

Emission Transitive Emission

Executive finding

Evidence verdict

There is something technically real to investigate. On-demand carbide-to-acetylene generation, acetylene engine operation, series-hybrid electrical buffering, exhaust scrubbing and carbon capture all have published or patented precedents. Recent laboratory work also shows that carbon dioxide can be converted into lithium or calcium carbide intermediates and then into acetylene. What has not been demonstrated is the complete closed-loop vehicle proposed here: lithium-carbide cartridges, minimal acetylene hold-up, an engine-generator, electrical storage, exhaust capture, and depot regeneration operating safely and with a favourable whole-system energy and carbon balance.

The most important discovery in the prior-art search is unusually close to the Bubble Butt concept. A 1972 United States patent proposed controlled calcium-carbide hydrolysis, an acetylene-fuelled engine, an afterburner, and passage of combustion products through the calcium-hydroxide slurry produced by the fuel-generating reaction. ^[8] Later patents proposed demand-regulated onboard acetylene generation and recovery of reaction and exhaust heat. ^{[6][7][9]} These documents establish prior proposals, not verified performance, safety, emissions compliance or commercial viability.

The strongest modern scientific foundation is at the stationary chemical-production end. McEnaney and colleagues demonstrated a lithium-mediated cycle in which lithium was generated electrochemically, reacted with carbon sources to form lithium carbide, and hydrolysed to acetylene while regenerating lithium hydroxide. The reported current efficiency was 15% with carbon dioxide and more than 55% with graphitic carbon. ^[2] A later calcium route reported 92% current efficiency for acetylene formation after a two-step high-temperature electrochemical process. ^[3] Current efficiency is not the same as plant efficiency or round-trip fuel efficiency; neither paper demonstrates a vehicle system.

A focused three-month programme could credibly produce a literature-validated system model, ranked chemistry pathways, safe bench demonstrations performed by an equipped laboratory, preliminary emissions data and a down-selected prototype architecture. It should not promise a road-ready fuel or certified vehicle in that period. Crash safety, durability, transient operation, cartridge logistics, emissions certification and lifecycle verification would remain later-stage work.

What is established and what remains proposed

Pathway element	Evidence level	What the evidence actually supports	Sources
Carbide + water → acetylene	Established industrial chemistry	CaC ₂ generators have more than a century of operating history; formal generator safety guidance exists.	[4–5, 10–11]
Pressure/demand-regulated generation	Established prior art	Automatic portable generators and vehicle-oriented demand control were patented.	[5–7]
Acetylene in engines	Laboratory demonstrated	SI and CI engine studies show combustibility and controllability, but efficiency and pollutants vary strongly with mixture and load.	[12–14]
CO ₂ → carbide → acetylene	Laboratory demonstrated	Lithium- and calcium-mediated electrochemical	[2–3]

Pathway element	Evidence level	What the evidence actually supports	Sources
		routes have been reported.	
Series hybrid + electrical buffer	Mature adjacent technology	The engine can be decoupled from wheel transients; batteries and supercapacitors can buffer power.	[15–17]
Wet exhaust scrubbing	Established adjacent technology	Useful for cooling, particulate matter and some soluble gases; plain water is not a high-capacity CO ₂ capture medium.	[20–21]
Onboard CO ₂ capture	Modelled; limited demonstrations	Published designs target high capture but impose equipment, regeneration and storage burdens; larger vehicles are favoured.	[18–19, 22]
Li ₂ C ₂ cartridge + engine-generator + capture + depot loop	Proposed integration	No complete prototype or validated lifecycle result was found.	Research gap

Project vision

The CL17 matrix is treated here as a connected research repository: chemistry, electrolysis, fuels, batteries, heat recovery, emissions separation, material return and manufacturing are examined as one system. Its guiding principle is that an output should not automatically be labelled waste. It may instead be a feedstock, an energy carrier, a recoverable material, a treatment burden or a residue that must be safely contained.

The public-interest aim is to develop transition technologies that can reduce dependence on newly extracted fossil carbon and make useful low-carbon systems accessible beyond incumbent fuel supply chains. That aim must be tested by mass balance, energy balance, lifecycle assessment and safety evidence. Processing can transform or separate waste, but it cannot make matter, energy losses, toxicity or disposal obligations disappear.

A disciplined statement of the ambition

With a small engineering team, an appropriately equipped laboratory and AI-assisted modelling, a three-month sprint should seek prototype evidence—not predetermined confirmation. The result may be a viable fuel pathway, a stationary manufacturing process, a useful emissions retrofit, several application-specific systems, or a well-supported decision to reject some branches early.

The proposed integrated system

Stage	Input	Output	Evidence status
1 Stationary manufacture	Low-carbon electricity + recovered LiOH/carbonate + captured CO ₂ or qualified carbon source	Dry, quality-controlled carbide carrier; separated coproducts	Demonstrated only as laboratory chemistry for Li route
2 Refill and return	Fresh cartridge and water delivered; spent hydroxide/carbonate returned	Material custody and batch traceability	Proposed logistics architecture
3 On-demand reaction	Metered solid–liquid contact	Acetylene + hydroxide + heat	Established for CaC ₂ ; Li ₂ C ₂ vehicle form unproven

Stage	Input	Output	Evidence status
4 Power conversion	Conditioned acetylene to dedicated engine-generator	Electricity + heat + exhaust	Engine operation demonstrated; integrated set unproven
5 Electrical buffer	Generator + regenerative braking	DC bus, battery and/or supercapacitor	Mature adjacent architecture
6 Bubble Butt treatment	Cooled exhaust and selected capture media	Reduced PM/soluble pollutants; possibly concentrated CO ₂ or carbonate	Needs pollutant-specific design and testing
7 Depot regeneration	Returned products, captured carbon, renewable electricity and heat integration	Regenerated carrier + managed residues	Central unresolved efficiency and cost question

The “capacitor tank” idea is best implemented electrically. A battery or supercapacitor downstream of the generator can supply acceleration and absorb regenerative-braking pulses while the chemical reactor and engine-generator operate slowly or near a selected steady point. Series-hybrid literature supports the architecture, while battery–supercapacitor research supports using high-energy storage for duration and high-power storage for short transients.

^{[15][16][17]} This reduces the required chemical response rate; it does not eliminate the need for safe gas-side control.

Chemistry and conservation limits

Core lithium-carbide reaction

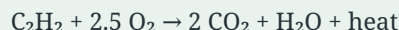
Fuel-release reaction



For every kilogram of theoretical acetylene product, the stoichiometric feed is approximately 1.46 kg lithium carbide and 1.38 kg water, producing approximately 1.84 kg lithium hydroxide. These values assume pure materials and complete reaction; a real system would carry packaging, excess water, controls, cooling equipment and unreacted or contaminated material.

Combustion reaction

Ideal complete combustion



Acetylene has a lower heating value of about 48.2 MJ/kg, or 13.4 kWh/kg of chemical energy. ^[1] Complete combustion produces about 3.38 kg CO₂ and 0.69 kg water per kilogram of acetylene. It therefore does not have zero-carbon exhaust. Its mass-specific fuel energy is higher than petrol, but the total carried reactant mass is much larger once lithium carbide and reaction water are counted.

Energy carrier	LHV by mass	LHV by volume	Equivalent	Interpretation
E5 petrol	≈42–43 MJ/kg	≈31.5–32.5 MJ/L	≈8.8–9.0 kWh/L	Liquid fuel benchmark; value varies by blend and season.
Acetylene	≈48.2 MJ/kg	≈0.056 MJ/L as gas near normal conditions	≈13.4 kWh/kg; ≈0.0156 kWh/L gas	A litre comparison is meaningless unless pressure, temperature and storage form are stated.
Li ₂ C ₂ + stoichiometric water	≈17.0 MJ/kg combined feed	System-dependent	≈4.7 kWh/kg combined feed	Before reactor, containment, cooling

Energy carrier	LHV by mass	LHV by volume	Equivalent	Interpretation
				and conversion losses.

Benchmark basis: NIST acetylene thermochemistry and government/DOE fuel-property ranges. Values are rounded screening figures, not certification data. ^{[1][25][26]}

The no-energy-gain rule

If captured CO₂ and water are the ultimate feedstocks, making acetylene is the energetic reverse of burning acetylene. The theoretical minimum renewable-energy input therefore cannot be lower than the fuel energy later released, and real electrolysis, heating, separation, compression, pumping and regeneration make the actual input larger. A favourable system can still be useful as energy storage, transport fuel or carbon recycling, but it cannot be self-powering.

The by-product capture limit

Lithium hydroxide can chemically bind carbon dioxide: $2 \text{LiOH} + \text{CO}_2 \rightarrow \text{Li}_2\text{CO}_3 + \text{H}_2\text{O}$. However, the LiOH produced while making one mole of acetylene can bind only one mole of CO₂, while combustion of that acetylene produces two moles. On stoichiometry alone, the fuel-generation by-product can bind at most 50% of its own ideal combustion CO₂. The same one-half relationship holds for Ca(OH)₂ made from CaC₂. Additional sorbent or repeated regeneration would be required for higher capture.

Capture also competes with carrier regeneration: once LiOH is converted to carbonate, the depot process must accept and separate that carbonate or convert it back. This is not a fatal flaw; it is a design choice that must appear explicitly in the material and energy balance.

Water recovery opportunity

The hydrolysis step consumes two moles of water per mole of acetylene, while combustion creates one mole. Perfect exhaust condensation could therefore replace at most half of the reaction water before real losses and contamination. This makes water recovery a useful subsystem, not a closed source of all required water.

Research already completed

A century of on-demand acetylene generation

Portable calcium-carbide generators were used historically for lighting and industrial applications by bringing carbide and water together only when gas was required. The American Chemical Society records their early commercial importance. ^[4] Patents from 1931 onward describe automatic response to gas pressure or demand. ^[5] The existence of these systems is strong evidence that controlled generation is physically possible, but modern vehicle crashworthiness and emissions standards are a different engineering problem.

Vehicle-oriented prior art

Document	Date	Relevant proposal	Meaning for CL17
US 3,664,134	1972	Carbide-water reactor, acetylene engine, afterburner and exhaust contact with Ca(OH) ₂ slurry	Closest discovered precursor to Bubble Butt; patent claims are not test validation.
US 4,054,423	1977	Pressure-regulated onboard CaC ₂ /water generator feeding a vehicle engine without conventional gas storage	Direct precedent for demand-controlled onboard generation.
US 4,444,159	1984	Compact generator intended for engine power with fast water-flow response and	Precedent for cartridge-like charging and response goals; design also included gas

Document	Date	Relevant proposal	Meaning for CL17
		cooling	storage.
US 6,282,900	2001	Calcium-carbide power system with reaction and exhaust heat recovery	Precedent for treating hydrolysis heat as a recoverable system output.

Modern CO₂-to-acetylene chemistry

The lithium route most directly supports the CL17 concept. In the 2020 study, lithium metal was electrochemically generated from LiOH, then reacted with CO₂, methane, carbon monoxide or solid carbon to form carbide-containing products. Hydrolysis generated acetylene and returned LiOH. The authors reported 15% current efficiency to acetylene using CO₂ and more than 55% using graphitic carbon. ^[2] This is proof of a chemical cycle, not proof of acceptable energy consumption, long life, scale, cost or cartridge manufacture.

The 2024 calcium study separated carbon deposition from carbide formation and reported 92% current efficiency to acetylene in the selected laboratory process. ^[3] It strengthens the general concept of turning captured CO₂ into a carbide intermediate. It also suggests that calcium deserves attention as a control pathway because CaC₂ generation and hydrolysis are industrially familiar, even though conventional coal-based calcium carbide is carbon-intensive.

A Chinese lifecycle study reported roughly 6.77 tonnes CO₂-equivalent per tonne of acetylene for the conventional calcium-carbide route. ^[23] Separate process studies have proposed carbon capture and carbide-slag recycling to improve this system. ^[24] The lesson is that carbide chemistry is not automatically low-carbon: the source of carbon, electricity, heat and metal regeneration controls the result.

Engine performance and pollutant evidence

Published engine trials confirm that acetylene can contribute useful combustion energy. They do not establish a universal power increase. A gasoline–acetylene study found lower brake thermal efficiency at rich and stoichiometric conditions but higher efficiency in some lean conditions. It also found lower unburned hydrocarbons, condition-dependent carbon monoxide, and generally higher NO_x except at very lean operation. ^[12] A later diesel–acetylene study found lower brake thermal efficiency and soot but higher CO, HC and NO_x under its test conditions. ^[13] Reviews conclude that engine design, load, mixture preparation, ignition timing, pilot fuel and excess-air ratio determine the outcome. ^[14]

Output	What research indicates	Screening result	Required interpretation
CO ₂	Produced whenever carbon in acetylene is oxidised	≈3.38 kg/kg C ₂ H ₂ under complete combustion	Capture or renewable-carbon sourcing can change lifecycle result, not the combustion stoichiometry.
NO _x	Often rises with high flame temperature and oxygen availability	Mixed, frequently adverse	Requires dedicated combustion calibration, EGR and/or aftertreatment study.
CO and unburned HC	Sensitive to mixture, quenching and transient control	Mixed	Cannot be claimed lower without a specific engine map and catalyst system.
Soot/PM	May fall in some diesel dual-fuel tests; acetylene is also a soot precursor in rich flames	Potential advantage, not guaranteed	Measure particle number, mass and size, not visible smoke alone.

Answer to “does it put out more power?”

Acetylene contains more chemical energy per kilogram than E5 petrol, but that does not mean the complete system

creates more power. Shaft or electrical power depends on fuel flow, air handling, knock limits, engine efficiency, generator efficiency and the mass and losses of the carbide–water system. It produces broadly the same pollutant families as other carbon fuels—CO₂, NO_x, CO, hydrocarbons and possibly particles—although the quantities and treatment opportunities differ.

Minimal gas hold-up rather than zero gas

Demand control can avoid storing the journey’s fuel as acetylene, which is a real safety advantage. It cannot mean that no gas is ever present. During operation there must be a finite reaction space, separators, piping and an intake path containing acetylene. Wet particles can continue reacting briefly after water flow stops, and heat, pressure, contamination or valve failure can upset the response.

The correct engineering target is therefore: no journey-scale acetylene inventory; minimum verified gas hold-up; bounded post-shutdown generation; fail-closed reactant isolation; monitored pressure and composition; flashback protection; controlled consumption or safe handling of residual gas; and crash-tolerant separation of dry carbide from water. EIGA guidance for stationary wet generators emphasises formal safeguards, buffers, mechanical integrity, inspection and maintenance.^{[10][11]} Acetylene has an exceptionally broad flammable range and can decompose violently under unsuitable conditions.^[27]

HHO and hydrogen as reaction assistants

“HHO” is a mixed hydrogen–oxygen product, not a catalyst. A catalyst changes reaction rate without being consumed; hydrogen is consumed as a fuel and oxygen is consumed as an oxidiser. Research on hydrogen-rich-gas enrichment shows that small hydrogen additions can speed early flame development, extend lean operation and sometimes improve efficiency or reduce CO/HC when the engine and controls are optimised.^{[28][29]} NO_x, knock, pre-ignition and backfire can worsen in other conditions.

Onboard electrolysis powered by the same engine–alternator cannot deliver free net energy: mechanical-to-electric, electrolysis and combustion losses make the return smaller than the input. A scientifically useful CL17 investigation would instead compare (a) separated, station-produced hydrogen as a combustion promoter; (b) hydrogen used at the depot to convert captured CO₂ into methanol, methane or other carriers; and (c) electrolysis only when surplus low-carbon electricity is available. Mixed oxyhydrogen should not be stored.

Battery and active reflux possibilities

Lithium carbide has also been investigated as a high-capacity lithium-ion battery cathode. A 2016 paper reported a theoretical capacity near 1,400 mAh/g and experimental electrochemical behaviour, while follow-on work observed structural change and capacity loss during cycling.^{[30][31]} This is evidence of a separate battery-material research path. It does not show that a fuel cartridge can simultaneously be a durable traction battery and an acetylene precursor.

The practical near-term integration is conventional electrical storage around the engine-generator. “Active reflux” can then mean measured feedback loops: recover braking energy; use exhaust and reaction heat where temperature levels match; condense water; return hydroxide/carbonate; and recycle captured carbon at the depot. Each loop must include its pumps, heat exchangers, separators, control energy, contamination and purge streams.

Bubble Butt and emission transformation

Bubble Butt should be treated as a modular exhaust-treatment platform, not one universal liquid bubbler. Water-based wet scrubbers are established for cooling exhaust, removing particulate matter and collecting some soluble gases. The U.S. EPA describes wet scrubbers primarily as controls for particulate matter and acid gases, and diesel studies show performance depends strongly on design and operating conditions.^{[20][21]} CO₂ is only weakly captured by plain water at exhaust conditions; meaningful carbon capture normally needs reactive sorbents, adsorption, membranes, mineralisation or separation of a concentrated stream.

Onboard carbon-capture research is real. One published temperature-swing adsorption design modelled 90% capture using exhaust heat, while acknowledging steady-state assumptions and the need for prototype and dynamic validation. ^[18] Other analyses find onboard capture more attractive for long-range heavy vehicles and ships than for light passenger cars because equipment and stored CO₂ add mass and volume. ^[19] A shipboard chemical-absorption demonstration confirms that mobile capture equipment can be engineered, but scale and duty cycle differ greatly from a car. ^[22]

Bubble Butt function	Transferred output	Potential value	Boundary condition
Cooling and water condensation	Heat + water	Useful	Recovered water is contaminated and supplies at most part of hydrolysis demand.
Droplet/PM collection	Slurry or filter cake	Useful retrofit target	Creates a managed liquid/solid waste stream.
Soluble/acid gas capture	Dissolved ions/salts	Pollutant-specific	Requires chemistry control and disposal or regeneration.
CO ₂ + LiOH/Ca(OH) ₂	Carbonate + water	Chemically credible	By-product amount captures at most about half of the fuel's own CO ₂ .
Concentrated CO ₂ storage	Returnable CO ₂ inventory	Possible in larger platforms	Compression, containment, heat and mass penalties must be counted.
CO ₂ reuse as fuel feedstock	Recycled carbon carrier	Potential carbon loop	Re-emits when burned; climate value depends on low-carbon energy and avoided fossil carbon.

What “no waste” must mean scientifically

The project principle is valuable when stated as a design rule: every output must have a named destination. That destination may be reuse, regeneration, saleable coproduct, safe storage, controlled treatment or final disposal. Separation changes the form and concentration of matter; it may make recovery possible, but it can also create a smaller, more hazardous waste stream. Heat can be recovered only where its temperature and timing match a useful demand.

- A pollutant moved from exhaust gas into scrubber water has been transferred, not eliminated.
- CO₂ reused to make fuel is delayed and recycled, not permanently removed, unless some carbon is durably stored.
- A hydroxide converted to carbonate remains valuable only if a practical regeneration or product route exists.
- A high current efficiency for one electrochemical step does not establish good whole-cycle efficiency.
- A negative result is useful when it prevents unsafe or uneconomic scale-up.

Three-month collaborative research sprint

The following programme is deliberately framed to create decision-quality evidence without promising a certified transport fuel in twelve weeks. Hazardous experiments must be designed and conducted by qualified laboratories under their own safety systems.

Period	Work package	Core activity	Decision output
Weeks 1–2	System definition and evidence register	Freeze boundaries; map every mass, energy and hazard stream; patent landscape; select Ca and Li controls.	System block model, source library, initial HAZID

Period	Work package	Core activity	Decision output
Weeks 2–4	Thermodynamic and lifecycle screen	Model theoretical and realistic energy demand, CO ₂ sourcing, water, sorbent regeneration and logistics.	Ranked pathway matrix; E5/B7/LPG/CNG/BEV benchmark
Weeks 3–6	Safe chemistry validation	Independent laboratory verifies yields, purity, heat release, residual reaction and by-product composition at small scale.	Reproducible data package; reject/continue gates
Weeks 5–8	Power and control simulation	Digital model of generator–reactor–buffer–motor dynamics; failure-state analysis; cartridge concept.	Response envelope and minimum buffer sizing
Weeks 6–10	Emissions and capture bench work	Test acetylene or representative gas in a stationary engine/generator; measure regulated and unregulated emissions; assess modular capture.	Engine map and capture mass balance
Weeks 9–12	Integrated stationary demonstrator plan	Combine validated subsystems at stationary scale; complete cost, lifecycle and safety review.	Prototype specification, budget and Phase 2 decision

Team and facilities requested

Role	Primary responsibility
Chemical/process lead	Reaction pathway, separation, heat and mass balance
Electrochemist/materials scientist	Carbide formation, electrolyte selection, LiOH/carbonate regeneration, chloride corrosion
Combustion and controls engineer	Engine calibration, generator operating map, transient control
Power-electronics engineer	DC bus, battery/supercapacitor sizing and safety
Emissions/capture specialist	Gas analysis, PM measurement, sorbent and wastewater assessment
Process-safety engineer	HAZID/HAZOP, protection layers, failure and crash scenarios
Lifecycle/economic analyst	Well-to-wheel carbon, cost and infrastructure comparison
AI/modelling support	Literature triage, experiment design support, surrogate models, uncertainty tracking and design-space ranking

Stage gates

1. Chemistry gate: measured yield, purity, heat release and residual reaction are reproducible.
2. Energy gate: credible renewable electricity-to-wheel efficiency and cost are competitive for at least one use case.
3. Safety gate: no journey-scale acetylene storage, bounded gas hold-up and acceptable failure-state consequences are demonstrated by qualified reviewers.
4. Emissions gate: a complete pollutant inventory shows improvement without unacceptable NO_x, particle or liquid-waste transfer.

5. Circularity gate: returned products have a verified regeneration or market route and contamination does not accumulate without control.
6. Application gate: stationary generation, depot fleets, agricultural machinery or emergency power is selected before any road-vehicle programme.

Priority experiments and modelling questions

- What acetylene yield and impurity profile can be obtained from candidate Li_2C_2 forms over repeated batches?
- How quickly does gas generation stop after reactant isolation, and what minimum gas hold-up is unavoidable?
- What is the total electricity and heat demand per kilogram of regenerated carbide, including separations and losses?
- Can recovered LiOH or carbonate be regenerated without accumulating chloride, metals, soot or water contaminants?
- Does a steady engine-generator operating point materially improve efficiency and emissions compared with direct mechanical drive?
- What electrical buffer size decouples road transients from safe chemical response?
- Which emissions are reduced, which increase, and which are transferred to liquid or solid capture media?
- Can the by-product hydroxide perform useful partial CO_2 capture without disrupting its return-to-fuel route?
- Is stationary manufacture with conventional acetylene delivery safer and more efficient than onboard generation?
- Which use case delivers the largest avoided fossil-carbon benefit per unit of renewable electricity and critical material?

Recommended first prototype boundary

Start stationary

The first integrated prototype should be a remotely operated stationary generator–reactor–electrical-buffer test rig at a qualified facility. It should use a mature carbide route as a control and introduce lithium chemistry only after its material handling and regeneration data are independently reviewed. A road vehicle should be a later application, not the first experiment.

This boundary still tests the distinctive CL17 logic: on-demand generation, minimal gas inventory, steady power conversion, electrical transient storage, heat and water recovery, pollutant measurement, product return and regeneration. It also makes comparison with conventional fuels and direct battery-electric operation much easier.

Updated exploration request

The following consolidates the current Emission Transitive Emission request and incorporates the evidence review.

An open request for scientific and engineering assistance

My name is AL, and I am seeking assistance to explore a connected body of ideas concerning alternative fuels, emissions capture, energy storage, recovery of useful materials, and the transfer of matter and energy between processes. I call the investigation Emission Transitive Emission.

The central question is simple: can the output or emission from one process become the controlled input to another process instead of being discarded into the environment?

This is not a claim of a finished fuel or a self-powering machine. Every pathway must obey conservation of energy and materials. External energy will be required, preferably from renewable or otherwise low-carbon sources. Processing does not make waste disappear; it can separate, transform, concentrate, recover or safely contain it.

Existing research shows that several parts of this vision are real. Carbide–water acetylene generation and automatic control have a long history; vehicle-oriented generators, by-product exhaust scrubbing and heat recovery have been patented; acetylene has been tested in engines; lithium- and calcium-mediated routes from carbon dioxide to acetylene have been demonstrated in laboratories; and series-hybrid electrical buffering and mobile carbon capture have substantial adjacent research. ^{[2][3][5][6][8][9][12][18]} The complete integrated system remains unproven, which is precisely why a disciplined programme is needed.

Research paths to explore

- Waste cooking oil and biodiesel in suitable older diesel generators or engines.
- Generator, battery, inverter and electric-drive series-hybrid systems.
- Water electrolysis using suitable electrolytes, with hydrogen and oxygen produced and handled separately.
- Hydrogen used as a controlled combustion promoter or stationary chemical feedstock, not described as a catalyst or free source of energy.
- Renewable hydrogen combined with captured carbon dioxide to produce methane, methanol, DME or other synthetic fuels.
- Lithium-mediated pathways, including lithium carbide reacting with water to produce acetylene and lithium hydroxide.
- Calcium-carbide pathways as an established control case, including electrochemical production from captured CO₂.
- Recovery and regeneration of lithium or calcium hydroxide/carbonate at a controlled stationary facility.
- Acetylene as a manufactured energy carrier with minimal operational hold-up, while recognising its fire, decomposition and flashback hazards.
- Methane, methanol, DME, hydrogen, ammonia, synthetic liquids, biodiesel and algae-derived oils as alternative fuel candidates.
- Capturing carbon dioxide and other emissions for reuse as chemical feedstocks or managed temporary storage.
- The Bubble Butt retrofit as a pollutant-specific platform for cooling, water recovery, particulate capture, chemical scrubbing or CO₂ separation.
- A refill–return–regenerate system in which vehicles or stationary generators receive an energy carrier and return concentrated products to a depot.
- Producing hazardous or bulky intermediates at controlled stations rather than transporting or storing unnecessary gas inventories.
- Repurposing useful heat, water, carbon, minerals and chemical residues while identifying every unrecoverable purge or disposal stream.

Chlorine, chlorides and lithium chloride should be examined for their roles in electrochemistry, corrosion, separation, contamination and toxicity. They should not be assumed to be fuels: lithium chloride mixed with water does not itself produce a fuel gas. High-temperature chloride electrolyte systems require specialist materials and containment.

Combination mapping

7. Every technically plausible input → process → output pathway.
8. Whether one output can safely and usefully become another process input.
9. Which materials can be recovered, returned or regenerated and how impurities accumulate.
10. External electricity, heat, compression, separation and transport required at every stage.
11. Net energy efficiency and unavoidable conversion losses.
12. Lifecycle carbon emissions, including energy source and equipment, rather than tailpipe claims alone.
13. Toxicity, causticity, corrosion, fire, explosion, pressure and environmental risks.
14. Compatibility with petrol, diesel, LPG, CNG, hybrid and electric vehicle architectures.
15. Stationary generation, transport, heating, agricultural, industrial and emergency-power applications.
16. Infrastructure, manufacturing, maintenance, material availability and realistic cost.
17. Household, community, filling-station, fleet-depot and industrial scale—while excluding scales that cannot be made safe.
18. Whether a pathway reduces extraction and pollution or merely transfers them into another medium or location.

Promising combinations should be compared with E5 and E10 petrol, B7 diesel, LPG, fossil CNG and battery-electric systems using the same functional unit, such as useful electricity delivered or vehicle-kilometres under a defined duty cycle.

Safety position

Mixed oxyhydrogen should not be stored or treated casually. Hydrogen and oxygen should be separated and managed using certified equipment. Onboard production of acetylene from reactive lithium compounds may be substantially less safe than stationary manufacture. “On demand” must mean minimal verified hold-up and bounded shutdown behaviour, not an assertion that no gas exists in the apparatus.

This request is for literature review, simulation, process-safety analysis and supervised testing in qualified facilities—not improvised hazardous experimentation.

Assistance required

I currently lack the laboratory space, specialist equipment, research capacity and technical access needed to test these possibilities properly. I am asking for assistance from universities, independent laboratories, chemists, electrochemists, chemical and process engineers, combustion and automotive engineers, power-electronics specialists, environmental scientists, process-safety specialists, students, manufacturers and responsible funding organisations.

- A structured literature, standards and patent review.
- Chemical, thermodynamic, process and transient-system modelling.
- Reaction yield, purity, heat-release and energy-balance measurements.
- Lifecycle carbon, toxicity and emissions analysis.
- Safe supervised bench experiments and independent replication.
- Gas composition, particle and exhaust analysis.
- Materials, corrosion, catalyst and contamination testing.
- Recovery, separation and regeneration experiments.
- Engine-generator and electrical-buffer compatibility assessment.
- HAZID, HAZOP, protection-layer and failure-mode analysis.
- Economic, infrastructure, material-circularity and application modelling.
- Access to suitable laboratory space, equipment and qualified supervision.
- Help rejecting weak pathways early and selecting those that merit prototypes.

Intended outcome

A focused three-month collaboration should aim for measured bench prototypes, a validated system model and a ranked research portfolio. The final answer may be one fuel, several fuels for different applications, a stationary production process, a transition retrofit, or an integrated system connecting renewable energy, fuel manufacture, vehicles, emissions capture and material regeneration.

The important principle is that an emission does not always have to be the end of a process. With the correct chemistry, energy source, recovery system and safety controls, it may become the beginning of another. I believe the CL17 matrix contains real and valuable research questions. I now need people with the facilities, knowledge and equipment to investigate them carefully, openly and honestly.

AL

The Green Tank

Conclusions for research partners

Decision	Current evidence-based position
Worth pursuing now	Stationary mass/energy model; CaC ₂ control experiments; independent Li ₂ C ₂ yield and impurity data; engine-generator emissions map; electrical-buffer simulation; by-product capture stoichiometry.

Decision	Current evidence-based position
Do not claim yet	Road-ready fuel, zero gas inventory, net energy gain, zero pollution, closed water loop, full CO ₂ capture by the hydroxide by-product, or economic competitiveness.
Most defensible novelty area	Integration of a modern low-inventory chemical generator with electrical transient buffering, measured exhaust/material recovery, and depot regeneration using low-carbon power.
Highest-risk dependency	Efficient, safe and repeatable carbide regeneration—especially the lithium route—after contamination and capture duties are included.
Best first market hypothesis	Controlled stationary or fleet-depot power where equipment can be supervised and returned materials can be handled centrally.

There is more prior work here than may first appear, including a strikingly similar 1972 exhaust-scrubbing patent. The opportunity is not to ignore that history, but to combine it with modern electrochemistry, sensing, power electronics, lifecycle methods and safer system architecture. The project should proceed as a falsifiable engineering programme: quantify every input, output, loss and hazard, then retain only the combinations that survive measurement.

Sources

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Evidence-use note

Peer-reviewed papers support laboratory chemistry, engine tests and system modelling. Patents are used only to identify prior proposals and possible novelty constraints. Standards and industry guidance support hazard framing. Numerical values in this brief are rounded screening calculations and should be independently reproduced before design decisions.