

CL17 Emission Transitive Emission Ongoing Research Study

Abstract

Emission Transitive Emission is an open, ongoing investigation of whether an output from one energy or manufacturing process can become a controlled input to another. The recovered CL17 work combines alternative fuels, carbon reuse, electrolysis, batteries, engine-generator systems, emissions capture, heat and water recovery, and refill-return-regenerate logistics. It contains two structured research databases, prior reports, source data, system figures and verification records. The primary matrix maps 26 species, 48 reaction records and 38 pathways. The supplemental workbook enumerates 14,400 bounded system configurations. Of those configurations, 1,134 are marked Candidate, 2,124 Research only, 4,302 Incomplete and 6,840 Reject. These are screening classifications, not experimental validation.

The strongest focused research candidate is demand-regulated acetylene generation within a stationary or depot-centred system. The chemistry and several component technologies have substantial prior art, including carbide hydrolysis, demand control, acetylene engine trials, carbon-dioxide-to-carbide laboratory routes, series-hybrid buffering and mobile capture studies. The complete CL17 integration has not been demonstrated. It must therefore be developed through independent mass and energy balances, process-safety review, supervised bench testing, engine and emissions measurement, lifecycle assessment and staged prototype gates.

Study status and authorship

Ongoing research status

This document records a research programme and a request for collaboration. It is not a declaration of a finished invention, a safety case, a vehicle approval, or proof that any candidate has a favourable lifecycle result. Each claim is intended to remain open to correction by calculation, experiment and independent review.

The originating researcher is AL of The Green Tank. The work arose from sustained conceptual mapping conducted with a laptop and AI assistance. Disability and social exclusion have restricted access to laboratories, engineering networks and equipment; those barriers do not determine whether the questions are scientifically testable. This study asks research organisations to judge the work by its evidence, transparent uncertainties and experimental value. The request is for access and partnership, not charity.

Any collaboration should record AL's originating contribution, preserve dated versions of the CL17 files and agree authorship, background intellectual property, new results, publication rights and data access before experimental work begins. Accessibility requirements should be discussed at project formation and budgeted as research-enabling costs where eligible. UKRI states that applicants can request reasonable adjustments throughout assessment and may request project-specific adjustment costs that arise directly from the research. ^[40]

Evidence classes used in this study

Class	Meaning
Established	Industrial chemistry, published measurements or mature adjacent systems with repeatable evidence.
Demonstrated	A peer-reviewed laboratory, engine or pilot result under stated conditions.
Modelled	A calculated or simulated result that still requires experimental confirmation.

Class	Meaning
Proposed	A CL17 system integration or application hypothesis not yet demonstrated.
Rejected or incomplete	A combination that violates a screening rule, lacks a necessary route, or creates an unacceptable unresolved hazard.

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	[12–14]

Pathway element	Evidence level	What the evidence actually supports	Sources
		and pollutants vary strongly with mixture and load.	
CO ₂ → carbide → acetylene	Laboratory demonstrated	Lithium- and calcium-mediated electrochemical routes have been reported.	[2–3]
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

Recovered CL17 research corpus

The present paper is based on the recoverable project record in the working collection and the current conversation frame. The record includes the primary CL17 chemistry network, the supplemental interactive-system investigation, the evidence review, two Bubble Butt concept boards, source datasets, figures, builders and verification logs. No additional specifically identifiable CL17 download was found in the available file collection. Missing chat-only material should therefore be described as unavailable rather than represented as an original recovered file.

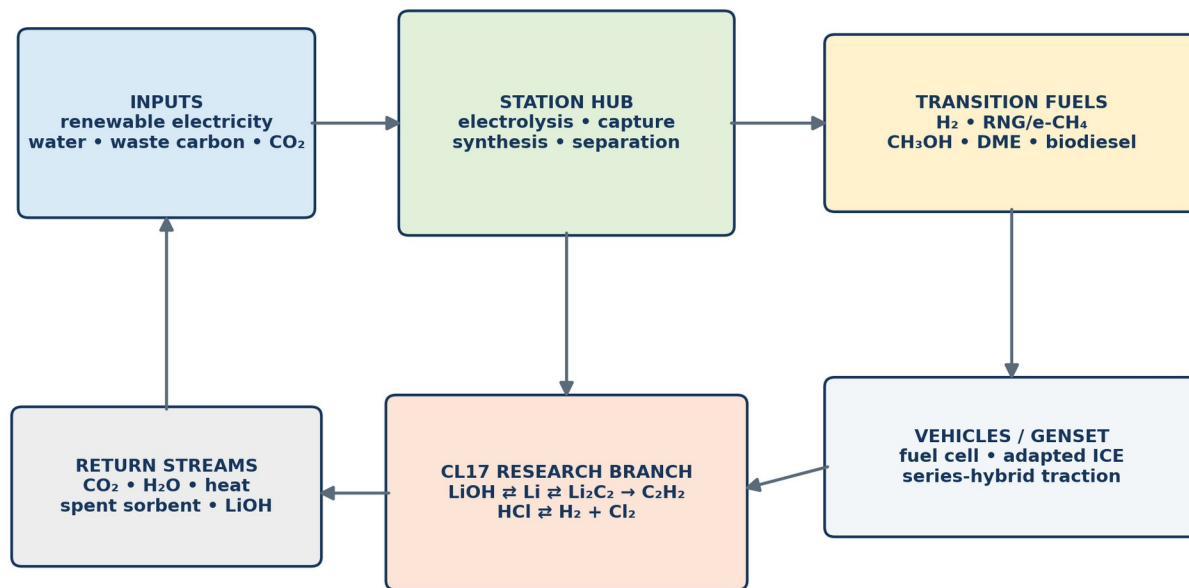
Asset group	Recovered extent	Purpose
Primary chemistry network	26 species; 48 reaction records; 38 pathways; 6 shortlisted programmes; 37 source records	Screening map of inputs, processes, outputs, hazards and applications
Supplemental systems study	8 fuels; 13 electrolysis routes; 6 H ₂ /O ₂ roles; 8 battery routes; 11 coproduct routes; 4 CO ₂ products; 36 source records	Interactive links among combustion, electrolysis, storage, capture, recycle and manufacturing
Combination explorer	14,400 bounded configurations	Cross-product screening rather than proof of physical validity
Prior reports	Three DOCX reports with rendered PDF counterparts	Narrative evidence, equations, cautions and research recommendations
Figures and concept boards	Five principal images	CL17 network, system architecture, HHO energy balance and two Bubble Butt boards
Reproducibility material	Two JSON datasets, four builder scripts and verification records	Source reconstruction, formula checks and audit trail

Bounded combination results

Status	Count	Share	Interpretation
Candidate	1,134	7.875%	Passes current screening rules; still requires calculation and experiment.
Research only	2,124	14.750%	Scientifically interesting but unsuitable for immediate application or missing a critical proof.
Incomplete	4,302	29.875%	One or more material, energy, safety, application or regeneration links are not defined.
Reject	6,840	47.500%	Fails a stated rule or contains an unsuitable combination within the current model.
Total	14,400	100.000%	All combinations in the bounded explorer.

The 1,134 Candidate rows are hypotheses selected by the workbook's present rules. They are not 1,134 valid fuels. The 2,124 Research only rows may contain useful electrolytes, sorbents, catalysts or catalyst precursors, battery materials, heat-transfer media, manufacturing feedstocks or diagnostic controls even when they fail as primary fuels. The model should retain rejected and incomplete rows with reasons because a failed sequence can still reveal a useful intermediate or show where a different reaction would be required.

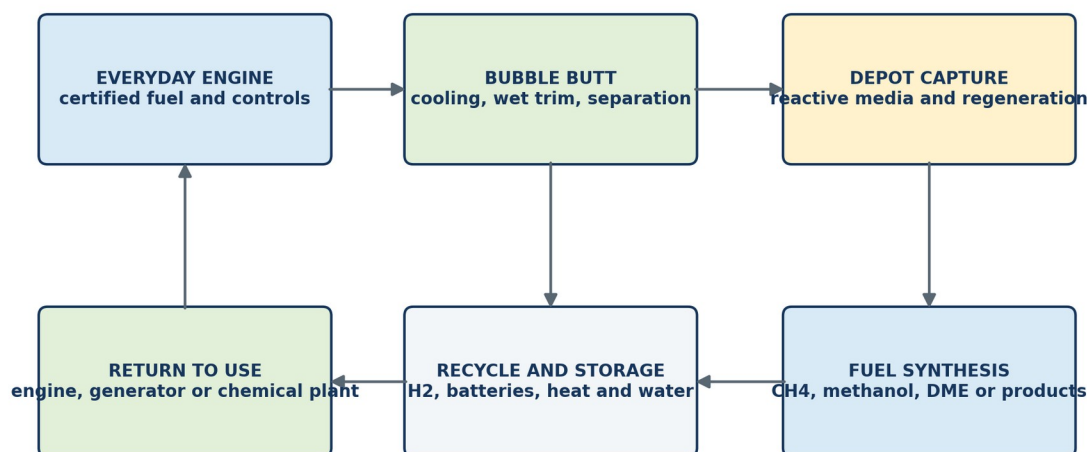
Emission Transitive Emission — proposed architecture



Energy enters as electricity, heat or sustainable feedstock; chemistry stores or transfers it. No closed material loop creates net energy.

Figure 1 Recovered CL17 network overview

Recommended CL17 system boundary



Material streams may cycle. Electricity, heat and sustainable feedstocks remain the net energy inputs.

Figure 2 Supplemental interactive-system architecture

Research method and global reporting standards

Future versions should use SI units, unambiguous chemical formulae and IUPAC names, balanced reactions, stated temperature and pressure, lower or higher heating value labels, uncertainty ranges, dated source access and persistent DOI links. Each result should identify its system boundary, functional unit, baseline and evidence class. Lifecycle work should follow the principles and requirements of ISO 14040 and ISO 14044, including goal and scope, inventory, impact assessment, interpretation, limitations and critical review. ^{[44][45]}

The digital record should follow the FAIR principles so that data, workflows and models are findable, accessible, interoperable and reusable. ^[35] Every dataset release should carry a version, machine-readable metadata, column definitions, units, source provenance, change log, licence decision and SHA-256 checksum. The paper uses numbered Vancouver-style references; future technical reports may adapt the formatting required by a target journal without changing source identity.

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
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

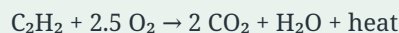
Fuel-release reaction



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. ^[11] 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 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 byproduct 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 demand regulated 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 prior art

Document	Date	Relevant proposal	Meaning for CL17
US 3,664,134	1972	Carbide-water reactor,	Closest discovered precursor

Document	Date	Relevant proposal	Meaning for CL17
		acetylene engine, afterburner and exhaust contact with $\text{Ca}(\text{OH})_2$ slurry	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 cooling	Precedent for cartridge-like charging and response goals; design also included gas 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 carbon dioxide 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 CO_2 , 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 CO_2 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 CO_2 into a carbide intermediate. It also suggests that calcium deserves attention as a control pathway because CaC_2 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 CO_2 -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	$\approx 3.38 \text{ kg/kg C}_2\text{H}_2$ 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,	Mixed	Cannot be claimed lower

Output	What research indicates	Screening result	Required interpretation
	quenching and transient control		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.

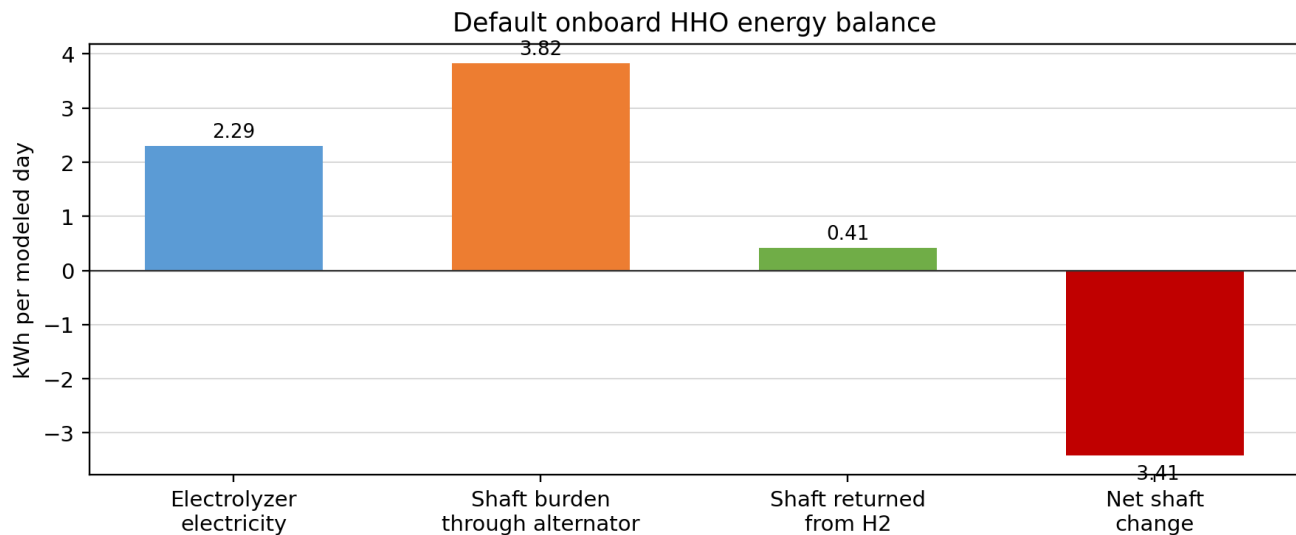


Figure 3 Recovered HHO energy-balance screen

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.

Bubble Butt function	Transferred output	Potential value	Boundary condition
Soluble/acid gas capture	Dissolved ions/salts	Pollutant-specific	Requires chemistry control and disposal or regeneration.
$\text{CO}_2 + \text{LiOH}/\text{Ca}(\text{OH})_2$	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.

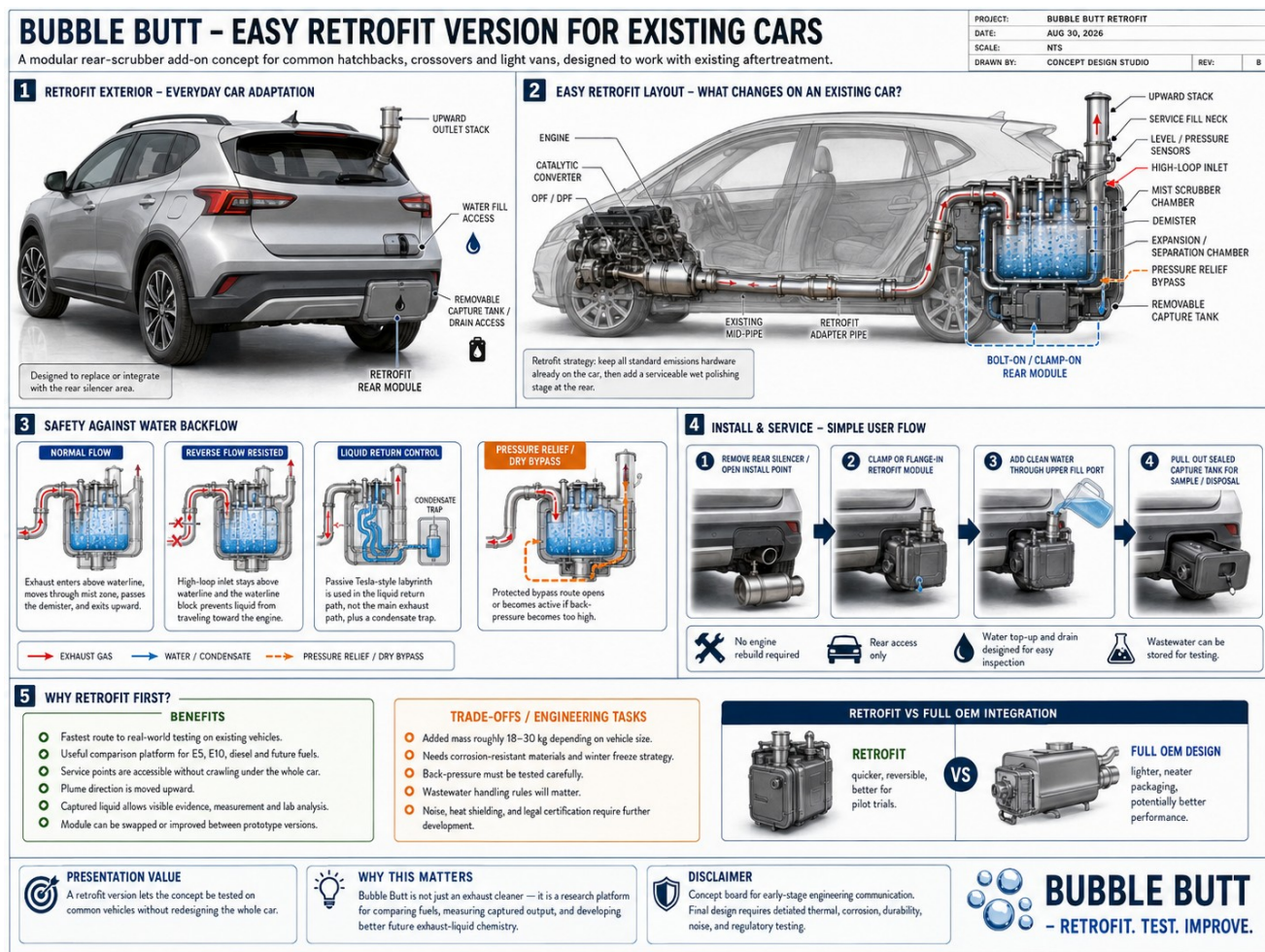


Figure 4 Recovered Bubble Butt retrofit concept board

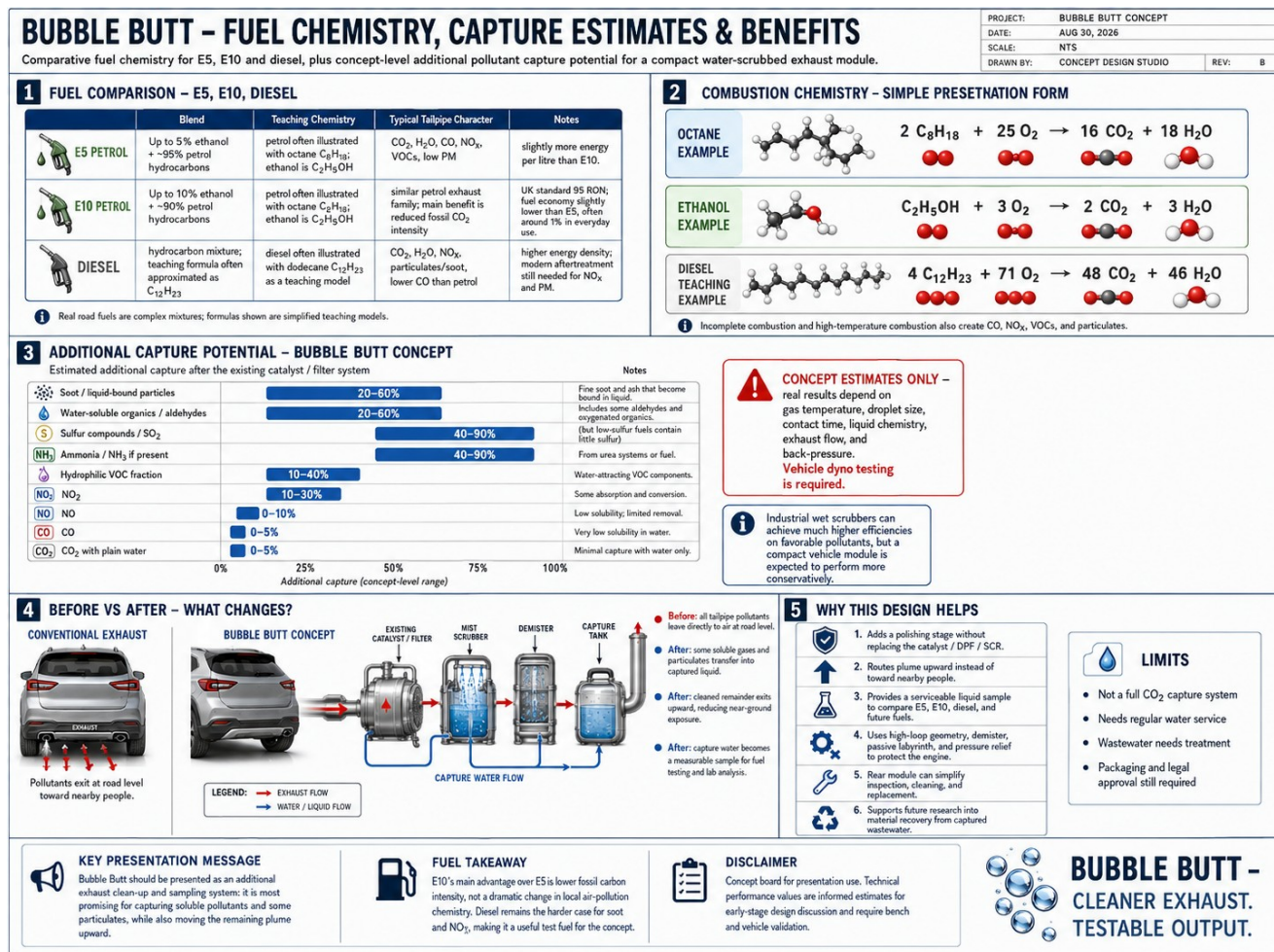


Figure 5 Recovered Bubble Butt fuel and capture concept board

Scientific meaning of no waste

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.
- CO_2 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	System block model, source library, initial HAZID

Period	Work package	Core activity	Decision output
		stream; patent landscape; select Ca and Li controls.	
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

Facilities and equipment required

The programme does not require one organisation to own every capability. It requires a lead host that can coordinate safe access to shared university, independent-laboratory, test-cell and pilot facilities. Equipment selection must follow the host's risk assessment; the list below defines capability, not an operating recipe.

Capability	Indicative resources	Decision supported
Data and modelling	Version-controlled repository; thermochemical and property data; process simulation; transient controls model; lifecycle and techno-economic tools; uncertainty and provenance tracking.	All phases
Chemical reaction work	Ventilated or enclosed small-scale reactor capability; calibrated mass, temperature, pressure and heat-release measurement; inert handling where required; controlled quench and residue collection.	Chemistry gate
Chemical analysis	GC-TCD/FID or equivalent permanent-gas and hydrocarbon analysis; GC-MS or FTIR where impurities require identification; ion chromatography, ICP-OES, XRD, Raman or microscopy through shared analytical services.	Yield, purity and contamination
Electrochemistry	Potentiostat/galvanostat; separated electrolysis cells; membrane evaluation; gas quantification; corrosion coupons; glovebox or specialist high-temperature molten-salt access only where justified.	Regeneration and battery routes
Power systems	Engine-generator dynamometer or load bank; programmable DC source/load; battery or supercapacitor buffer; inverter and motor emulator; fast data acquisition and safety-rated control hardware.	Transient and efficiency testing
Emissions and capture	Calibrated CO ₂ , CO, NO _x , total-hydrocarbon and O ₂ analysers; mass-flow and humidity measurement; heated sampling where needed; particle mass and number measurement; capture-media and wastewater analysis.	Emissions gate
Process safety	Gas detection; ventilation; ignition-source control; flashback and overpressure protection; isolation and emergency shutdown; remote operation; secondary containment; approved storage and waste routes.	Required before hazardous work
Pilot integration	Skid-mounted stationary system, physical separation of incompatible reactants, guarded test area, remote monitoring, documented inspection and maintenance, and independent pre-start review.	Only after earlier gates pass

How collaborators can provide access

Partner	Practical contribution
University host	Appoint an academic lead, provide laboratory governance, recruit students or research staff, and coordinate analytical facilities.
Independent laboratory	Repeat critical measurements, verify gas composition and residues, and provide an impartial data package.
Engine or vehicle partner	Supply a representative stationary engine or generator, controls expertise, instrumentation and compatibility assessment.

Partner	Practical contribution
Electrochemistry partner	Evaluate carbide regeneration, chloride handling, membranes, corrosion and alternative carbon-to-fuel routes.
Safety and regulatory partner	Lead HAZID and HAZOP, define protection layers, review chemical duties and map the route to vehicle or stationary approval.
Community or public-interest partner	Define affordability, ownership, workforce and local-benefit measures; represent affected users in decisions.
Funding partner	Support staff time, facility fees, consumables, independent replication, accessibility costs and open-data preparation.

A workable first approach is a two-page expression of interest containing the research question, recovered evidence, first-stage test boundary, team gaps, equipment gaps, accessibility needs, requested in-kind access, a twelve-week budget and the decision gates in this paper. It should be sent to chemical engineering, electrochemistry, combustion, sustainable fuels and process-safety groups as one coordinated request rather than as separate unconnected ideas.

Electrolysis routes should be benchmarked against current system data. The U.S. Department of Energy distinguishes alkaline, proton-exchange-membrane and solid-oxide systems and notes that electricity source determines the associated emissions.^[32] Its 2022 PEM system status was 55 kWh per kilogram of hydrogen, about 61% efficiency on a lower-heating-value basis.^[33] These values prevent hidden electricity demand from disappearing inside a fuel-cycle claim.

Collaboration and decision structure

Function	Lead	Required decision
Research origin and system logic	AL and The Green Tank	Maintain the problem statement, contribution record and community-purpose tests.
Scientific quality	Academic and independent technical leads	Approve methods, uncertainty treatment, replication and publication claims.
Safety authority	Host laboratory and process-safety lead	Hold stop-work authority and approve each experimental stage.
Data stewardship	Data lead with AI and laboratory support	Maintain identifiers, schemas, source provenance, code versions and checksums.
Application decision	Cross-disciplinary review board	Compare stationary, depot, industrial and vehicle cases at each gate.
Public and workforce value	Community and worker representatives	Test whether costs, skills, ownership and benefits are fairly distributed.

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

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

Adapting new energy carriers to existing technology

The transition hypothesis is to use suitable existing engines, generators, depots and maintenance skills where adaptation produces a better overall result than immediate replacement. This does not mean preserving every internal-combustion application. Direct electrification should remain the control case because it often avoids multiple fuel-conversion losses. A CL17 route earns a place only where it provides a measured advantage in duty cycle, resilience, asset reuse, storage, local feedstocks, infrastructure or cost.

Legacy asset or use	Possible CL17 role	Decision rule
Existing stationary generator	Early controlled application for certified transition fuels or measured acetylene	Safety, emissions, efficiency and supervision are easier to control than on-

Legacy asset or use	Possible CL17 role	Decision rule
	trials	road use.
Series-hybrid retrofit or new platform	Engine operates near a selected point while a battery or supercapacitor handles transients	Additional conversion losses must be outweighed by improved engine operation and asset reuse.
Fleet-depot system	Refill–return–regenerate logistics with central quality control and capture-media handling	Strong candidate where vehicles return regularly and materials can be accounted for.
Agricultural or emergency power	Local fuel or energy-carrier production where grid access or supply resilience matters	Reliability and safe storage may matter more than peak efficiency, but emissions still count.
Passenger vehicle	Late-stage application only after stationary and fleet evidence	Crash, public exposure, packaging, approval and service-network burdens are highest.

Community value and a just transition

The social aim is to reduce dependence on concentrated fossil-fuel supply by enabling transparent, locally serviceable energy and material systems where the evidence supports them. A change in chemistry does not automatically transfer power to people. Ownership, access to data, repair rights, financing, training, feedstock control and fair prices determine who benefits. The International Labour Organization’s just-transition guidance treats low-carbon change as a practical programme for decent work, social protection and dialogue among governments, workers and employers.

[41]

Public-interest test	Measure
Energy and material control	Share of feedstock, generation, regeneration or storage under community, cooperative, municipal or small-enterprise control.
Affordability	Delivered energy cost, exposure to volatile imports and access for low-income or remote users.
Work and skills	Paid training, recognised qualifications, job quality and transfer of existing mechanical and industrial skills.
Repair and resilience	Availability of parts, diagnostic access, modular replacement, local maintenance time and outage recovery.
Environmental performance	Lifecycle greenhouse gases, air pollutants, water use, material loss and final waste per functional unit.
Public accountability	Open methods, independent tests, declared conflicts, versioned datasets and published negative results.

The programme is intended to move work rather than erase workers. Engine technicians, fabricators, electricians and plant operators would work alongside chemists, materials scientists, data specialists, safety professionals and environmental analysts. Training should be built into the research budget and prototype design so that knowledge does not remain locked inside one laboratory or company.

The project’s values statement is that the physical world is not defective simply because current systems use it badly. Science can improve how people understand energy, matter, waste and one another. That is a social perspective, not a laboratory result. The technical work remains falsifiable: an appealing philosophy cannot rescue a pathway that fails energy, safety, emissions, cost or material-accounting tests.

Safety regulation and approval route

In Great Britain, laboratory and pilot work involving flammable gases, reactive chemicals, pressure and corrosive materials requires competent legal review. DSEAR requires employers to identify dangerous substances, assess risks, control or mitigate them, plan for emergencies, train people and classify places where explosive atmospheres may occur. ^[36] COSHH requires hazardous-substance risks to be identified, assessed and controlled. ^[37] COMAH may apply to establishments holding relevant dangerous substances above regulatory thresholds. ^[38]

A modified vehicle must follow the approval route for its jurisdiction. UK Individual Vehicle Approval uses inspection and, for normal IVA, documentary evidence; some compliance testing must be carried out by an authorised designated technical service. ^[39] The project should obtain written advice from the relevant vehicle approval, roadworthiness, insurance, pressure-system, environmental-permitting and dangerous-goods authorities before moving beyond controlled off-road testing.

The safety file should include chemical inventories and safety data sheets, a process description, DSEAR and COSHH assessments, HAZID and HAZOP records, pressure and ignition studies, control and shutdown philosophy, proof-test intervals, ventilation and gas-detection design, emergency response, waste routes, operator competence and management of change. No road demonstration should occur until the host organisation and relevant authorities approve it.

Research governance and protection of contribution

Control	Minimum requirement
Contribution register	Date each concept, dataset, calculation, drawing, correction and experimental result; name the contributor and reviewer.
Background intellectual property	List material brought into the project by AL, each institution and each partner before work starts.
New intellectual property	Agree ownership, licensing, community-access aims and patent decisions before disclosing enabling detail.
Publication	Pre-register key comparisons where practical; publish methods, uncertainty and negative results subject to safety and legitimate IP limits.
Independent review	Use a laboratory or analyst that did not build the system to repeat the decisive measurements.
Conflicts and funding	Declare financial interests, in-kind support, fuel or equipment donations and publication restrictions.
Accessibility	Provide communication formats, flexible participation, assistance and remote access needed for AL and other disabled contributors.

Immediate actions to open the research

1. Freeze this package as version 1.0 and record its SHA-256 checksums.
2. Nominate a host investigator in chemical or process engineering and a separate process-safety lead.
3. Hold a two-hour cross-disciplinary review of the six shortlisted primary programmes and the supplemental matrix rules.
4. Choose one stationary use case and one direct-electrification control with the same functional unit.
5. Recalculate all mass, energy and carbon balances from primary data before ordering experimental hardware.
6. Prepare a HAZID and legal-applicability register; remove any pathway that cannot be safely tested by the host.

7. Define a calcium-carbide control and a separate lithium-mediated research question; do not combine them prematurely.
8. Book analytical, electrochemical, engine-test and emissions facilities through the smallest capable partner network.
9. Write a twelve-week budget including staff, facility charges, consumables, independent replication, accessibility and data publication.
10. Publish the accepted protocol and record every rejected route with its reason so later researchers can revisit it when technology changes.

Conclusions for research partners

Decision	Current evidence-based position
Worth pursuing now	Stationary mass/energy model; CaC_2 control experiments; independent Li_2C_2 yield and impurity data; engine-generator emissions map; electrical-buffer simulation; by-product capture stoichiometry.
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.

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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 study are rounded screening calculations and should be independently reproduced before design decisions.

Attachments and preservation record

The files below are included in the accompanying preservation package. The register distinguishes recovered project material from the present synthesis. Intermediate render pages and unrelated files retrieved during title searches are excluded. The package manifest records file size and SHA-256 checksum for each included item.

Type	Package path	Purpose
Present study	01_Paper/ CL17_Emission_Transitive_Emission_Ongoing_S tudy.docx	This ongoing study in editable form
Present study	01_Paper/ CL17_Emission_Transitive_Emission_Ongoing_S tudy.pdf	Rendered preservation copy
Primary database	02_Databases/ CL17_Emission_Transitive_Emission_Matrix.xls x	Species, reactions, pathways, thermochemistry, shortlist and sources
Supplemental database	02_Databases/ CL17_Supplemental_Interactive_Systems.xlsx	HHO roles, electrolysis, batteries, coproducts, capture and 14,400-case explorer
Previous report	03_Previous_Reports/ CL17_Emission_Transitive_Emission_Report.doc x and .pdf	Primary matrix report
Previous report	03_Previous_Reports/ CL17_Supplemental_Investigations.docx and .pdf	Supplemental systems report
Previous report	03_Previous_Reports/ Emission_Transitive_Emission_Evidence_Revie w.docx and .pdf	Acetylene and integrated-system evidence review
Source data	04_Data/cl17_data.json	Machine-readable primary network source
Source data	04_Data/cl17_supplement_data.json	Machine-readable supplemental source
Figure	05_Figures/cl17_network.png	Primary network overview
Figure	05_Figures/supplement_architecture.png	Interactive-system architecture
Figure	05_Figures/hho_energy_balance.png	Onboard HHO energy screen
Recovered concept	05_Figures/bubble_butt_retrofit.png	Bubble Butt retrofit board
Recovered concept	05_Figures/bubble_butt_fuel_chemistry.png	Bubble Butt fuel and capture board
Builders	06_Source_Builders	Python and JavaScript document and workbook builders
Verification	07_Verification	Workbook inspections, formula scans and interactive checks
Reference register	08_Reference_Register/ CL17_Source_Register.csv	Deduplicated source inventory from the recovered datasets and this study
Integrity	MANIFEST.csv and SHA256SUMS.txt	Package inventory and checksums

Recovery note: two Bubble Butt images were located in the available persistent file collection. The CL17 matrices, reports, data and builders were recovered from the current working collection. No other specifically identifiable CL17 download was located. If an earlier original file becomes available, it should be added as a new preserved object with its original filename, date, provenance and checksum rather than silently replacing this package.