended to block the Trump administration's plan to expand offshore oil drilling by prohibiting new leases for new construction of oil and gas-related infrastructure, such as pipelines, within state waters if the federal government authorizes any new offshore oil leases.

VII. Calling for region-wide solutions to carbon emissions, including rapid adoption of renewable energy sources, affordable densification of cities and low-emissions public transportation infrastructure

The Council has rightly included the need for regional coordination to address energy supply, housing and transportation. It's safe to say all Bay Area cities are grappling with these issues in one way or another, with significant disparities among them in both priorities and resources. It will take trust, willingness to move away from a

provincial mentality, leadership from MTC/ABAG and BAAQMD and probably some State action to facilitate deep progress in these areas.

VII.1. Renewable Energy Sources

Renewable Energy Sources Recommendations

1. Opt up all Berkeley's municipal, commercial and residential accounts to EBCE's[5] 100% Renewable electricity with a policy of no added cost for CARE customers and an outreach campaign to enroll all eligible customers in the CARE program in 2019.

2. Partner with all cities in CCAs to influence state legislators, the Governor, and CPUC Commissioners to develop guiding legislation, policies, and rules that support the continued existence of CCAs.

Discussion

It is critical to move toward 100% clean energy generation sources as soon as possible in order to fully realize GHG emission reductions through "fuel switching" from combustion to electricity in all spheres. There is long established worldwide consensus that the path to climate stabilization requires, in this order:

1. Deep reductions in energy demand through conservation and efficiency,
2. Conversion to clean electricity generation, and
3. Massive electrification.

---

[5] A regional approach to increase reliance on renewable energy sources is possible through our new energy provider: East Bay Community Energy (EBCE). EBCE was initiated under a state law passed in 2002 that allowed government jurisdictions to create agencies (called Community Choice Aggregators or CCAs) to purchase power on their residents' behalf as a way to provide energy options to Californians. As a local government agency, EBCE is not for profit and is entirely devoted to the community. Even before EBCE was providing electricity, it was developing a plan to invest locally in energy development. In July 2018, the Board of EBCE adopted a groundbreaking Local Development Business Plan which spells out strategies for local clean energy, energy efficiency, and energy storage projects specifically to help address the environmental, economic, and social justice needs of the East Bay community.

Once established, a CCA is authorized to automatically enroll all accounts in its jurisdiction in the new energy program. Customers have the option of changing the product they are enrolled in or switching back to PG&E. EBCE currently offers three electricity supply products to its residential, commercial and municipal customers:

- Bright Choice - a mix of electricity generated by fossil fuels, renewable sources and large scale hydro, which the State of California does not classify as renewable. It is offered at a slightly lower in price than electricity from PG&E;
- Brilliant 100 - a mix of renewable energy and large hydropower at the same price as PG&E power; and
- Renewable 100 - 100% renewable energy at a slightly higher price.

Both Berkeley (through BESO and other programs) and California (largely through frequent Energy Code updates) have long standing, successful conservation and efficiency requirements. We are national leaders in this and continue to press forward with program improvements and new initiatives. Now that a 100% renewable option is available from EBCE, Berkeley can immediately convert the entire city to clean electricity generation, and turn its focus to the challenge to 'electrifying everything.' Shifting accounts to 100% renewable will reduce community-wide GHG emissions by a whopping 10%.[6]

Under the Climate Emergency Resolution, Council has signaled the intention to act boldly. Berkeley has already fallen significantly behind in achieving it's 2050 GHG emission reduction goal as set forth in the 2009 Climate Action Plan.[7] Opting all its EBCE customers to the Renewable 100 plan is the single most impactful and timely action the City can take in 2019, both because of immediate emission reductions, and to avoid GHG emissions from future increases in demand due to electrification. It is critical to do this now because by the end of 2020, EBCE will be required to sign long term contracts for 65% of its supply portfolio. Once these long term contracts are signed, it will be more difficult for EBCE to shift the sources of its power mix. For these reasons, the Energy Commission recommends that Berkeley move to 100% renewable electricity in 2019.

While EBCE energy mix options were being established last spring, the Berkeley City Council, as did most EBCE cities, chose to enroll all residential and commercial accounts in Bright Choice. Berkeley enrolled its municipal accounts in Brilliant 100. The City of Albany enrolled all accounts in Brilliant 100, Hayward enrolled its residential accounts in Brilliant 100, and the City of Piedmont enrolled all accounts in Renewable 100. We note that ten jurisdictions in Los Angeles and Ventura counties served by Clean Power Alliance (CPA, a CCA) were enrolled in Green Power, its 100% renewable product, as the default. These ten jurisdictions cover a third of CPA's one million customers.[8]

CPA, like EBCE, also has a Community Advisory Committee to help prioritize local renewable energy development and job creation, rebates and incentives. For California's progressive cities and counties, enrollment in 100% renewable energy is a climate action whose time has clearly come. Because 35% of EBCE's power purchase agreements are not required to be long term and electrification will increase demand, we anticipate ample opportunities for EBCE to make significant investments in local

---

[6] Berkeley Climate Action Plan Annual Progress Update, Office of Energy and Sustainable Development, Planning Department, Slide 5, December 6, 2018

[7] Berkeley Climate Action Plan Annual Progress Update, Office of Energy and Sustainable Development, Planning Department, Slide 14, December 7, 2017

[8] Clean Power Exchange, Alliance will provide clean, competitive energy, January 12, 2019 https://cleanpowerexchange.org/alliance-will-provide-clean-competitive-energy/

energy development. As the local development market matures, there will be rolling opportunities to incorporate locally generated power into long term contracts.

There were initial concerns that new EBCE customers would opt out and go back to PG&E. There were also worries that customers would opt out if enrolled in a cleaner mix of energy generation priced at the same or slightly higher cost than PG&E rates. Both of these fears have been shown to be unfounded for the inner East Bay cities of Alameda County. In fact, among all Alameda County cities in EBCE, only the City of Livermore, at 5.56%, has had an opt out rate greater than 2.07%.[9] Piedmont's experience in making Renewable 100 the default level is instructive. As of December 2018, 6.8% of customers opted down to Brilliant 100 or Bright Choice, and only 2.07% opted out and went back to PG&E. The takeaway is that few customers took any action, and of those who did, the overwhelming majority (77.7%) chose to stay in EBCE.

Concerns have also been raised that opting all customers to the 100% Renewable product would harm low-income customers. The Energy Commission recommends that EBCE follow CPA's lead in which "customers in 100 percent renewable energy communities who are enrolled in CARE, FERA or Medical Baseline will get Green Power at no extra charge."[10] We understand that EBCE is reporting strong net revenues which could be allocated to subsidize CARE customers. Alternatively, non-CARE customers could absorb the additional cost. Furthermore, the value of the non-binding nature of the enrollments is that price sensitive customers can opt down. Unlike an increase in property taxes, nonCARE customers who cannot afford to pay any more for power can simply opt down to the lower priced option.

It has recently come to light that Bright Choice power may in fact have a higher carbon content that electricity provided by PG&E.[11] The City Council has the opportunity right now, while the nascent EBCE is locking in long term contracts for power, to opt all accounts to fossil fuel free power to ensure that joining the CCA does in fact reduce citywide GHGs.

The political landscape for CCAs is fraught with heavy opposition from PG&E and its entrenched allies in State government even as they supply electricity that is cleaner and cheaper than their for-profit counterparts.[12] Berkeley needs to partner with all Bay

---

[9] EBCE Enrollment Update, December 5, 2018

[10] Clean Power Exchange, Alliance will provide clean, competitive energy, January 12, 2019 https://cleanpowerexchange.org/alliance-will-provide-clean-competitive-energy/

[11] See comments in: https://www.berkeleyside.com/2018/12/11/why-does-your-december-electricity-bill-look-different

[12] A 2016 UCLA study found that CCAs in California offered 25% more renewable energy compared to the investor-owned utility (IOU) in the same area resulting in an estimated reduction of 600,000 metric tons of CO2 in 2016.

Area cities in CCAs to work with our elected representatives to defeat legislative threats and overcome obstacles at the California Public Utilities Commission. Also, the CCA's themselves need to ensure unity and coordinated responses to initiatives aimed at undermining success.

VII.2. Affordable Densification of Cities

Affordable Densification Recommendations

1. Work with MTC/ABAG, BART cities and counties to reframe and expand Transit Oriented Development concepts to conform with internationally used approaches that look beyond infill at already heavily used transit hubs, and prioritize infill housing everywhere developed in concert with expanded transportation strategies and expanded services (educational, recreational, commercial and environmental enhancement).

2. Work with Bay Area cities and counties to develop a regional funding mechanism to subsidize low income and affordable housing in all jurisdictions.

2. Explore viability of reducing R-1 zoning to increase housing availability, opportunities for home ownership and improve transit access through increasing densification. In addition, support adoption of such transit oriented development throughout the region to reduce development pressure on open spaces, provide more housing near jobs, and provide the density to support expansion of regional.

Discussion

In order to provide affordable densification we need massive housing construction, housing subsidies and expanded transit opportunities. The high cost of living in the Bay Area includes the high cost of construction. If we want to reduce vehicle miles traveled (VMT) and the unhealthy stress of long commutes we must find ways to subsidize housing for average people, because at the present time people living on average incomes who do not already own homes cannot afford to live in the Bay Area either as renters or homeowners, forcing many into ever longer vehicular commutes. This is something that needs to be addressed by both the region and the state. There is too much disparity in wealth across the region for the problem to be completely solved by individual cities.

A desire for walkable neighborhoods and transit access has contributed to gentrification in Berkeley and San Francisco. This new gentrification is fueled by the migration of young professionals from the suburbs to these two cities in particular because they both have ample neighborhood scale services. Remarkably, the median price paid per square foot of living space is no longer significantly higher in most R-1 zones where access to transit is often limited.[13] This indicates that the hunger for the amenities of a more urban lifestyle is widespread. It's quite possible that there is an

[13] (https://www.trulia.com/real_estate/Berkeley-California/market-trends/)

untapped openness to neighborhood-scale services and transit development in existing suburbs too. This possibility needs to be explored. Any such nascent cultural shifts should be identified and reinforced. The suburbs have already absorbed job growth in the form of large business parks. Likewise, rails to trails conversions have acculturated suburban residents to walking and biking where convenient. Managed thoughtfully, initiatives to increase suburban infill housing coupled with increased transit, active transportation options and some small scale services could be welcome developments.

The push for housing densification in the Bay Area has relied on a concept of transit-oriented development (TOD) defined by MTC as [emphases added]:

> "the clustering of homes, jobs, shops and services near *rail stations, ferry terminals or bus stops with high-frequency service*"

defined by BART as:

> "mixed-use, higher density development *adjacent to frequent transit*."

and directed by Berkeley's General Plan to:

> "[e]ncourage and maintain zoning that allows greater commercial and residential density and reduced residential parking requirements in *areas with above-average transit service* such as Downtown Berkeley."

This perspective pre-supposes that densification is not a serious goal beyond existing heavily used transit corridors, or beyond cities that are already dense. Plan Bay Area forecasts the need for 800,000 new housing units by 2040. It seems doubtful that so much new housing can be built only around existing transit lines. Recent state legislation for infill housing fell victim to this kind of limited thinking.

In other parts of the world, TOD includes community scale planning with new transit service in mind, not just placing new homes near existing heavily used transit. We need to expand the mindset of housing development in the Bay Area to one of transit *coordinated* development (TCD). We need suburban infill housing developed in concert with public transit strategies, and educational, recreational and commercial services. Infill housing and transit alone do not address human needs for social, commercial and fitness activities. Enhancement of ecological surroundings is also important. A comprehensive TCD approach would improve the quality of life in many ways, serve as an attractor to development and significantly reduce GHG emissions.

Note that a substantial amount of new housing units in the suburbs will need to be subsidized for the reasons described above. Affordable and workforce housing is critical for every Bay Area city and county. Plan Bay Area has set forth affordable housing goals for the whole region, but so far every city is failing. Taking a comprehensive TCD approach would make such infill projects more relevant and attractive to existing residents.

One action cities such as Berkeley can take is to change zoning restrictions to eliminate R-1 zoning. Berkeley's General Plan institutionalizes R-1 low density housing:

"These areas are generally characterized by single-family homes. Appropriate uses for these areas include: residential, community services, schools, home occupations, recreational uses, and open space and institutional facilities. Building intensity will range from one to 10 dwelling units per net acre, not including secondary units, and the *population density will generally not exceed 22 persons per acre."*[Emphasis added.]

The recent move to allow Accessory Dwelling Units is too restrictive to increase density to the extent needed on the land that is most available. It also preserves privilege, in failing to foster home ownership for additional residents.

Berkeley's R-1 zoning is visually correlated with the legacy of red-lining. Its perpetuation restricts growth in areas with the most open land that could support densification. There is quite a lot of aging housing stock in the Berkeley that needs significant renovation, including in R-1 zones. Under current policies, large houses in R-1 cannot be subdivided to allow for more occupants. As a result when modernized they grow larger and more luxurious, a sort of "deep gentrification." It's well documented, but rarely acknowledged, that such consumption drives GHG emission increases.

If the zoning was changed and subsidies provided, we could see small scale condo development like is happening in areas with higher density zoning, and much lower average household CO2e emissions because all the infill would be natural gas free as well as house more people. We could also reverse gentrification and truly become a city that prioritizes diversity. Increased density in R-1 areas would facilitate increased transit service and car sharing, and reduce congestion in shopping corridors. The fact is, many people actually spend little free time in their homes and gardens, preferring to recreate elsewhere, and even when self or contractually employed, preferring to go to work spaces and coffee shops with other people. Children in R-1 zones don't generally play in their neighborhoods, but are shuttled daily to many activities, increasing VMT. Densifying housing in R-1 areas could eventually prompt further zoning changes along the more major roads already served by public transit leading to infill services and commercial development there as well such as the two small and well used commercial districts in Kensington. The result could very well be both environmentally preferable and lead to an increase in our city-wide happiness quotient. Human happiness is correlated with low economic disparity. Our zoning ordinances should be reviewed to see how they amplify disparity and/or inhibit community happiness and act as a bias toward creating GHGs.

VII.3. Low Emissions Public Transportation Infrastructure

Public Transportation Recommendations

The Energy Commission would like to coordinate recommendations with the Transportation and Public Works Commissions for accelerating a reduction in fossil fuel vehicles in Berkeley. To begin the process, the Energy Commission makes the following recommendations.

1. Work with AC Transit to convert all public transit to EVs.
2. Work with AC Transit and major employers to expand existing bus service and add all manner of appropriately sized bus and shuttle services, including into the suburbs.
3. Work to create dedicated bus/shuttle-only lanes on all bridges, freeways and major streets.
4. Work to normalize ride sharing.
5. Work with MTC, regional transit providers and the state to augment subsidies such that public transit is affordable for all.
6. Lobby the state to regulate ride hailing services to reduce overall per capita VMT.

Discussion

MTC distributes enormous sums of money and wields huge power over regional transportation decisions but has not seriously addressed how the region can mitigate climate pollutants from transportation. As a start we need to press MTC to set clean transportation goals commensurate with the damage to our climate that dirty transportation has wrought and the urgency to make drastic emission cuts by 2030. The goal setting process must include a planning document showing the path to take, and policy commitment to achieve the goals.

The Bay Area's freeways are already some of the most crowded in the nation. As housing affordability has worsened, more people are commuting farther distances to their Bay Area jobs. According to MTC, time spent in weekly traffic in the Bay Area shot up 80% between 2010 and 2016. All this traffic is increasing transportation emissions, with no end in sight. Clearly there is a need for increased transportation options, and they need to be carbon free. To expand clean public transits as quickly as possible, light rail is not likely to play a large role. EV buses and shuttles can be built and routed in the time frame we need.

Given the number of tech workers (living all over the region, including the suburbs) who now take buses to their jobs, it is clear that old ideas about who will use bus transit is completely obsolete.

Like housing, transportation is an equity issue. All driving services, public or private, should be required to provide a living wage to drivers. Likewise, we cannot expand public transportation services without massive investment to assure affordability for all. This is a wealthy region that can afford such investments. Significant wealth generated

in this region is also sent to Sacramento. We need the state to assist in subsidizing the transition to clean, affordable public transit available to all.

On June 12, the Berkeley City Council also passed item 49 "Declaration of a Climate Emergency" which refers "to the Energy Commission to study and report back to Council on a path for Berkeley to become a "Carbon Sink" as quickly as possible, and to propose a deadline for Berkeley to achieve this goal."

Carbon Sink Recommendations

1. Plant more trees.
2. Apply compost (and biochar where possible) to city parks, median strips and generally all planted areas.
3. Support use of low carbon construction materials both in municipal buildings and commercial and residential projects.
4. Support urban farming: for example through recently adopted urban farming policies and also planting suitable edible perennials in public spaces.
5. Support citywide programs, such as the Ecology Center's farmers market program, that give all residents access to fresh, organic, regionally grown foods.

Discussion

Carbon sequestration is an essential component of comprehensive state, national and global efforts to meet climate change reduction goals. The October 9, 2018 UN IPCC report recommends that at least 1000 gigatons of CO2 be removed from the atmosphere and sequestered by the end of the century. A wide range of strategies are being looked at to remove and sequester atmospheric carbon. The most promising strategies, biological sequestration, rely on natural processes, including afforestation and carbon farming. The California Air Resources Board is already providing Cap and Trade funds to support and expand these promising approaches to carbon sequestration.

Because of the density of habitation, Berkeley is unlikely to be able to be a carbon sink until annual emissions have been reduced by about 99%. Citywide CO2 emissions totaled 640,000 metric tons in 2015. With roughly 6 square miles of space not covered with buildings and roads, only a very small fraction of these annual emissions could be offset with biological sequestration.[14]

---

[14] Background for Carbon Sink section:
Carbon sequestering buildings: While using rapidly renewable materials such as wood, straw and bamboo can sequester carbon in buildings, the amount is quickly offset by the vastly greater energy intensity of metals, plastics and concrete required in taller buildings and

While not having significant climate benefits, carbon sequestering strategies such as afforestation and application of biochar to the soil can have health and resilience benefits for the city residents improving air quality and local sources of food.

---

seismically active zones. In Berkeley, the effects of low carbon footprint construction can at best lower the carbon footprint of an individual building, which is important. However, it cannot provide a means to offset carbon emissions in the city generally.

Biological sequestration in soil: It is practical to sequester carbon from the atmosphere in two ways, changing farming practices to capture more carbon in soils, and reversing deforestation. (It is also possible to capture CO2 from the air but because of the low concentration of CO2 in the air, the cost is prohibitive. Sequestering the captured CO2 is also expensive, , requiring either mineralization or pressurization in a natural cavern (think Aliso Canyon) which is not present in Berkeley.)

Berkeley is 10.5 square miles. If 40% is impervious surfaces, then approximately 6.3 square miles would be available for carbon sequestration.

(https://en.wikipedia.org/wiki/Impervious_surface#Total_impervious_area) If the City and its residents were to implement ambitious carbon building land management practices, the land could optimistically sequester 2 metric tons of CO2 per acre annually or about 8000 metric tons of CO2.(Soil Carbon Restoration: Can Biology do the Job? by Jack Kittredge, policy director, NOFA/Mass www.nofamass.org August 14, 2015) This compares to annual emissions of approximately 640,000 metric tons.

Purchasing carbon offsets: Carbon offsets cost between $5.50 and $29 per ton of CO2. Taking the average, it would cost $1.1 mill to offset 640,000 metric tons or about $90 per resident. (https://www.whatitcosts.com/carbon-offsets-cost-prices/) However, purchasing carbon offsets should be discouraged since it transfers money away from Berkeley without addressing our local objective of becoming fossil free.