

Robert Gray

Subject: FW: REACH Discussion - please add to council packet
Attachments: Marginal Emissions Rate from building Electrification.pdf

From: Robert Lipp <ebob@2lipps.com>
Sent: Thursday, December 12, 2019 1:58 PM
To: Marico Sayoc <MSayoc@losgatosca.gov>
Cc: Council <Council@losgatosca.gov>; Town Manager <Manager@losgatosca.gov>
Subject: Re: REACH Discussion - please add to council packet

Ms Sayoc,

At the last council meeting I contended that we cannot both purchase clean energy and have it delivered to our homes. I also contended that full electrification will delay retiring inefficient gas fired plants.

You chastised me for these claims long after I had left the podium rather than engage me while I was up there.

Please review the attachment. It is a chart of the projected marginal green house gas (GHG) emissions generated by electrification in 2030. Marginal emissions are the only technically sound way to evaluate electrification. Note that electrification doubles GHG emissions compared to direct natural gas combustion for most of the day.

The report's unspoken agenda is clearly to create a narrative to support electrification, so these numbers are as low and optimistic as they could make it and still be creditable.

I hope this will help you better understand one of the nuances of your proposed REACH ordinances. If you have further concerns, I will be at the next council meeting and will be happy to discuss either formally or informally.

Thanks and Regards,

Robert Lipp

Marginal GHG Emissions Rate from building Electrification.

Note the marginal GHG emission rate of using electricity is typically twice that of combusting natural gas for most of the day.

The marginal emission rate is the environmental cost of adding an additional MWh of electricity to the base load.

Using your electric stove at 6PM (19th hr) generates over twice the amount of CO₂ gas than burning natural gas. Multiplied by relative efficiencies (these numbers are in this report) there is little to no difference between gas and electricity.

The marginal emissions rate is reported in metric tons of CO_{2, eq}/MWh. Figure 8-1 shows the average calculated emissions rate for each month and hour in 2030.

	Hour of Day																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Jan	0.33	0.33	0.34	0.33	0.34	0.36	0.39	0.37	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.35	0.33	0.36	0.38	0.37	0.36	0.35	0.34
Feb	0.34	0.34	0.34	0.34	0.34	0.37	0.40	0.30	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.38	0.40	0.40	0.38	0.36	0.35	0.34
Mar	0.27	0.28	0.29	0.28	0.31	0.34	0.25	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.33	0.35	0.35	0.35	0.33	0.32	0.29
Apr	0.18	0.21	0.22	0.20	0.27	0.32	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.17	0.37	0.29	0.28	0.23	0.27	0.25
May	0.26	0.27	0.27	0.27	0.33	0.29	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.25	0.38	0.39	0.35	0.29	0.31	0.28
Jun	0.23	0.24	0.23	0.26	0.30	0.24	0.09	0.01	0.01	0.02	0.01	0.00	0.00	0.01	0.05	0.08	0.08	0.19	0.29	0.37	0.29	0.27	0.29	0.26
Jul	0.34	0.34	0.34	0.34	0.35	0.36	0.33	0.12	0.07	0.10	0.12	0.09	0.05	0.03	0.02	0.02	0.20	0.32	0.36	0.37	0.36	0.36	0.35	0.34
Aug	0.35	0.35	0.36	0.35	0.37	0.39	0.35	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.36	0.39	0.34	0.38	0.39	0.37	0.36	0.36
Sep	0.38	0.37	0.37	0.36	0.38	0.41	0.37	0.21	0.02	0.04	0.00	0.00	0.00	0.00	0.02	0.16	0.36	0.39	0.40	0.39	0.41	0.39	0.37	0.37
Oct	0.35	0.35	0.35	0.35	0.36	0.40	0.42	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.39	0.45	0.43	0.42	0.39	0.37	0.36	0.36
Nov	0.33	0.33	0.33	0.34	0.35	0.36	0.37	0.29	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.35	0.36	0.36	0.36	0.36	0.35	0.34	0.33
Dec	0.33	0.34	0.35	0.34	0.35	0.37	0.40	0.37	0.17	0.00	0.00	0.00	0.00	0.00	0.02	0.12	0.36	0.38	0.39	0.38	0.36	0.35	0.34	0.34

Figure 8-1 Heat map of the assumed marginal emissions rate (metric tons of CO_{2, eq}/MWh), averaged by month and hour in 2030.

https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf

For reference, natural gas combustion generates 0.18 metric tons CO_{2,eq}/MW.

The source material for this study is not available. From the discussion, the methodology and modeling is very suspect in favoring electrification (which is the whole object of the report) and therefore probably optimistic.

For example, one questionable assumptions is it assumes there is always a glut of solar energy in the middle of the day - even on hot summer days and dark cloudy wintry days.

Robert Gray

Subject: REACH Discussion - please add to council packet

From: Robert Lipp <ebob@2lipps.com>

Sent: Thursday, December 12, 2019 2:47 PM

To: Council <Council@losgatosca.gov>; Town Manager <Manager@losgatosca.gov>

Subject: REACH Discussion - please add to council packet

Dear council members,

I seem to have convinced no one with my arguments about the imperfections of REACH for full electrification. But I would still like to help by pointing out at least one serious technical weakness in the current proposal.

In Section 4.106.4.1, most of the original draft regulation by the State was deleted and replaced. A requirement for a raceway for the EV hookup was deleted and replaced by a requirement for a 40A connection. This is just wrong!

This low power 40A connection was standardized for backward compatibility with conventional 200A service drops. It is completely inadequate for the future. Without a raceway, it is difficult and expensive to upgrade. I cannot even begin to imagine why someone would think it was a good idea to lock in an obsolescent connector for a new service installation.

The requirement should have been to change the 1" raceway to a 1.5" raceway, not delete it. It is trivial to pull cable through such a raceway, upgrading it as desired.

I think your added requirement for two EV plugs will already require a larger service drop. This service drop should preferably be 200A 3-phase if available, 400A single phase if not.

Why these suggestions? Future EVs will certainly be outfitted with faster charging options. A 100A EV connection will charge a vehicle 2.5 times faster. A 60A 3-phase connection will charge a vehicle 4.5 times faster. This is not just a matter of convenience.

Firstly, the vehicle can be charged rapidly during times of solar power gluts at very low cost, thereby preventing wasting such excess power.

Secondly, in the next 10-20 years base generating plants, gas and nuclear, will be retiring. This will create a shortage of overnight power. Overnight charging will go from cheap to expensive, making quick charging during the day imperative. Overnight charging may even be banned if the mismatch grows too great.

Thirdly, I believe vehicles will evolve to become closely integrated with the grid, using their batteries for offline power storage. This will only be successful if the batteries can be charged and discharged rapidly. Just think, your idle car sitting in the garage buying cheap energy and selling high, both making you money and performing a community service. They may be supplying that overnight base power.

Lastly, 3-phase power is slightly more efficient than single phase, making heat pumps both cheaper and more efficient.

BTW - I am quite disturbed with the urgency to pass this new ordinance without a good technical vetting, rather than take the time to get it right. A much more serious technical review was needed rather than depend on the unvetted San Jose regulations. The council as much as admitted they are doing an inadequate job by pressing counsel on how easily it could be amended later.

Thanks and Regards,

Robert Lipp