

# Draft Pleasanton Climate Action Plan 2.0

## Public Comments & Feedback

### Overview

This document compiles and summarizes public comments received on the draft Pleasanton Climate Action Plan (CAP) 2.0. The draft CAP 2.0 was open for public comment on the Konveio online platform November 19, 2021, through December 21, 2021, and the City received 48 comments during this period. The City also received verbal comments through a community meeting on December 2, 2021, Committee on Energy and the Environment hearing on December 15, 2021, and City Council hearing on December 21, 2021. Comments included minor text edits, implementation considerations, and requests to specific strategies and actions.

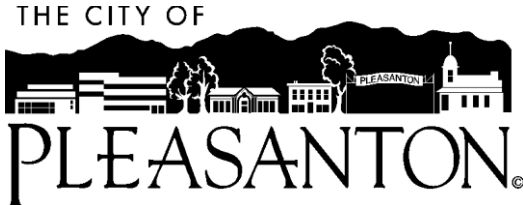
### Key Themes and Summary

Themes from the public comment process and feedback is summarized below with the full text comments attached for reference. The City reviewed, considered, and integrated comments as relevant and appropriate. Most recommendations were integrated into the final CAP 2.0; comments that reflect those received earlier in the planning process were considered at that point in the process.

Topic	Feedback Summary
Buildings & energy	<ul style="list-style-type: none"> <li>▶ Define storage capacity</li> <li>▶ Consider allowing some exceptions for new building electrification</li> <li>▶ Allow new construction to participate in a community-based storage system and facilitate neighborhood microgrids</li> <li>▶ Consider that electrifying buildings is just moving emissions somewhere else, unless electricity is renewable</li> <li>▶ Consider availability of residential solar rebates</li> <li>▶ Consider energy efficiency incentives for rental property owners</li> </ul>
Transportation & land use	<ul style="list-style-type: none"> <li>▶ Remove phrasing of “those without personal vehicles” (reliable access to alternative transportation is important for everyone)</li> <li>▶ Include a metric for percent of residents who work in Pleasanton</li> <li>▶ Encourage residents to walk, bike, use public transit, and telecommute</li> <li>▶ Develop a baseline number of how students get to school (walk, bike, take the bus, or get dropped off in a car)</li> </ul>
Natural systems	<ul style="list-style-type: none"> <li>▶ Explore tree installation in parking lots</li> <li>▶ Apply compost to open lands</li> </ul>
Water	<ul style="list-style-type: none"> <li>▶ Prioritize use of grey water, and add examples of green infrastructure</li> <li>▶ Repave City parking lots with permeable asphalt for rainwater percolation</li> </ul>

**PLEASANTON CAP 2.0**  
PUBLIC FEEDBACK SUMMARY

<b>Topic</b>	<b>Feedback Summary</b>
City leadership & accountability	<ul style="list-style-type: none"> <li>▶ Take more substantial and expedited action; Pleasanton can be a stronger leader on climate action across the state</li> <li>▶ Hire adequate City staff to manage the CAP 2.0 program implementation</li> <li>▶ Measure greenhouse gas emissions more frequently</li> </ul>
Education, partnerships, & funding	<ul style="list-style-type: none"> <li>▶ Partner with schools and prioritize education</li> <li>▶ Use utility bills as educational tools</li> <li>▶ Add more partners to the Plan; partnerships are important and reduce costs</li> <li>▶ Take advantage of grant opportunities and have projects ready to be funded</li> </ul>
Resilience & adaptation	<ul style="list-style-type: none"> <li>▶ Implement community disaster training and communication systems</li> <li>▶ Consider urban heat island effect related to road surfaces</li> <li>▶ Bolster resilience performance sector</li> </ul>



**ATTACHMENT 3 COMMENTS RECEIVED THROUGH ONLINE KONVEIO PLATFORM**

Page	Comment	Comment From
3	Does the City have a standard indigenous land acknowledgment? This would be an appropriate place for it. See UC-Berkeley's which specifically identifies the Verona Band (i.e., near Castlewood): <a href="#">link</a>	Todd Nelson
5	Maybe change without a 'vehicle' to a 'privately owned' vehicle	Jay Galvin
6	P2. The plan does not explicitly say how rental property owners will be incented to improve energy efficiency and electrify. Since renters typically pay the utilities, specific action is needed for the 30% of Pleasanton residents who rent. Could the city require rental property owners to disclose the relative efficiencies of their properties? For example, could they be required to disclose their BayRen Home Energy Scores, or their PGE 'Your Home vs. Similar Homes' energy usage.	Michael Connolley
6	P4. Requiring solar and storage on new homes will make a small number of individual homes more robust. Could Pleasanton take this further by facilitating neighborhood microgrids (in those neighborhoods that want to participate)? The read that the Oakland Ecoblock Project is piloting this.	Michael Connolley
12	I really like this graphic depiction of CAP 2.0 vision in concrete and digestible terms.	Terry Chang
23	Replace gas-powered landscaping equipment with electric (plug-in or battery)	Bruce Daggy
23	Add link to sign up for automatic leak detection program	Bruce Daggy
23	Reducing meat and dairy seems like an unsustainable idea. The US consumers very large amounts. What is the substitute? I've seen recommendations of eating fish, but the oceans are already overfished. Or is the idea to eventually	James Bohannon

Page	Comment	Comment From
	<p>become vegan? Is that truly a scalable and healthy alternative? I'd like to see more science of the scalability of non-meat-and-dairy diets before pushing them as preferred diets. From what I have read, the risks of malnutrition rise with more restrictive diets. And we must be concerned with food security as well. More diverse diets with more concentrated nutrition that is easier to preserve (with preservatives and freezing/refrigeration) may provide better security by storing large quantities of food for those emergency situations when needed, both at home and nationally in warehouses. And what about all the arguments against fruits and nuts? I've read complaints that it takes 90 gallons of water to grow a single avocado, and lots of water for almonds and other nuts. So if we have cut back on those foods, too, what's left? Water matters as much in California as carbon footprints do. I am concerned about pushing for ever more restrictive diets. It just doesn't seem scientifically sound when all the variables are considered together.</p>	
23	<p>Further to the point about considering the impact of water usage on the types of food consumed and whether they are produced locally, it may make sense to take into account the distribution of natural resources, particularly water. When California imports beef from the midwest, where they have no water shortages, we reduce the impact on water locally. Growing the equivalent amount of protein (whether as beef or as vegetables) requires a similar amount of water, and if this is grown locally, the impact on water locally can be high. The analysis of recommendations of what to eat should take this into account.</p>	James Bohannon
24	<p>Because climate change is so volatile (wildfires today and floods tomorrow; funding today and none tomorrow). It's important for our city to have shelf ready projects, waiting for the right funding source or partner. From my experience Pleasanton has missed out on grant opportunities in the past. In adopting this plan we will need the authority (not quite the right word, but you get the drift) to jump on opportunity.</p>	Jocelyn Combs
29	<p>Employee housing belongs in this diagram somewhere. Otherwise the green bike and trail transportation is purely recreational, and won't cut GHG emissions significantly. Where would staff recommend placing the house icon?</p>	Becky Dennis
30	<p>Why specify "those without vehicles"? Wouldn't viable alternatives be attractive to those *with* vehicles and therefore have greater impact on emissions reduction?</p>	Todd Nelson
30	<p>Let's look at adding services closer to where residents live. For instance Ruby Hill residents have to drive for all of their services. Having neighborhood services (grocery, banking, etc.) within their neighborhood could cut their vehicle miles traveled.</p>	Jocelyn Combs
30	<p>Encourage residents to walk, ride bikes, and drive electrical golf carts around town. Golf carts can be charged during the day, fleets of them can be stationed throughout the town. Anything to get people out of gas-powered vehicles.</p>	Jocelyn Combs
30	<p>Also encourage residents to use transit.</p>	Anonymous

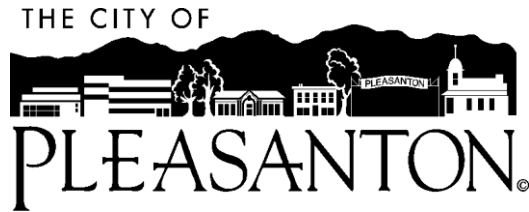
Page	Comment	Comment From
30	Is there a way to make the primary pathway less dependent on single-occupancy cars (even if they are electric)? Transit, biking, walking all have lower GHG impacts than any type of car. Understandable if this is what is achievable for Pleasanton but something to consider for future CAPs.	Anonymous
35	Does this mean "...shifting *heating* from natural gas to electric fuels..."? I wouldn't think any building is generating its own electricity on-site, but rather buying it from PG&E - so PG&E determines the source of electricity. Is this strategy about converting natural gas heating to electric heating?	Todd Nelson
36	Staff and the E&E Commission would draft, for council approval, an "electrification trigger policy". This would require electrification of commercial and industrial buildings (and perhaps residential) when they are sold or expanded or any other trigger that would open the door to this modification.	Jocelyn Combs
36	You may consider the policy for new building electrification that San Louis Obispo has adopted. Although they strongly promote all-electric new construction, they allow some exceptions (like for commercial kitchens) and allow for some mixed-fuel installations as long as the building is pre-wired for future electrification and the building exceeds other energy efficiency standards. See the text of the ordinance here: <a href="https://opengov.slocity.org/WebLink/DocView.aspx?id=122344&amp;dbid=0&amp;repo=CityClerk&amp;cr=1">https://opengov.slocity.org/WebLink/DocView.aspx?id=122344&amp;dbid=0&amp;repo=CityClerk&amp;cr=1</a>	Phil Bowman
37	"Covered Projects" Will all new commercial and residential projects then be emissions free and/or carbon neutral? What about projects that increase VMT and commute related GHG emissions? Can the City require 100% mitigation on these anticipated impacts through developer participation in Pleasanton's other CAP 2.0 programs on site or within Pleasanton's planning area? Can we develop incentive programs to attract projects that will be net neutral?	Becky Dennis
37	Why is the electrification requirement only imposed on new residential construction of at least 2000 square feet? Why not ANY new construction? Suggestion: Reword this to require ALL new residential construction to be compliant.	Phil Bowman
38	Storage systems vary widely in capacity. A residential storage system capable of supporting an hour of power outage is much different than one capable of sustaining a house solely on solar panels continuously. At some point, storage capacity will need to be defined.	Todd Nelson
38	Consider modifying this so that the "covered building" includes any residential projects or additions where the CUMULATIVE size of the additions since the time this policy was enacted exceeds 2000 square feet. This will prevent someone trying to circumvent the rule by doing two separate additions over time where each addition by itself may be less than 2000 square feet.	Phil Bowman

Page	Comment	Comment From
38	Consider allowing an option for electrical storage for new construction: EITHER the new construction include adequate local energy storage (batteries) OR they participate in a community based shared electrical storage system. The community based system may be more affordable and optimizes the number of batteries required when pooled over a larger number of buildings. Tesla is currently piloting a community power-wall storage system in Australia.	Phil Bowman
39	One important indicator of improved sustainability would be a significant increase in the percentage of Pleasanton residents who work in Pleasanton. Providing housing opportunities for the employees of businesses located, in Pleasanton, most of whom earn 60%AMI or less, will do the most to reduce emissions and VMT. Those earning above 80% AMI commute to locations outside the Tri-Valley.	Becky Dennis
39	Was there any discussion of urban heat islands? This would be in support of "adaptation" rather than reducing GHG emissions. The City is currently making our existing streets blacker by resurfacing, thereby making our ambient temperature hotter which worsens the effects mentioned earlier. Other technologies are available for road surfaces but there are trade-offs.	Todd Nelson
40	Does this include the Alameda County Safe Routes to School (SR2S) program?	Todd Nelson
40	remove "those without personal vehicles have" – we should encourage reliable access to alternative transportation for those with and without personal vehicles.	Anonymous
40	Great to see the City working to phase out pollution (air and noise) from gas powered small engines. With the State of California prohibiting sales of small gas-powered engines in 2024, seems like a great opportunity to educate residents on the 'why' and 'how' of phasing out their own use of lawnmowers, leaf blowers, and more. This should include encouraging residents to ask their lawn maintenance service providers to only use electric or manual alternatives, in place of high-polluting gas powered devices.	Jim van Dyke
42	Suggest including an education and promotion campaign to encourage use of bicycles over cars. Perhaps sponsor monthly "bike-to-work" days with incentives.	Phil Bowman
43	Even with Valley Link and BART at capacity, they will only be able to carry a limited percentage of the people who currently commute. Encouraging people to telecommute or, if not feasible, live close to their jobs and commute by EV, foot, or bike, will be necessary to achieve our climate goals.	Jocelyn Combs
44	Can we measure and report numbers for Pleasanton residents who work within Pleasanton? I suspect the balance is quite bad for those commuting in/out vs those who work locally. A baseline metric would be useful.	Todd Nelson

Page	Comment	Comment From
44	Building housing in infill areas will reduce VMT and support active and shared transportation investments. Does this strategy include building more housing? If yes, this should be made more clear.	Krute Singa
44	Transportation and Land Use A measure of succes should be an increased percentage of Pleasanton residents who work in Pleasanton.	Becky Dennis
44	Can we ask the school district to keep a count of students who walk, bike or take a bus vs getting dropped off by car? Having a baseline number would allow us to measure improvement.	Todd Nelson
49	These key indicators seem very difficult to measure. Is there an objective way to measure things like carbon sequestration or total tree canopy growth? Perhaps photo analysis of before and after satellite photos?	Phil Bowman
50	Unless I am mistaken Pleasanton can mitigate (in this case sequester carbon) on land outside our city limits but within our sphere of influence. This would give use more land, landowners and partners for carbon sequestration. Can you check?	Jocelyn Combs
53	I don't see where "Increase use of City Programs" is defined. Please explain this and show associated actions. Or else delete it.	Phil Bowman
56	"Green infrastructure" and "stormwater management" seem like buzzwords. Are they defined somewhere else?	Todd Nelson
56	I'm thinking it's in this section but earlier I had mentioned permitting use of gray water (sinks and shower/bath, etc.) for irrigation. In light of the drought I think it would be wise to move this up as a priority.	Jocelyn Combs
57	While "resilience" and "sustainability" are related, they are not the same. The Performance section shows very little about resilience. Do we need a tri-valley evacuation plan? Do we need an additional fire station closer to fire-prone or remote areas? Do we need different fire-fighting equipment for remote areas? What precautions do we need for radioactivity should Lawrence Livermore lose power or suffer fire damage? Do we need to improve notification in the event of excessive water contamination (PFAS, etc.)? That's what I expected here.	Todd Nelson
59	Use the bottom and back of our utility bill as a monthly update and educational piece, similar to the insert with our garbage bill.	Jocelyn Combs
59	In addition to Todd's comments I highly recommend community disaster training. All of the community. At least annually. Make sure communication systems work	Jocelyn combs

<b>Page</b>	<b>Comment</b>	<b>Comment From</b>
64	Please add two columns to the implementation plan showing the carbon saving for each action item and the likelihood of grant funding. If there is low carbon savings for high cost consider implementing a high carbon saving item instead. However if there is a high like likelihood of grant funds the item could be moved up.	Jocelyn combs
66	Absolutely necessary to have adequate staffing!	Jocelyn combs
67	Please add East Bay Regional Park District, Alameda County RCD, Alameda County Farm Bureau, Lawrence Livermore Lab and Scandinavian lab plus many more. We're all in this together and everyone has a part to play.	Jocelyn combs
72	Every three years for GHG emissions surveys sounds too infrequent to measure how we are doing. What would it take to increase this to every year?	Jocelyn combs
73	"Miles of new infrastructure" is not a defined metric in the Bike/Ped Master Plan. Is this a readily available metric from the City? Regardless, I think "mode share" is a better metric because it covers multiple modes of travel (even though I question the accuracy of that number ...as a member of the Bike/Ped & Trails Committee).	Todd Nelson





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## ATTACHMENT 3: COMMENTS RECEIVED VIA EMAIL

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**From:** Varsha Nene <[REDACTED]>  
**Sent:** Monday, November 29, 2021 7:23 PM  
**To:** Megan Campbell <mcampbell@cityofpleasantonca.gov>  
**Subject:** Re: Draft CAP 2.0

Hello Megan,

Great work by City staff and consultants on this urgent matter in a very thorough format. I missed the deadline to comment on the report but wanted to send some comments here:

1. For Green Space, parking lots of retail & office buildings could be explored to install trees with large canopies to provide shade for cars as well as help reduce GHG. For existing parking lots, city should allow a slight reduction in required parking spaces to convert into spaces to install trees. Medians don't work well for trees since there isn't enough space for roots to grow.
2. City parking lots which need repaving to be installed with permeable asphalt to allow rainwater to percolate into the ground to replenish natural aquifers.
3. Carbon sequestration by applying a thin layer of compost on open lands.  
[www.stopwaste.org/about-stopwaste/news/stopwaste-and-partners-fight-climate-change-with-compost](http://www.stopwaste.org/about-stopwaste/news/stopwaste-and-partners-fight-climate-change-with-compost)

Thank you for your hard work & dedication!

Varsha Nene  
Principal  
Harmony Architects  
[REDACTED]

<http://www.harmonyarchitects.com/>

**From:** Mick Hanou [REDACTED]  
**Sent:** Thursday, December 2, 2021 10:49 AM  
**To:** Megan Campbell <mcampbell@cityofpleasantonca.gov>  
**Subject:** RE: Draft CAP 2.0 - feedback from Hanou

Hello Meghan,

I've been following this over the last few months and thank folks for their efforts.

I may not be able to attend today's meeting but wanted to have some input – which you may be able to share or pass on to the audience.

- |  • BE1 Decarbonization – P1 – Electrification of new buildings for heating is not as efficient as gas. This follows the basic laws of thermodynamics – (science) engineering that can't be disputed. Loss of transmission in moving the electricity is one main reason. But it just takes more electricity to heat something than does gas.
  - **Unless that electricity is generated by solar/wind/hydroelectric, all it is doing is moving CO2 emissions to elsewhere as it would still be generated by gas-fired plants (or worse).**
- |  • BE1 Decarbonization – P2 – I'm glad to see that forcing existing residential buildings to switch from gas to electric is off the Cap 2.0! Really a silly thing to have ever proposed. In addition to the points above, the costs would be prohibitive and basically waste the costs of the existing gas infrastructure.
- |  • BE3 – P4 – Solar – **Has the Cap 2.0 considered that there is now an effort underway to eliminate or reduce residential solar NEM rebates?** (Independent November 25, 2021, page 8). That would totally undermine our efforts towards reducing power generation from Gas Power plants by using solar. **This one is pretty important to consider!**

I've also attached an article in the Economist from April 10, 2021. “**A New Use for Microwaves**”. Though the science is about microwaves, **there are a lot of good points about the inefficiency and cost of converting from gas to electric heating.**

- |  • Page 21 of the [Draft IS-ND](#) is a negative declaration. Although some of the subsections are a bit confusing as to whether they are contributing to the effort to reduce Energy use (6, page 45) or GHG (8, page 54). One heck of a thorough analysis though! Took a long time to go through.

*Has anyone considered giving credits for those of us whose yards sequester 100s of pounds of CO2 that go into our green waste bins? I consider myself close to carbon-neutral, with easily a couple of tons of green waste recycled, roof solar panels, effective retrofit of insulation to reduce cooling bills, use of a small portable heater rather than heating the entire house in the winter, and only one or two fires in the fireplace I have at Christmas – all sourced by wood grown in my yard.*

Take your time answering as I know you are getting ready for the meeting.

Regards,

Mick Hanou

[REDACTED]  
Pleasanton, Ca 94566

[REDACTED]  
(After 9:30am Pacific Time)

Covid-19 vaccines

## Sorting signal from noise

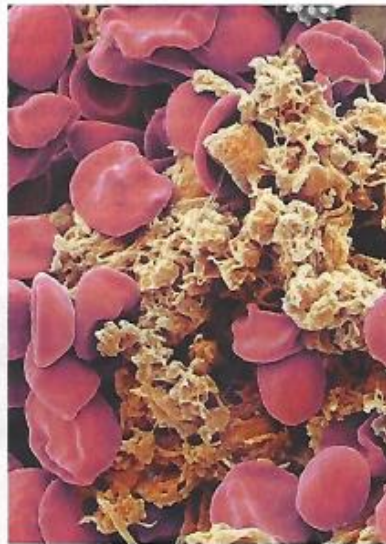
With millions vaccinated, rare side-effects of covid jabs are coming to light

CHRIS WHITTY, England's chief medical officer, vividly recalls a nerve-racking moment on December 8th 2020. That was the day when England became the first country to roll out a covid-19 vaccine, a jab developed by Pfizer and BioNTech. Near midnight on vaccination day one "We were discussing it and just thinking 'What are we dealing with here? These are small numbers and we've already had several dangerous near misses'" said Dr Whitty in a recent talk at the Royal Society of Medicine. In some people, it had turned out, the vaccine sets off anaphylaxis, a life-threatening allergic reaction. But this is rare. It occurred just once among the 22,000 or so people vaccinated in the trial, which could have been by chance. Now, with hundreds of millions vaccinated, the rate at which it occurs is clearer: five per million.

Fortunately, this side-effect is not only extremely rare but shows up soon after the jab. And treatment for it exists. Everyone who receives the Pfizer vaccine is now asked to stick around for 15 minutes, just in case. There have been no deaths from anaphylaxis related to the vaccine.

As millions of jabs of various covid-19 vaccines are administered every day, such rare adverse reactions will inevitably emerge. On April 7th both Britain's health officials and the European Medicines Agency (EMA), which regulates drugs in the European Union, said there is strong evidence that AstraZeneca's covid-19 vaccine may be linked with very rare blood clots, often in the brain or the abdomen. The EMA experts reached their conclusion based on a review of 86 reported cases, 18 of which were fatal. Britain's experts reached the same conclusion from data on 79 cases, 19 of which were fatal. Both the EMA and Britain's drug regulator concluded that the vaccine's benefits outweigh the potential risk of the clots. But Britain's officials, armed as usual with some nifty charts for their televised briefing, said that for people under 30 the risks and benefits from the vaccine were "finely balanced", so a different jab may be preferable.

The investigation of the suspected clots from the AstraZeneca jab has been a prime example of the challenge of sorting the signal of a vaccine's side-effects from the cacophony of medical emergencies that happen to millions of people every day. Vaccine-safety experts have two ways to un-



Platelets at work

caused by a vaccine, says Kathryn Edwards of the Vanderbilt University School of Medicine, in Nashville, Tennessee. They can compare its rate in vaccinated people against the "background" rates of it that are observed in the unvaccinated. And they can look for unusual features of the medical condition being investigated.

The first signals emerged in late February, when doctors in several European countries noticed clusters of blood clots in people recently given the AstraZeneca jab, some of whom died. Most were women under 60, which was not terribly surprising because many EU countries were, at first, not convinced that the jab worked in the elderly and used it largely for essential workers, such as nurses, teachers and social-care workers—professions in which most employees are women.

The EMA's data as of March 22nd suggested that the rate of brain clots in people under the age of 60 who had had AstraZeneca's vaccine was one in 100,000—higher than would be expected normally. Precisely how much higher, though, is hard to tell. The rates of such rare and difficult-to-diagnose conditions vary a lot by country, age and sex. Estimates of the incidence of such brain clots have ranged from 0.22 to 1.57 cases per 100,000 people per year, and they are more common in younger people and women.

As doctors began to look more closely, something curious emerged. Many patients with suspected clots from the vaccine had unusually low levels of platelets. These are fragments of special precursor cells that float in the blood. Their job is to form blood clots (they rush to the site of a cut or other bleeding). Low platelet levels therefore usually result in uncontrolled bleeding, not clots.

With this new information to hand, Britain's medical regulators searched their data on vaccinated people for the unusual tandem of clots and low platelet counts. They found four cases per million people vaccinated, a rate several times lower than in the EU. One explanation is that Britain, unlike the rest of Europe, had used the jab primarily in older people. The rate at which the clots occurred in Britain declined steadily with age. Importantly, Britain's experts found that the clots occurred as much in men as they did in women.

This combination of blood clots and low platelet counts is something that doctors know how to diagnose and treat, says Jean Marie Connors, a haematologist at Brigham and Women's Hospital, in Boston. It resembles a condition seen in some people who are given heparin, a drug used widely to treat blood clots. For unknown reasons, some people develop an immune reaction to heparin, which results in blood clotting so profound that it depletes their platelets. The same reaction appears to be provoked by the vaccine.

Medical societies in several countries have already issued guidelines to doctors on how to spot and treat this rare reaction to the AstraZeneca vaccine. With vigilance and appropriate care, the extremely rare deaths that may result from it will become even rarer. ■

Domestic heating

## A new use for microwaves



If you can have microwave ovens, why not microwave boilers?

DECARBONISING AN ECONOMY is a big job. Coal- and gas-fired power plants must be swapped for wind, solar or nuclear ones. Petrol-driven cars must be replaced by electric versions. Less attention is paid to heating. But in cold countries such as Britain, warming houses, offices and the like consumes more fossil fuel than either electricity generation or transport.

The fuel involved is usually natural gas. This is burned in a central boiler in order to heat water that flows to radiators elsewhere in the building. Britain's government would like to change this. From 2025 gas-fired boilers will be banned in newly built homes. By the mid-2030s installing new gas boilers in existing houses will be banned, too.

The question is what will replace them. Unlike electricity generation, where renewables are proving popular, or cars, where battery-powered vehicles are rapidly becoming established, the market for



▶ green heating is anyone's to play for. The usual suspects (assuming any electricity supplied is generated using appropriately carbon-free means) include electric immersion heaters, heat pumps (devices that work a bit like refrigerators in reverse, in that they extract heat from a building's surroundings and then pump it into that building), and burning hydrogen instead of natural gas. Engineers at a small British company called Heat Wayv, though, think they have another contender: microwaves.

The principle is the same as in a microwave oven. Many molecules, water included, are electrically dipolar. This means they have a positive charge at one end and a negative one at the other. They will therefore rotate to align themselves with a strong electromagnetic field. If that field is oscillating, as is the case with electromagnetic radiation such as microwaves, then the molecules themselves will oscillate too—bumping and jostling their neighbours as they do so, and thus creating heat.

But there is more to building a microwave boiler than simply repurposing the parts used for an oven, says Phil Stevens, one of Heat Wayv's founders. Most microwave ovens employ magnetrons—chunky devices built by surrounding a cathode with a carefully shaped anode that is designed to produce electromagnetic radiation of a specific frequency. With the help of a pair of big chipmakers, Heat Wayv has come up with a solid-state device that performs the same job, but which fits on a 10-square-centimetre silicon chip.

Arrays of these devices beam microwaves into water in a boiler, heating it up. The pipes that carry the water are also made of microwave-sensitive materials, as is the insulation that lags them. And a heat exchanger recycles residual waste warmth. The upshot, says Mr Stevens, is a boiler that is about 96% efficient. The best existing gas boilers rarely exceed 90%.

Efficiency matters, because the move away from gas may mean higher heating bills. Electricity generated from fossil fuels is necessarily more expensive than the fuels themselves. In Britain, at the moment, a given amount of energy delivered as electricity costs three or four times as much as the same amount delivered by natural gas. Switching to renewables is unlikely to change that much. Though the "fuel" involved (wind or sunlight) is free, other costs are often higher than for conventional power stations. Forced by law to switch from gas, then, customers will surely have their eyes on the cost.

Heat Wayv argues its technology offers advantages over rival methods. Immersion heaters must run continuously to deliver water at a suitable temperature. That often warms water which is never used. By contrast, and like existing gas boilers, microwaves heat water quickly enough to pro-

vide it only when it is needed.

Heat pumps, too, have drawbacks. Their efficiency plummets on cold days, when they are needed most. They are also bulky. And they generate water that is warm rather than hot, often requiring the retrofitting of bigger radiators or underfloor heating.

Hydrogen, meanwhile, must either be extracted from natural gas or created by running electrical currents through water. Both processes are inherently inefficient

and the former is hardly green. Also, the infrastructure needed to produce and deliver hydrogen in quantity does not yet (and may never) exist.

Heat Wayv hopes to be producing microwave boilers for sale by 2024, in time for the first stage of the government's ban. Mr Stevens says the idea has attracted interest from most of Britain's big housebuilders. Soon, perhaps, microwaves may heat people's water as well as their food. ■

Particle physics

## Model misbehaviour

For the second time in a month, an anomaly in the laws of physics has been noted

**“WHO ORDERED that?”** This was the reaction, famous in particle-physics circles, of Isidor Isaac Rabi to the discovery of the muon. Rabi, a Nobel laureate who helped America develop the atom bomb, was reflecting physicists' general surprise that muons, which are, to all intents and purposes, just heavy and unstable versions of electrons, actually exist. To an orderly physicist's mind they somehow seemed superfluous to Nature's requirements.

Establishing the muon's nature was, though, an important part of the creation of what is known as the Standard Model of particle physics. This, along with Einstein's general theory of relativity (actually a theory of gravity), is one of the two foundation stones on which modern physics is built. Yet the Standard Model is known to be incomplete for several reasons, one of which is precisely the fact that it does not yet embrace gravity. So it seems fitting that an answer to Rabi's question, and with it a path to an explanation of physics beyond the Standard Model, may now have been opened

by a measurement made on muons.

The study in question, called Muon g-2, used a superconducting storage device (pictured) to look at the magnetic behaviour of muons. Experiments conducted with this machine at Brookhaven National Laboratory, in New York state, in the 1990s, had suggested an anomaly in such behaviour—a deviation of about 0.1% from theoretical predictions about the way that muons should spin in magnetic fields—but without sufficient statistical power to be sure. If this anomaly were real, it would suggest that an unknown force was tugging on the muons in the experiment.

To have another go at finding out, the storage device was shipped to Fermilab, outside Chicago, in 2013. There, it was linked to equipment which gave it more oomph. This boost has, indeed, confirmed the previous result—though irritatingly not quite unambiguously enough for physics' finicky requirements. These demand “five sigma” of significance (five standard deviations from the mean, for the mathematically inclined). The new data, added to the old, and announced on April 7th, give only 4.2 sigma. That, nevertheless, suggests there is only one chance in 40,000 that the result is a fluke.

This is the second time in a month that a group of physicists has published a result which might lead beyond the Standard Model, for on March 23rd researchers on a project being conducted at CERN, home of the Large Hadron Collider, the world's largest particle accelerator, pulled a similar surprise. Their work involved the decay of particles called B-mesons into electrons, muons and their antimatter equivalents. Again, the details are not yet quite as statistically robust as might be desired. But two such findings in short order give hope that the hunt for physics beyond the Standard Model may soon run its quarry down.



A magnetic moment

**From:** Corrina Gould <[REDACTED]>  
**Sent:** Sunday, December 5, 2021 8:57 PM  
**To:** Megan Campbell <mcampbell@cityofpleasantonca.gov>  
**Subject:** Re: AB 52 Climate Action Plan Update for Pleasanton

Thank you for reaching out to the Tribe about the proposed project. At this time the Tribe has no further information to supply about the proposed site for this plan. As always we encourage developers in our traditional territories to remain cognizant of the facts that our tribal people lived all over the Bay Area and because of colonization and genocidal practices that reached into the late 19<sup>th</sup> century and early 20<sup>th</sup> Century, it is not always possible to know for certain if you may find cultural resources or burials at sites where you anticipate ground disturbance. The Tribe wishes to be contacted if there are any findings.

**'Uni (Respectfully),**

***Corrina Gould, Tribal Chair***  
Confederated Villages of Lisjan Tribe



December 21, 2021

Re: Item #17 CAP 2.0

Dear Mayor Brown and Councilmembers.

First, kudos to Becky Hopkins and Megan Campbell for the skillful ushering of this plan for the last two years, especially this year, through the public and City processes. As written, it is very responsive to the comments that have been received. Also, a shout out to the Committee on Energy and Environment. They are engaged, thoughtful, energetic, and ready to start the work of implementation.

I'd like to focus on implementation.

City Leadership and Accountability:

CAP2.0 touches every aspect of what the City does, and every department, and every guiding document. In fact, the revised plan states that the City *will* implement every element, there are no more might's, could's, or hope's. It will live in the City Manager's office and the City Manager will allocate and balance staff. It is critical to success of the plan that CAP2.0 have the necessary staff. I recommend a full time Project Manager, someone accountable for all the moving parts. And there are many, including managing and balancing the projects, data collection, research, partner and public outreach, and grant writing among others.

Partnerships: Our partners, and there are many, are one huge key to implementation. Partnering reduces cost, shares resources and information, and lightens the load. We are all in this together. Please keep your ears open with your counterparts on boards and commissions for partnering and funding opportunities.

Funding: Grant opportunities, either solo or with partners, from government or the private sector, are out there. Using OPM (other peoples' money) is a quick way to fund projects. I have heard that Pleasanton has missed out on grant opportunities in the past. It is critical that we be nimble and flexible in applying for funding before we lose out to other cities. What are we missing? What will it take to fast-track grant applications?

Finally, the plan states that the greenhouse gas from transportation accounts for 64% of our total emissions. Tying our Housing Element to the CAP2.0 has given us the opportunity to house more people who work in Pleasanton but now commute, which will move us most quickly to our goal of carbon neutrality.

Thank you,  
Jocelyn Combs