C.E.H.A.J.
coalition for environmental health and justice

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December 19, 2023

**Re: LB-ELA Taskforce Draft Investment Plan- Caution Against Blanket Endorsement of Hydrogen Projects**

On behalf of the undersigned organizations and members of the Coalition of Environmental Health & Justice ("CEHAJ"), we write to express our deep concerns regarding the potential safety, climate, and health impacts from hydrogen-related outlined in the current list of investment projects. (See **Attachment A**). Over the past two years, we have worked with staff to develop what has been touted as a "re-envisioning" of investments for the 710 corridor to promote greater equity in impacted communities and repair the racist legacy of freeway building.

As Metro prepares to present its draft investment plan to the Metro Board next month, we are alarmed by Metro's swift endorsement of hydrogen as a "zero-emissions" solution without adequate scrutiny or robust community engagement. Our concerns stem from the dearth of information about these projects—raising serious questions about the potentially harmful effects of hydrogen production, transportation, and end-use on already impacted communities.

We urge Metro to stay focused on its promise to deliver on community stakeholders' vision for mobility that **advances equity and sustainability**. In this letter, we propose the following recommendations for Metro's Draft LB-ELA 710 investment plan as it relates to zero-emissions transportation along the corridor:

- **Prioritize Funding for Battery-Electric and Catenary Zero-Emissions Transportation:**
  - Allocate resources to projects that promote available battery-electric and catenary zero-emissions transportation.
  - Develop a Metro Board policy that prioritizes investments in battery-electric, catenary, and/or catenary/battery technology and infrastructure.

- **Recognize Limited Applications of "Green" Hydrogen:**
    - Acknowledge that "green" hydrogen's limited sector applications extend beyond the scope of this investment plan.

CEHAJ has been consistent in its calls for change along the 710. We have been consistent in our demands for greater protection of public health for impacted residents, the deployment of only truly zero-emissions solutions, non-displacement, opportunity for high-road jobs for local residents, and community-centered decision-making with impacted communities as co-designers of a plan to help repair past harms. To advance a vision that centers on equity and sustainability, Metro needs to align its commitment to zero emissions with solutions that electrify transportation while minimizing harm to the community.

## I. Hydrogen Presents Risks Too High to Endorse Through this Investment Plan.

There are some members of the Task Force who are enthusiastic about using hydrogen in multiple sectors of the economy and are requesting funding from various sources. This enthusiasm fails to recognize how leveraging Metro's limited funding to support hydrogen projects will perpetuate the environmental injustices which have plagued these communities. Testing dangerous, poorly studied hydrogen gas infrastructure in communities that already suffer from the 710 corridor's toxic legacy is unacceptable. Our concerns about endorsing hydrogen projects are grounded in the risks associated with various production methods, upstream impacts, storage, and transportation. It is critical to consider the significant environmental and public safety risks associated with such projects. We cannot afford to disregard the well-being of communities who have historically borne the brunt of environmental pollution.

Ignoring these impacts also risks perpetuating the fossil fuel industry, directly contrary to the Long Beach-East Los Angeles Corridor's Vision Statement, Equity and Sustainability Guiding Principles and Air Quality, Environment and Community goals. Currently, more than 95% of hydrogen production comes from fossil fuels. As a result, nearly 830 million tons of CO2 are generated per year to produce only 74 million tons of hydrogen.[1] The primary process for making hydrogen heavily relies on methane gas, and both the upstream production of methane and its conversion to hydrogen leads to the release of carbon dioxide, methane, and other pollutants.[2] These by-products are not harmless and pose a further threat to communities already impacted by the industry and freight along the corridor. Globally, hydrogen production is

[1] Massachusetts Institute of Technology, *Hydrogen Explainer*, Climate Portal, https://climate.mit.edu/explainers/hydrogen (last accessed December 13, 2023).
[2] United States Department of Energy, Office of Fossil Energy, *Hydrogen Strategy: Enabling A Low-Carbon Economy* (July 2020), https://www.energy.gov/sites/prod/files/2020/07/f76/USDOE_FE_Hydrogen_Strategy_July2020.pdf (last accessed December 13, 2023).

having a significant impact on the climate as it produces more greenhouse gas emissions than the entire country of Germany.[3]

Hydrogen–the smallest and lightest molecule–is prone to leakage and can add to the problem of climate change and undermine the efforts of states and regions to reduce greenhouse gases that are harmful to the climate and communities. When hydrogen is introduced into the atmosphere, it can contribute to climate change by prolonging the life of greenhouse gases such as methane.[4] This prolongation of GHG life is likely to undermine efforts to reduce their emissions elsewhere. Hydrogen is a greenhouse gas that is at least five times more potent than carbon dioxide on a 100-year timescale and much higher on shorter timescales, which are highly relevant to our current climate crisis.[5]

End uses involving hydrogen combustion may result in hazardous amounts of Nitrogen Oxide (NOx), a pollutant known to cause ozone.[6] This pollutant disproportionately impacts health in communities that are already overburdened in our region. In fact, it can produce up to six times more NOx emissions than burning methane.[7] The pollution caused by NOx has severe health consequences, including respiratory illness and asthma. It is also a precursor to particulate matter and ozone[8] which we already know has a disproportionate impact on vulnerable communities along the corridor. If the primary goal of the Metro's Investment Plans and the ZET Truck Program is to avoid further harming already impacted communities, then wholehearted support of hydrogen projects will surely undermine it.

The transportation and storage of hydrogen present further safety risks to surrounding communities. Three principal methods for hydrogen transportation involve pipelines, trucks, rail, and ships.[9] Each of these presents its own set of risks. Regarding pipelines, most current proposals include using fossil gas pipelines as a "quick fix" for transportation. Unfortunately, this "quick fix" reflects and perpetuates the environmental racism which resulted in fossil gas pipelines being co-located with low-income communities of color. Hydrogen's energy density

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[3] Sara Gersen and Sasan Saadat, *Reclaiming Hydrogen for a Renewable Future: Distinguishing Oil & Gas Industry Spin from Zero-Emissions Solutions*, Earthjustice Report (August 2021), p.10, https://earthjustice.org/feature/green-hydrogen-renewable-zero-emission.

[4] Zhiyuan Fan et al., *Hydrogen Leakage: A Potential Risk for the Hydrogen Economy,* Columbia University Center on Global Energy Policy (2022), https://www.energypolicy.columbia.edu/publications/hydrogen-leakage-potential-risk-hydrogen-economy (last accessed December 13, 2023).

[5] Gersen & Sadaat, *supra,* at 19; *see also* Alissa B. Cook and Steven P. Hamburg, *Climate consequences of hydrogen emissions, Atmospheric Chemistry and Physics* (July 20, 2022), https://acp.copernicus.org/articles/22/9349/2022/acp-22-9349-2022.pdf.

[6] *Id; see also* E4tech (UK) Ltd for the Department for Business Energy and Industrial Strategy (BEIS), *H2 Emission Potential Literature Review* (2019), p. 26, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/798243/H2_Emission_Potential_Report_BEIS_E4tech.pdf.

[7] Sierra Club, *Hydrogen: Future of Clean Energy or a False Solution?*, p. 4, https://www.sierraclub.org/sites/www.sierraclub.org/files/blog/Sierra%20Club%20Hydrogen%20factsheet_External.pdf (last accessed December 13, 2023), citing to Leeds City Gate, H21 Report.

[8] *Id.,* citing *Basic Information about NO2*, www.EPA.gov.

[9] Gerson & Sadaat*, supra,* at 19.

and small size make transporting with generic pipeline materials dangerous. It can cause "embrittlement" in pipes, is highly flammable, and is prone to leaks.[10] Due to its flammability, an explosion would have devastating consequences for densely populated areas like the corridor. Current research shows that fossil gas pipelines are not a safe method of transporting hydrogen.[11]

Given the limited extent of existing hydrogen pipelines, it is very likely that most hydrogen will be transported by truck. Transporting hydrogen by truck and rail brings additional air pollution to our region and has greenhouse gas impacts unless these trucks and locomotives are themselves zero-emission. This adds either unnecessary pollution or unnecessary cost relative to powering zero-emission vehicles directly from the grid. Regarding ships, the required liquefaction, refrigeration, or conversion from ammonia to hydrogen are each costly and energy-intensive.

The storage of hydrogen is also challenging due to its low energy density. Hydrogen storage requires large amounts of space to contain.[12] Theoretically, the volume challenge can be addressed by cooling and compressing hydrogen into a liquid state or converting it to ammonia, and some proposals may include these storage options. Still, each option comes with added energy and resource challenges and potential health hazards to nearby communities.[13]

Finally, the latest Intergovernmental Panel on Climate Change (IPCC) report finds that the use of fossil fuels must be phased out to avoid catastrophic warming past the 1.5℃ threshold long held as the point of no return.[14] Notably, the recent United Nations COP28 summit concluded with nearly 200 countries entering a first-ever agreement calling for transitioning away from fossil fuels. Current hydrogen production perpetuates the expansion of fossil fuel infrastructure, production, and resulting emissions. Metro can avoid perpetuating the fossil fuel dependency cycle by not funding hydrogen projects that extend fossil fuel infrastructure and reliance.

## II. Hydrogen Production Impacts Water Supplies

Hydrogen production is energy and resource-intensive, including using freshwater as a feedstock. Large-scale hydrogen production is resulting in even greater inequities. Although only 1% of hydrogen is produced through electrolysis, it can significantly impact freshwater supplies. Producing hydrogen through electrolysis uses approximately 9 kilograms (kg) of water for every 1 kg of hydrogen.[15] As the Sierra Club cites in its recent report on hydrogen, supplying

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[10] *Id.*
[11] Accufacts, *Report: Safety of Hydrogen Transportation by Gas Pipelines* (November 28, 2022), pp. 4, 10-12, https://pstrust.org/wp-content/uploads/2022/11/11-28-22-Final-Accufacts-Hydrogen-Pipeline-Report.pdf.
[12] Gerson & Sadaat, *supra*, at 20.
[13] *Id.*
[14] Intergovernmental Panel on Climate Change, *Climate Change 2023 Synthesis Report: Summary for Policymakers* (2023), p. 21, https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf.
[15] Sierra Club, *supra*, at 5.

a 288-megawatt power plant with 100% hydrogen would call for the equivalent of draining an Olympic-size pool every 12 hours.[16] This is simply unsustainable for regions with extreme drought risk like ours.

We must also recognize that much of the local water supply is from Tribal lands to the north, including Mono Lake. In 1941, the Los Angeles Department of Water & Power (DWP) began diverting water from Mono Lake's tributary streams, sending it 350 miles south to meet the growing water demands of Los Angeles. As a result, over the next 40 years Mono Lake dropped by 45 vertical feet, lost half its volume, and doubled in salinity.[17] Projects that will perpetuate the vast water consumption from these regions without protecting Tribal communities must be opposed.

Water usage has played a limited role in the development and talks surrounding hydrogen policy. However, the substantial water requirements of hydrogen production pose potential negative environmental justice concerns and impact local ecosystems, particularly in regions with constrained water resources such as Southern California. Substantial quantities of fresh water are required for hydrogen production, a resource already strained globally.[18]

## III. The Challenges of "Green Hydrogen"

Many hydrogen-related projects may propose using only "green hydrogen". But even green hydrogen presents a slew of challenges as a zero-emissions solution in most applications today. Primarily, the lack of legislative or regulatory certainty around the definition of green hydrogen means that many such projects propose empty promises. Presently, it costs more to produce green hydrogen than hydrogen derived from fossil fuels.[19]

Green hydrogen that is made using 100% renewable electricity from wind or solar power to split hydrogen from water molecules does not exist on an industrial scale in California.[20] True green hydrogen is in short supply, representing 0.02% of hydrogen produced through electrolysis.[21] Green hydrogen production is still energy-intensive, requiring large amounts of electricity generated from renewable sources, with anywhere from 20-40% of the energy lost.[22] This makes delivering green hydrogen for many applications inherently inefficient and costly. By some estimates, green hydrogen costs between $2.50/kilogram and $4.50/kilogram to produce

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[16] *Id.*
[17] Mono Lake Committee, *State of the Lake,* https://www.monolake.org/learn/stateofthelake/.
[18] Ahmed Osman et al., *Hydrogen production, storage, utilisation and environmental impacts: a review,* Environmental Chemistry Letters (2021), pp. 156-158, https://link.springer.com/article/10.1007/s10311-021-01322-8 (last visited Dec. 14, 2023).
[19] International Renewable Energy Agency & World Trade Organization, *International Trade and Green Hydrogen Supporting the Global Transition To A Low-Carbon Economy,* p. 10, https://www.irena.org/Publications/2023/Dec/International-trade-and-green-hydrogen-Supporting-the-global-transition-to-a-low-carbon-economy (last visited Dec. 14, 2023).
[20] Gersen and Sadaat, *supra*, at 3.
[21] *Id.*, at 20; *see also* International Renewable Energy Agency, *Hydrogen*, https://www.irena.org/Energy-Transition/Technology/Hydrogen (last visited Dec. 14, 2023).
[22] *Id.*, at 16.

as compared to the cost of conventional (and more polluting) fossil hydrogen, which is between $1.25/kilogram and $2/kilogram.[23] The possibility of a market where green hydrogen is affordable is largely dependent on if the price of renewable energy and electrolyzers, which is technology used in the production of green hydrogen, continues to drop.[24]

Green hydrogen production also challenges the state's water needs, requiring large amounts of water to produce hydrogen through electrolysis. Also, once produced, green hydrogen presents storage challenges similar to those produced by other means. Due to these limitations, only hard-to-electrify sectors should be considered, not sectors that could decarbonize and cut emissions more efficiently through direct electrification. For Metro's LB-ELA Corridor investment plan, funding should focus on the direct electrification of freight transit along the corridor with electricity generated through renewables to deliver air quality and health benefits while promoting greater equity on a more reasonable timetable and with fewer risks.

## IV. The LB-ELA 710 Investment Plan and the ZET Truck Program should advance projects that support only direct transportation electrification.

Direct electrification of transportation is safer and cleaner, and Metro can prioritize those projects that offer support to charging battery electric zero-emissions vehicles that will be more accessible. Solutions in battery electric and catenary zero-emissions transportation are available in multiple transportation sectors for the corridor, including freight, HD trucks, locomotives, and public transportation. These are areas where investments from LB-ELA Corridor Investment Plan and the ZET Truck Program may be better suited.

### A. Medium and Heavy-Duty Battery Electric Trucks

Medium- and heavy-duty battery electric trucks are already available. They are projected to offer a lower total cost of ownership compared to current diesel models and are more readily available than Hydrogen Fuel Cell trucks. Direct electrification of transportation is safer and cleaner, and Metro can prioritize those projects that offer support to charging battery electric zero-emissions vehicles that will be more accessible. Solutions in battery electric and catenary zero-emissions transportation are available in multiple transportation sectors for the corridor, including freight, HD trucks, locomotives, and public transportation. These are areas where investments from LB-ELA Corridor Investment Plan and the ZET Truck Program may be better suited.

We often hear proponents of hydrogen technology make the unsupported claim that battery-electric technology is infeasible due to costs. Medium- and heavy-duty battery-electric trucks are already available and have long been projected to offer a lower total cost of ownership compared to current diesel models. Even with the upfront and infrastructure installation costs,

[23] *Id.*, at 17.
[24] International Renewable Energy Agency & World Trade Organization, *supra*, pp. 4, 10.

Class 7-8 tractor EV's have a dramatic cost advantage over their current diesel equivalents when considering fuel, maintenance, health, and avoided environmental externalities.[25]

Battery-electric trucks also have a lower total cost of ownership when compared to hydrogen-powered trucks for long-haul applications.[26] This is true even when taking into account tax credits under the Inflation Reduction Act and is largely attributed to the lower cost of charging and maintenance.[27] When coupled with strategically placed megawatt charging, battery-electric long haul trucks are estimated to be the only zero-emissions transportation solution that can deliver lower cost per mile than long-haul diesel trucks.[28] Studies have suggested that for fuel cell electric vehicles (FCEVs) to compete economically with BEVs, green hydrogen fuel needs to be within a range of $3/kilogram (kg) to $6.50/kg by 2030. In 2023, retail green hydrogen fuel prices in California hit around $30/kg, and reasonable estimates have suggested that at-the-pump prices will remain between $8/kg and $10/kg even with federal incentives.[29] With large batteries for class 8 trucks expected to drop in price within this decade[30], the lower cost trend supporting battery-electric trucks is likely to continue.

Since drayage along the 710 corridor typically operates on shorter routes, these fleets are prime for electrification through existing battery electric technology. Most corridor trucking operations would benefit from strategically placed charging infrastructure co-designed with impacted communities to minimize additional harm, like the pilot project demonstrated through a partnership between this coalition and the Los Angeles Cleantech Incubator (LACI). Prioritizing charging infrastructure along the 710 is also aligned with the strategy of deploying electrification along "No Regrets" freight zones and corridors identified by researchers at The International Council on Clean Transportation (ICCT) as key to keeping national commercial trucking electrification aligned with climate goals.[31] ICCT staff further recognize that installing enough charging infrastructure is within reach and will help achieve 2030 climate milestones for long-haul trucks.[32] Metro should prioritize battery electric charging over hydrogen fueling for freight truck transportation along the 710 corridor.

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[25] UC Berkeley Goldman School of Public Policy, *Plummeting Costs and Dramatic Improvements in Batteries Can Accelerate Our Clean Transportation Future* (June 2021), http://www.2035report.com/transportation/wp-content/uploads/2020/05/GridLab_2035-Transportation-Appendix.pdf?hsCtaTracking= .
[26] Hussein Basma et al, *Total Cost of Ownership of Alternative Powertrain Technologies for Class 8 Long-Haul Trucks in the United States*, The International Council on Clean Transportation (April 2023), p. iii, https://theicct.org/wp-content/uploads/2023/04/tco-alt-powertrain-long-haul-trucks-us-apr23.pdf.
[27] *Id.*
[28] *Id.*
[29] Sam Wilson, *Hydrogen-Powered Heavy-Duty Trucks: A review of the environmental and economic implications of hydrogen fuel for on-road freight*, Union of Concerned Scientists (November 2023), p. 5, https://www.ucsusa.org/sites/default/files/2023-12/hydrogen-powered-heavy-duty-trucks.pdf.
[30] UC Berkeley Goldman School of Public Policy, *supra*.
[31] Yihao Xi and Ray Minjares, *Deploy Charging Infrastructure in "No Regrets" Freight Zones and Corridors to Keep the U.S. Commercial Truck Electrification Aligned with Climate Goals,* The International Council on Clean Transportation (December 13, 2023), https://theicct.org/deploy-charging-infrastructure-in-no-regrets-freight-zones-and-corridors-to-keep-us-commercial-truck-electrification-aligned-with-climate-goals-dec23/.
[32] *Id.*

### B. Direct Electrification of Locomotives

Locomotives are another example of a transportation mode that currently impacts corridor communities but can potentially transition to battery-electric or catenary technology. Locomotives relying on hydrogen combustion pose a risk of air pollution stemming from $NO_X$ emissions, as discussed in further detail above. Attempting to use such technology in commercial settings for hydrogen powered locomotives to mitigate the risk of $NO_X$ emissions from hydrogen combustion could prove costly, less efficient, time consuming, and risky, especially when there are other technologies already in use elsewhere.

Metro should instead invest in technology for locomotives—like battery-electric, catenary, or hybrid– that has demonstrated success and efficiency in practice. Updating current diesel-fueled locomotives with battery electric or catenary technology could be more cost-effective and lessen negative environmental and health impacts caused by current diesel-powered technology while benefiting electrical grids.[33] For example, locomotives with flexibility in their recharging times can charge batteries primarily when there is surplus renewable electricity available, which can make locomotives cheaper to fuel with electricity than diesel, even in the near term.[34] Similarly, a 2018 simulation of line-haul locomotives found that it would be significantly cheaper for an electric locomotive powered by overhead catenary as compared to diesel.[35] By comparison, hydrogen fuel cell EV technology currently lags far behind battery electric and catenary in market readiness and cost effectiveness. Anecdotes concerning the alleged unsuitability of direct electrification of locomotive transportation should not serve to mold the investment plan towards endorsing hydrogen.

### C. Direct Electrification of Public Transit

Finally, Metro can continue leading the way in the public transit sector by deploying battery-electric zero-emissions solutions for buses. Although Metro claims the nation's most battery-electric buses in service, there is still a long way to go to electrify its fleet fully. Fuel cell electric buses lag significantly behind battery electric technology, and their cost is much higher when compared to battery-electric versions. Therefore, Metro's investment strategies should focus on deploying the necessary charging infrastructure to advance progress in electrifying the region's bus fleet and remove polluting and climate-harming buses currently in service.

For these reasons, the expressed interest in committing Metro's limited funding and resources to hydrogen technology and infrastructure, whether for trucks, locomotives, or buses along the 710 corridor, is misguided.

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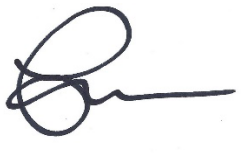
[33] Natalie Popovich et al. *Economic, environmental and grid-resilience benefits of converting diesel trains to battery-electric*, Nature Energy (2021), p. 1022, https://www.nature.com/articles/s41560-021-00915-5.
[34] *Id.,* at 1017-25.
[35] Federico Zenith et al., *Techno-economic Analysis of Freight Railway Electrification by Overhead Line, Hydrogen, and Batteries: Case Studies in Norway and USA,* Journal of Rail and Rapid Transit (July 7, 2019), p. 798, https://journals.sagepub.com/doi/pdf/10.1177/0954409719867495.

## V. Conclusion

In conclusion, we urge Metro to uphold its commitment to the equity principles it has developed through this process. The community needs to be co-designers of solutions in this investment plan. Blanket endorsement of unproven and potentially dangerous hydrogen applications risks causing even greater harm to impacted communities. Community groups should not be shut out of this process at the eleventh hour by having Metro arbitrarily endorse unproven and potentially dangerous hydrogen applications along the corridor.

We have gathered a list of projects with a potential hydrogen invesment to illustrate these points in Attachment A. Thank you for your attention to this matter and we look forward to further engagement.

Sincerely,



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**Attachment A - List of Projects with Potential Hydrogen Investments**

| Project Name | Project ID | Project Description | Potential Hydrogen-related Concerns |
|---|---|---|---|
| Long Beach-East Los Angeles Corridor Clean Truck Program | 4 | The objective of this program is to turn over diesel trucks in favor of zero emissions trucks in the LB-ELA Corridor. The program would contribute subsidy funding to deploy a number of zero emissions trucks on I-710 as well as seed funding to develop electric charging/refueling stations for zero emissions trucks. | Truck charging infrastructure should be the focus of the infrastructure investments. Hydrogen fueling infrastructure should not be funded through this program. |
| Clean Truck Infrastructure | 23 | Install charging infrastructure for zero emissions trucks. | While hydrogen is not currently part of this project description, “zero emission trucks” should be clearly defined as battery-electric. This project should remain limited to charging infrastructure, not hydrogen fueling infrastructure. |
| Metrolink Regional Rail Line between Union Station and Long Beach | 219 | Construct a new Metrolink regional rail line between Union Station and downtown Long Beach. Trains would be powered using electrical multiple unit (EMU) traction motors, which are anticipated to be required by the California Air Resources Board after 2030. Specific EMU technology has yet to be determined, but could be powered by overhead catenary, hydrogen fuel cell, or catenary/battery electric. | Catenary or catenary/battery electric should be the technology implemented as part of this project. |

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|---|---|---|---|
| Freight Rail Electrification Pilot Project | 217 | Work with the Union Pacific (UP) and BNSF railroads to develop and test battery-electric locomotives for operation on the Pacific Harbor Line and in the Alameda Corridor with an ultimate goal of advancing a zero-emissions technology capable of entering commercial, revenue service operation. | While hydrogen is not currently part of this project description, it was suggested at the December 11, 2023 Task Force meeting that this project include hydrogen-fueled locomotives. This project should be limited to battery-electric operations as originally proposed. |