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An ALTEA Insight:

Beyond the Hype

The real state of alternative propulsion
for regional aviation.



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The Big Picture

"Today, hydrogen has retreated to where the balance sheets are biggest, and battery-electric and hybrid-electric aircraft have become the default path. The field has split sharply, however, between programmes carrying serious airline and OEM backing and independents still fighting for runway.

The real story of 2026 is not which technology won. It is who can afford to still be playing."



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An ALTEA Insight:

Executive Summary

The central question in regional aviation's shift to electric, hybrid-electric and hydrogen propulsion is no longer simply whether these technologies work. It is whether the operators expected to fly them, on the routes they serve, can absorb the risks of early adoption.

That risk falls unevenly, and not for the reason most industry commentary assumes. It isn't just about the size or sophistication of an operator, though that matters too. Many of the routes with the clearest case for this technology – thin, often-subsidised, single-aircraft-type connections with no fallback if something goes wrong – are exactly the routes that can least afford a reliability problem, whatever the resources of the airline flying them. A well-resourced operator can still be running a critical route with zero redundancy.

This paper sets out, in specific, sourced detail, where that risk currently sits. It shows which programmes have real capital and engineering credibility behind them and which are running mostly on paper commitments. It looks at how a shift in who controls an aircraft's lifetime value (battery, software, and data) could reshape the balance of power between OEMs, lessors, and operators. It also examines the economics: the case for this technology now rests as much on operating cost as on sustainability, and for operators the battery becomes a significant part of that cost equation. And it sets out the allocation questions the industry needs to resolve deliberately, rather than by default.

The propulsion race has changed

Three years ago, hydrogen and battery-electric propulsion looked evenly matched for the future of regional aviation. By 2026, that picture has narrowed. Among independent developers, hydrogen has consolidated around a single significant survivor, ZeroAvia, though it too has suffered workforce cuts and now focuses on its smaller ZA600 powertrain.

At the other end of the market, hydrogen is not retreating at all, with Airbus, MTU Aero Engines, and GKN Aerospace continuing to invest at a scale only the largest balance sheets, or the most heavily subsidised programmes, can sustain. Projected timescales are lengthening, however, and major infrastructure questions remain. Battery-electric and hybrid-electric architectures have become the sub-30-seat default instead, driven less by preference than by two constraints: battery weight limits payload and range, and certification choice determines market access. In the US, a lighter Part 23 aircraft is barred from Part 121 scheduled airline service; Heart Aerospace's move from a 19-seat Part 23 concept to a Part 25 aircraft, now the 36-seat ES-36, bought that access at real cost.

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Established manufacturers are taking the more conservative route. ATR and GE Aerospace are pursuing incremental hybrid-electric demonstrators rather than clean-sheet designs, backed by existing certified types and far longer runways than most independents in this paper have. Even there the timetable has softened: ATR stepped back in 2025 from launching a hybrid-electric successor to the ATR 42 and 72 until the technology is ready.

Capital may matter more than technology

The sharpest dividing line between programmes is increasingly not propulsion architecture but financial endurance. Certification of a genuinely new propulsion architecture takes eight to ten years or more from clean-sheet design to entry into service, against a venture-capital return horizon of five to seven years. That mismatch is now the single best predictor of which programmes survive. The scale of that mismatch shows up in development cost too. A clean-sheet Part 23 aircraft has historically cost in the order of USD100m to develop, against the low billions for a clean-sheet Part 25 aircraft. Elysian's own public estimate for its considerably larger E9X is around USD10bn, close to two orders of magnitude apart. Heart's ES-36, unveiled in September 2026 with entry into service targeted for 2031, some thirteen years after the company began work in 2018 and three years later than first stated, shows the same mismatch in a single programme.

Delays themselves are not unique to independents: Ishka Airfinance tracking finds 16 of 48 new propulsion products have already slipped their public timelines, by 16 months on average, and Airbus and Embraer have each absorbed multi-year slips of their own. What differs is survival. Universal Hydrogen flew the largest aircraft ever powered by hydrogen-electric propulsion and folded within a year, not because the technology failed but because its funding could not stretch to match the delay; established manufacturers can absorb the same slip and continue.

“The programmes that win this race may not be the ones with the most ambitious technology or the largest headline order book...”

That has direct implications for how order books should be read. Letters of intent, memoranda of understanding, and even signed term sheets are typically non-binding at this stage. They are real signals of interest but no guarantee of revenue, and should be weighed alongside capital raised, strategic investors, OEM partnerships, certification progress, and manufacturing commitments, not read alone. The Heart and JSX position shows the difference: JSX's 2023 letter of intent for up to 100 aircraft became, in September 2026, a deposit-backed agreement for 50 ES-36s with purchase rights for 50 more. The contrasts can be stark: Aura Aero holds close to 700 letters of intent against one firm order, Tidal Flight more than USD900m against about USD3.4m raised, and

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Vaeridion over 100 against about EUR15m of capital available. The programmes that have stabilised are, without exception, the ones that show several of these signals together, not just a large headline order book.

The aircraft business model is also changing

Alternative propulsion could reshape more than the aircraft itself. A conventional turboprop OEM largely sells an airframe once, whereas an electric or hybrid OEM instead typically controls battery replacement, the software managing the powertrain, and health monitoring – a far larger share of the aircraft's lifetime value sitting inside a single company. BETA Technologies' own IPO prospectus puts real numbers behind that shift. An aircraft operated for 20 years will need 18 to 20 sets of replacement batteries, generating around USD13m in revenue per aircraft. The company has told the market that its aftermarket battery business could eventually generate up to three times the revenue of the aircraft itself. What the filing does not address is the other side of that transaction. There is no exchange or core-return structure, and no credit for the value of a removed pack, typically still holding 80% or more of its original capacity at removal.

That concentration of control shifts negotiating power towards the OEM by default, in every transaction with an operator, lessor, or financier, unless they negotiate a different starting position now. It also exposes a genuine information gap. Aircraft appraisers normally set a residual value against comparable transactions; none exist yet for any aircraft in this market. In their absence, appraisers are dependent on engineering data only the OEM holds: battery degradation curves under real dispatch conditions, residual pack value at the point of removal, and exchange or core-return economics, if any exist. Until OEMs share that as underwriting-grade data rather than marketing material, every residual-value assumption in this market is closer to a guess than an estimate.

Operating economics need careful evaluation

The economic case for electric and hybrid aircraft rests on cheap electricity and lighter maintenance than a gas turbine, and manufacturers already quote large savings. Heart, for example, targets operating costs at least 40% lower than legacy regional aircraft for its ES-36. Those are manufacturer claims, and Heart's published comparison does not state its basis; hybrids also keep a turbogenerator and its costs. For operators the battery also becomes a significant part of the cost equation, through replacement cost, cycle life, and residual value. That needs careful, operator-side evaluation before fleet decisions are taken, rather than acceptance of headline claims.

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The industry now faces an allocation problem

None of this is a reason to wait. It shows that the next phase of alternative propulsion depends as much on risk allocation, financing structure, and data transparency as it does on engineering. The unresolved questions are specific: who should underwrite early-technology risk on essential regional routes, and does today's financing structure get that allocation right? Who bears the risk if battery residual-value assumptions prove wrong? What data OEMs need to share with appraisers and lessors to build credible residual-value models where no transaction history yet exists? Whether the OEM revenue-capture shift changes how lessors and financiers should structure transactions? Whether the operational reality of hybrid aircraft matches what has been promised? How operators should evaluate the true operating economics of these aircraft, including battery costs, rather than rely on headline claims? How essential connectivity should be protected while new propulsion systems establish real-world reliability? And who pays for charging and hydrogen refuelling infrastructure, and on whose timeline?

The programmes that win this race may not be the ones with the most ambitious technology or the largest headline order book, but the ones that align technology, patient capital, operational risk, and lifetime asset economics most effectively. Answering these questions well, deliberately rather than by default, is the work ALTEA does with operators, lessors, OEMs, financiers, and public authorities.

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Beyond the Hype: In Brief

- The routes and communities that most need sub-30-seat electric and hybrid aircraft are often the least able to absorb the risk of early technology going wrong, whatever the resources of the operator flying them, a paradox the industry has not yet resolved.
- Certification timelines of eight to ten years against five-to-seven-year venture capital horizons, not battery chemistry or motor reliability, are the single best predictor of which programmes survive.
- Letters of intent and 'firm' order books are cheap to accumulate; real capital and engineering credibility are not, and the two need reading together, not apart.
- Electric and hybrid OEMs control a far larger share of an aircraft's lifetime value (battery, software and data) than conventional OEMs ever did, shifting bargaining power and residual-value risk toward the OEM by default unless operators, lessors and financiers negotiate otherwise.
- Operating economics, more than sustainability alone, now drives the interest in this technology. Electricity and motor maintenance should cost less, but for operators the battery becomes a significant and less visible part of the cost equation, and one that needs careful evaluation.
- None of this is a reason to wait. It is a set of allocation questions, set out in Section 6, that ALTEA helps operators, lessors, OEMs, and financiers work through together.





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Who Can Still Afford to Play?

Many of the operators who most need this technology are least able to absorb the risk of it going wrong in its early years. Outside North America, where some substantial regional carriers see an opportunity to rebuild lost connectivity to small communities over recent decades, most operators are small and have limited capability to manage the inevitable immaturity of early adoption. That single fact is reordering the race to build it.

From a technology perspective, three years ago, hydrogen and battery-electric propulsion were competing neck-and-neck for the future of regional aviation. Today, hydrogen has retreated to where the balance sheets are biggest, and battery-electric and hybrid-electric aircraft have become the default path. The field has split sharply, however, between programmes carrying serious airline and OEM backing and independents still fighting for runway. The real story of 2026 is not which technology won. It is who can afford to still be playing.

It is also worth being clear about what is driving this technology now. Sustainability remains part of the case, but the commercial argument increasingly rests on economics: the prospect of a step change in operating cost, much as re-engined aircraft such as the A320neo displaced the A320ceo. The two cases overlap, but it is the economics that will decide whether operators, lessors and financiers commit, and it is through that lens that we examine the programmes.

“The real story of 2026 is not which technology won. It is who can afford to still be playing.”

The sections that follow set out why, in specific, sourced detail, not because the picture is bleak, but because naming precisely where risk, capital, and data currently sit is the only way to reallocate them sensibly. Section 6 turns that diagnosis into a working set of questions for the industry; these are exactly the sort of question ALTEA works through with operators, lessors, OEMs, and financiers directly, and the diagnosis is the necessary first step, not the end point.



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The Risk Paradox: Who Is Actually Meant to Fly These Aircraft?

Look past the demonstrator flights and order books, and ask a simpler question: who is this technology actually for? The addressable early market for most sub-30-seat electric and hybrid platforms is not network carriers with diversified fleets and deep engineering teams; it is thin, often-subsidised regional routes and island connectivity, services that exist because there is no alternative, not because they are commercially attractive, often flown by smaller operators. Section 4 returns separately to how the picture changes for larger platforms like Evio, Elysian, and Heart's now 36-seat ES-36.

These are precisely the operators least equipped to absorb new-technology risk. They typically run any given route on a single aircraft type, so if a new, still-unproven powertrain develops a reliability problem, there is no fallback capacity to keep what is often a vital connection running. Margins are thin, maintenance organisations are lean, and the communities they serve have essentially zero tolerance for a drop in dispatch reliability. For many, this is their only scheduled transport link.

This is a real pattern, not an absolute rule. The operators generally best placed to absorb early-technology risk (larger, better-capitalised carriers with fleet diversification and engineering depth) typically have the least operational need for a 30-seat electric aircraft. The operators with the clearest mission fit typically have the least capacity to bear the risk of being early. Put plainly, this technology is being developed and financed disproportionately for a market that, on current form, is not the market it is principally meant to serve. Somewhere between those two positions, the technology has to find a way to reach the routes it was actually designed for.

That framing risks collapsing two separable things into one: an operator's own capacity to absorb early-technology risk, and the criticality of the specific routes it flies, meaning whether there is any fallback if the aircraft develops a reliability problem. They do not always move together. A well-resourced airline can still face a genuine tension between taking on new-technology risk and the community's reliance on the route it serves. If anything, this suggests that early deployments may concentrate among larger, better-resourced operators, and on their less critical routes first, rather than the most essential, single-fallback services where the need and markets lie.

“Put plainly, this technology is being developed and financed disproportionately for a market that, on current form, is not the market it is principally meant to serve.”

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Two live examples show that gap already being crossed from both directions, rather than waiting for a structural fix to close it first. Loganair, a UK regional carrier of medium scale with a more diverse fleet than many, operates a network that sits squarely inside the thin-route, essential-connectivity category this paradox describes. It chose to take on early-technology risk directly. Its Beta Technologies term sheet, covered in Section 4, shows an operator whose essential routes have no easy fallback backing itself, rather than waiting for other launch customers to go first. Republic Airways, the US regional group that flies American Eagle, Delta Connection, and United Express services across a fleet of more than 240 aircraft, has approached the same territory from the opposite direction. In 2026 it signed a memorandum of understanding to evaluate Beta's ALIA CTOL, alongside flight demonstrations across Vermont, New York, and Florida. That brings genuinely larger scale and engineering resources to the operator side of the equation, though scale alone does not resolve the route-criticality side. A well-capitalised airline's most critical routes can carry the same lack of fallback capacity as a small operator's entire network. Neither example resolves the paradox outright, Loganair's commitment is real but modest in scale, and Republic Airways is still evaluating rather than ordering, but both show the gap closing in more than one direction. Until it closes further, the industry's early adopters and its intended beneficiaries will keep being, for the most part, two different groups.

Beyond individual operators choosing to bear that risk directly, there are several further ways this gap could structurally close. Subsidy or public-service-obligation frameworks could explicitly underwrite early-technology risk rather than only route economics. OEMs could retain more of that risk themselves through power-by-the-hour structures, rather than passing it to operators at the point of sale. There could be a phased path, in which better-capitalised launch customers absorb the early operational risk before the technology reaches the routes that need it most. Or there could be a transitional period of parallel conventional backup capacity. Which of these fits depends heavily on route network, ownership structure, and regulatory environment. None of them need solving in isolation, and working through exactly that trade-off with operators, lessors, regulators and governments directly is the kind of work ALTEA does with clients navigating this decision.

Sections 4 and 5 pick this up, with worked examples of how paper commitments and real capital can tell very different stories about which programmes are actually best placed to reach the routes this paradox describes.



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Reordering the Propulsion Race

Three years ago, it was reasonable to treat hydrogen fuel cells and battery-electric or hybrid propulsion as competing bets, pursued in similar numbers across the industry. That picture no longer holds, but the honest version of what replaced it is more nuanced than 'hydrogen lost.'

Among independent small-aircraft and powerplant developers, hydrogen has narrowed to essentially one significant player, ZeroAvia. Even so, ZeroAvia scaled back its ambitions sharply through 2026, halving its workforce and refocusing on the smaller ZA600 powertrain for 9 to 19-seat aircraft rather than larger platforms.

At the other end of the industry, hydrogen is not retreating at all, but timescales are moving to the right and major infrastructure questions remain. Airbus and MTU Aero Engines used Farnborough 2026 to deepen a joint venture on hydrogen fuel-cell propulsion, alongside Airbus's own hybrid-electric LEIA demonstrator programme. The same week, GKN Aerospace marked completion of its government-backed H2GEAR programme. Its £44m follow-on, H2FlyGHT, was itself narrowed in 2025, cutting planned motor and power-generation work, after Airbus pushed back its ZEROe hydrogen timeline by at least five years. The pattern is not that hydrogen is dying; it is that only the largest balance sheets can still afford to continue to develop it at aircraft scale, while independents have been forced towards the battery-electric and hybrid-electric architectures that dominate the sub-30-seat category.

For the battery-electric category, the 'physics' leaves little choice, though the way it bites is not quite the simple story usually told. Independent modelling by the International Council on Clean Transportation puts a nine-seat all-electric aircraft at around 7,500kg maximum take-off mass, roughly double a comparable conventional nine-seat turboprop such as the Cessna Grand Caravan. At 19 seats, the constraint changes shape rather than simply growing. Part 23 certification rules cap maximum take-off mass for this aircraft category at around 8,600kg regardless of propulsion type, so an all-electric design cannot simply get heavier to fit more batteries unless it takes on the more challenging Part 25 certification rules. Instead, the battery is left fighting structure and payload for a share of a fixed weight budget. On the same modelling, batteries end up taking the smallest share of maximum weight of any of the aircraft sizes studied at this point in the market. Either way, weight has to come from somewhere. That is why nearly every serious sub-30-seat programme has converged on some form of hybrid architecture, combining batteries with a turbogenerator or parallel conventional engine, rather than pursuing pure electric flight.

That weight cap is not simply a technical constraint. It is also a choice with real commercial consequences, because the certification basis and market access are directly linked. Under US rules, any aircraft type certificated after March 1995 must be certified to the larger Part 25 transport-category standard, not the lighter Part 23 commuter category, to be eligible for Part 121

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scheduled airline operations. A new aircraft that stays under the Part 23 weight limit to keep itself lighter is, by the same token, shutting itself out of Part 121 scheduled US airline service and limiting itself to Part 135 commuter and on-demand operations instead. Heart Aerospace's move from a 19-seat, Part 23 design to a 30-seat, Part 25 aircraft, now the 36-seat ES-36, was made explicitly for this reason. It accepted a heavier, more expensive certification basis in exchange for access to the scheduled-airline market from which a lighter aircraft would have been barred. That single decision is arguably as important to Heart's current position as any technical milestone covered in Section 4.

Current regional and engine OEMs are not standing on the sidelines either, but their approach looks markedly different from the start-ups covered elsewhere in this paper: generally more conservative, evolutionary steps rather than clean-sheet bets. ATR is working with Pratt & Whitney Canada on a mild-hybrid version of the PW127XT engine. It would add a 200kW electric motor at the reduction gearbox, contributing up to ten percent of the roughly 2MW peak power required from each powerplant, well short of the parallel or series hybrid architectures envisaged by new market entrants. The companies are targeting a hybrid-electric ATR 72-600 demonstrator to fly in 2029 under the EU-backed DEMETRA project. The commercial timetable has softened, however. ATR stepped back in 2025 from launching a hybrid-electric EVO to replace the ATR 42 and 72 in the early 2030s, saying the technology was not ready. ATR now pursues hybrid-electric propulsion and a next-generation turboprop engine in parallel, and says it will not launch an aircraft until the technology is ready.

GE Aerospace is taking a similarly incremental path: its own hybrid-electric demonstrator. Using a Saab 340B testbed modified under NASA's USD260m Electrified Powertrain Flight Demonstration programme with Boeing's Aurora Flight Sciences and Beta Technologies as partners, the aircraft reached the first hybrid-electric flight above 30,000 feet in May 2026 before a transatlantic ferry flight to Farnborough.

Both the ATR and GE programmes are smaller technical steps than the architectures pursued by the independents in Section 4. They come, however, from manufacturers with existing certified products and established support networks, with timelines measured in a single decade rather than the funding-survival window most of those independents face.

European public funding continues to underpin that work. Clean Aviation's third call committed EUR144m of EU funding to hybrid-electric regional projects led by ATR, Pratt & Whitney Canada, and Safran. In September 2026 its fourth call added 19 projects with a total research effort of EUR664m (about USD760m), EUR290m of it being EU funding, although only EUR40m of that went to the regional-aircraft strand, well down on the previous call.

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The Credibility Reckoning

The clearest evidence for this split between the approaches of established OEMs and independents is not in propulsion architecture but in who is backing whom.

It is worth being precise about what these aircraft commitments actually represent, since this paper cites several of them, here and again in Section 5. At this stage of development, most such commitments, letters of intent, memoranda of understanding, even signed term sheets, are typically non-binding: they carry no deposit, no cancellation penalty, and no obligation to convert into a delivered aircraft. That is standard practice for pre-certification programmes, not a flaw specific to any one of them, and it is a different order of commitment from the deposit-backed backlog an established manufacturer reports. Where the distinction matters, we have tried to be precise throughout this paper about which kind of commitment is in play. None of that makes the interest these figures represent meaningless: real airlines and lessors do not sign even a non-binding document without some genuine intent. But it should be read as a signal of interest rather than a guarantee of revenue.

Heart Aerospace flew its X1 demonstrator on 12 August 2026. At 106 feet of wingspan, it is the largest battery-electric aircraft to have flown, and it delivered over a megawatt of power on an all-electric flight.

On 23 September 2026, during the Regional Airline Association's Leaders Conference, Heart unveiled its production design, the 36-seat ES-36, which replaces the 30-seat ES-30. The ES-36 carries six more seats and 1,415lb more payload for the same maximum take-off weight and battery capacity. It replaces the ES-30's four nacelles and independent parallel-hybrid arrangement with two nacelles and a twin series-hybrid powertrain, in which a megawatt-class turbogenerator supplements the batteries feeding each of two 1.65MW electric motors. Heart quotes 125 miles of all-electric range and 745 miles in hybrid mode, both plus reserves, with first flight of a pre-production aircraft targeted for the second half of 2028 and entry into service in 2031, following Part 25 certification. The programme still rests on the decision described in Section 3, moving from a 19-seat Part 23 design to a Part 25 aircraft, taken specifically to gain access to scheduled US airline operations from which the smaller aircraft would have been barred.

The flight followed a genuinely rocky period, not a steady climb. Heart cut around 72 roles in February 2024 alongside a design overhaul of the ES-30. Then in April 2025 it closed its Swedish operations entirely, roughly 75 further roles, and relocated its headquarters from Gothenburg to Los Angeles, citing the need to be closer to its increasingly US-based customers, partners, and investors. That is two separate rounds of cuts in little over a year, and it is worth holding in mind alongside the milestone above: Heart's current position was not achieved in a straight line. The ES-36 adds a further point in the same direction. It is the latest of several redesigns since the company began in 2018 with the 19-seat, all-electric ES-19. If its 2031 entry-into-service target

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holds, that would be some thirteen years from the start, and three years later than the 2028 Heart first gave for the ES-30. That is the certification-timeline mismatch Section 5 describes, seen in a single programme.

Its order book also deserves the same scrutiny applied throughout this paper. Heart's own current language is a single aggregate, 'over USD9 billion in customer commitments' from carriers including United Airlines, Air Canada, and JSX, with no breakdown between firm orders, options, and letters of intent. Earlier trade reporting cited 250 'firm' ES-30 orders alongside roughly 120 further options and purchase rights and letters of intent for close to 100 more aircraft, though the figures varied between sources and dates. It is not yet clear how those positions carry across to the ES-36, although ALTEA assumes that they will transfer. Underneath the headline number, the individual relationships vary in what they actually commit to. Air Canada agreed to purchase 30 ES-30s and separately made a USD5m equity investment in Heart, real capital at risk, not just a signature. United Airlines committed to a future purchase agreement for up to 100 aircraft, conditional language rather than a firm commitment. Swedish leasing company Rockton agreed to buy up to 40 ES-30s, a lessor-side commitment.

“Real airlines and lessors do not sign even a non-binding document without some genuine intent. But it should be read as a signal of interest rather than a guarantee of revenue.”

JSX shows how a commitment can change in kind. It signed a letter of intent with Heart in December 2023 for up to 100 aircraft. On 23 September 2026 it converted that into a deposit-backed purchase agreement for 50 ES-36s, with purchase rights for 50 more, securing early delivery positions. That is a step from intent towards commitment of the kind this section asks readers to look for, although the announcement gave no deposit amount, order value, or delivery schedule. JSX's December 2023 announcement covered up to 332 aircraft across three manufacturers (Heart, Aura Aero, and Electra), all as letters of intent, and only the Heart part has so far been publicly reported as converted. Aviation Week also reports that JSX's Part 135 certificate limits it to 30 seats, so it would fly the 36-seat aircraft with 30. That is a reminder that the operating regime shapes what an airline can do with a design as much as the aircraft's own certification does.

Beta Technologies signed a term sheet with Loganair at Farnborough on 20 July 2026 for five all-electric ALIA CTOL (CX300) aircraft, with options for five more, targeting entry into service from 2029. The agreement followed a UK demonstration campaign in March 2026 in which the aircraft flew 23 flights in ten days across Loganair's network, and Loganair has said the agreement

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positions it to become Europe's first commercial airline operating an electric aircraft fleet. Loganair's commitment sits within a much larger total. Beta's own Q1 2026 results put its overall commercial aircraft backlog at 991 aircraft worth USD3.9bn, up from 891 aircraft/USD3.5bn at year-end 2025. Much of that growth came from a March 2026 order from Surf Air Mobility for 25 firm CX300s plus 75 options. That total figure spans all three of Beta's platforms, the CX300 fixed-wing aircraft, the A250 eVTOL, and the MV250 hybrid-electric defence variant, rather than the CX300 specifically. Beta does not separately disclose a CX300-only backlog total.

Evio continues to develop its 810 with backing from Boeing and Boeing Canada, and its comparatively conservative parallel-hybrid architecture has attracted steadier support than more ambitious all-electric designs.

That size jump is worth pausing on. Evio's 76-to-88-seat aircraft and Heart's own 36-seat ES-36 sit well above the thin, subsidised, single-aircraft-type routes Section 2's risk-paradox argument describes. Their likely early operators are larger and better resourced, with the fleet diversification and engineering depth to absorb a new-technology problem that a small island operator could not.

That does not mean the risk disappears, only that it shows up differently. Even mature, established powerplant technology can impose real unplanned cost on capable operators. Pratt & Whitney's PW1000G geared turboprop, a conventional powerplant from a decades-established OEM, illustrates the point. A powder-metal contamination issue disclosed in 2023 grounded 648 GTF-powered aircraft at its March 2025 peak (28% of the GTF-powered fleet). It was still affecting roughly a third of the fleet by December 2025, and hit the A320neo, A220, and Embraer E2 fleets to very different degrees. A salutary tale for new propulsion architectures from companies with a fraction of Pratt & Whitney's operating history.

Electra is showing good progress across market and business development. In July 2026 it selected Safran's TG600 as the powertrain for its EL9 Ultra Short hybrid-electric aircraft, with an initial order for 250 TG600 engines (Electra's own commitment to Safran as a supplier, not a customer order for aircraft). It also announced an \$850m production facility in Springfield, Ohio, targeting up to 800 aircraft a year at full capacity. First flight is targeted for late 2027 or early 2028. In September 2026 it flew its two-seat EL2 technology demonstrator from heliports, taxiways, and a drag strip across Virginia, testing the helicopter-style operations on which its point-to-point concept depends. Aviation Week also lists JSX as holding a letter of intent for up to 82 EL9s. Bristow, by contrast, converted its own letter of intent in January 2026 into a deposit agreement for five EL9 delivery slots, with options on 45 more, binding subject to certification, although the deposit amount was not disclosed. As with Heart, Beta, and Evio, the scale of the commercial and manufacturing commitment behind Electra is the clearest signal of where the programme stands, well beyond what the underlying technology alone would suggest.

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A less widely covered example fits the same pattern. Germany's MD Aircraft, developing the ten-seat (pilot plus nine passengers) all-electric MDA1 eViator with a distinctive swappable-battery architecture, secured a strategic investment from Piper Deutschland (Piper Aircraft's German sales and maintenance representative, not Piper Aircraft itself) in late 2025. It has since built a letter of intent book that the company states at over 200 aircraft. MD Aircraft has also disclosed the aircraft's maximum take-off weight (approximately 4.6 tonnes) and payload (918kg), alongside a refined CS-23 Amdt.6, Level 3, Low Speed certification basis. Battery capacity has not been disclosed. Motor development has drawn on Rolls-Royce input. Its timeline has slipped a year on both ends, a full-scale demonstrator first flight now targeted for Q1 2028 and series entry into service for 2031, versus 'early 2027' and 2030 as reported in 2024. It remains a smaller and less publicised programme than Heart, Beta, or Electra, but shows the same underlying pattern: a durable but smaller manufacturer with backing correlating with steady but quieter progress.

A third pattern is worth looking at alongside these two. Ampaire, a longstanding hybrid-electric developer, closed a \$19m Series B in August 2026, with strategic backing from Alaska Airlines' and IAG's own venture arms, having gone through IAG's accelerator programme in 2025. Rather than a clean-sheet design, Ampaire is pursuing certification of a hybrid-electric retrofit for the Cessna Grand Caravan, aiming to roughly halve fuel consumption on an already-certified airframe. Retrofitting an existing type sidesteps much of the clean-sheet certification timeline that drives the financing mismatch set out in Section 5, which may be exactly why airline venture arms have found it an easier commitment to make.

Not every programme with a credible, well-documented history has found such backing. Elektra Solar's Scylax E10, a ten-seat all-electric design pursuing CS-23 certification, has been in development since around 2019. It continues to operate and develop. But it illustrates the slower, quieter version of the same financing pressure: a technically credible design without the scale of external backing that has moved Heart, Beta, or Evio forward faster.

Maeve is the starkest illustration of what happens when that mismatch occurs. The Dutch developer of the 76 to 100-seat hybrid-electric Maeve Jet, backed at one stage by an investment from SkyWest Airlines, was declared bankrupt on 28 May 2026 alongside its parent company, Green Transition Alliance. A EUR20m bridge round it needed to fund the next phase of development had failed to close. The collapse disrupted the regional fleet plans of both SkyWest and Delta Air Lines, which had been counting on the aircraft.

Elysian's case is different in kind, not just in degree. Its E9X is a genuinely larger undertaking than anything else covered in this paper. It is an all-electric aircraft targeting around 90 seats, with a maximum take-off weight above 80 tonnes after an April 2026 design revision that also trimmed the number of electric motors from eight to six. At that size the aircraft sits well inside Part 25 transport-category territory regardless of any certification-basis choice. Against that, Elysian has raised about USD10m in private funding to date, alongside Dutch government support through the National Growth Fund's aviation-transition programme and a battery-technology agreement with

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ProLogium signed in June 2026. The company's own public estimate is that a further EUR5bn to EUR10bn will be needed to certify and industrialise the aircraft, on top of roughly EUR300m just to build and fly a prototype. Few programmes in this paper state the scale of the financing mismatch as plainly as Elysian's own numbers do.

Aura Aero sits at the credibility end of this group, though not without some strain. Aura Aero has raised EUR340m to date for its 19-seat ERA, including a EUR50m round in April 2026. In March 2026 it won its first firm order, one aircraft plus three options, from French regional operator Pan Européenne Air Service, a binding commitment rather than another letter of intent. It also holds close to 700 non-binding letters of intent from 16 further operators. Its timeline has still slipped: first flight has moved from early to mid-2027 and certification from 2027 to 2028, with entry into service now targeted for 2029. The company has also diversified into Uncrewed Aerial Vehicle development of a new design. ERA is a CS-23/Part 23 design, which, following the certification-basis mechanism set out in Section 3, would in principle limit it in the US market to Part 135 commuter and on-demand operations rather than scheduled Part 121 service. Aura Aero has not addressed this limitation publicly; it is ALTEA's own inference from the general rule, not the company's own admission, and is worth naming as a structural constraint distinct from the financing question.

Vaeridion, developing the smaller nine-seat all-electric Microliner, shows a different balance. Its technical credentials are strong for its size. It has completed two EASA pre-application contracts, the second in July 2026 with GKN Aerospace on high-voltage electrical systems. It opened its first manufacturing and test facility at Oberpfaffenhofen in March 2026, on the same site as Deutsche Aircraft, with which it signed a memorandum of understanding in September 2025 to flight-test its battery technology on the D328eco testbed. It also has a strategic collaboration with Aura Aero. Its commitments are largely paper. ASL Group placed an order for ten aircraft in 2025, on terms not disclosed, and in June 2026 Vaeridion announced over 100 further letters of intent from six customers. Its capital is thin by comparison: a EUR14m Series A in December 2024, led by World Fund, with about EUR1.4m of public research grants, against the roughly USD100m that Section 5 gives as the historical cost of a clean-sheet Part 23 aircraft. General Atomics Aeronautical Systems has announced an investment of undisclosed size and is evaluating its battery packs, and the European Investment Bank has given advisory support, not equity or debt. The timetable is also moving: first flight has shifted from 2027 to about mid-2028, while entry into service is still given as 2030.

The amphibious niche, where Tidal Flight, NOEMI, and JEKTA have converged on water-based designs that reach those island and coastal communities that larger players contest less, shows the same gap in miniature. JEKTA's PHA-ZE 100 is a 19-passenger flying boat at the Part 23 weight ceiling discussed in Section 3 (full specifications in Table 2). It has the largest claimed order book in the niche: a conditional USD1.35bn, which its chief executive expects to pass USD2bn by the end of 2026, built in part on a March 2023 letter of intent for ten aircraft. No comparable public figure exists for the capital it has raised, and testing so far has been limited to subscale prototypes. Tidal

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Flight's Polaris has 11 letters of intent worth more than USD900m across upward of 140 aircraft as of September 2025, against around USD3.4m raised to date. NOEMI runs the other way, with a strong engineering team and a formal EASA pre-application contract, but an uneven capital story: a slowdown earlier in 2026, then EUR7m in July for flight testing. None combines a well-verified order book with deep capital and engineering credibility. Paper commitments are cheap to accumulate, and real capital and technical depth are harder currencies.

Worth watching alongside all three is REGENT's Viceroy, a wing-in-ground-effect craft regulated as a marine vessel rather than a certificated aircraft, and so outside the analysis in this paper. It completed its first crewed flight in September 2026, backed by a \$240m Series B, which is real capital reaching the same underserved-connectivity problem by a genuinely different route.

Table 1: Programme comparison, credibility and commitments (as of September 2026)

Programme	Seats	Propulsion	Key backing	Status (Sept 2026)
Heart Aerospace ES-36 / X1	36	Series hybrid-electric	Air Canada (purchase agreement + USD5m equity); United (future purchase agreement); JSX (deposit-backed agreement, 50 aircraft + purchase rights for 50); Rockton (LOI/intent, ES-30 era)	X1 flew 12 Aug 2026 (largest battery-electric aircraft flown); ES-36 unveiled 23 Sep 2026, first flight targeted H2 2028, EIS 2031; two rounds of layoffs (2024, 2025) and Sweden-to-LA relocation; 'over USD9bn' customer commitments claimed, no breakdown given
Beta Technologies ALIA CTOL (CX300)	5	All-electric	Loganair (term sheet, 5 aircraft + 5 options)	Term sheet signed 20 July 2026 at Farnborough; EIS targeted 2029
Evio 810	76-88	Parallel hybrid	Boeing, Boeing Canada; Pratt & Whitney Canada (propulsion)	Steady development, conservative architecture
Electra EL9 Ultra Short	9	Hybrid-electric	Safran (250-engine initial order, supplier commitment not customer aircraft order); Bristow (deposit agreement, 5 aircraft + options on 45)	\$850m Ohio production facility announced July 2026; first flight targeted late 2027/early 2028
Ampaire Eco Caravan (AMP-H570)	9 (retrofit of Cessna Grand Caravan)	Hybrid-electric retrofit	Alaska Airlines and IAG venture arms	Part 33/Part 23 STC certification in progress;

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			(\$19m Series B, Aug 2026)	retrofit of an already-certified airframe
MD Aircraft MDA1 eViator	10	All-electric	Piper Deutschland (Piper Aircraft's German sales/MRO representative, not Piper itself); 200+ aircraft LOI book (incl. Evia Aero, 10 aircraft), company-stated	Demonstrator first flight targeted Q1 2028, series EIS 2031 (both a one-year slip from earlier 2027/2030 reporting)
Tidal Flight Polaris	9-12	Hybrid-electric	DeltaHawk; Tropic Ocean Airways (20-aircraft order)	11 LOIs (Sep 2025), USD900m+, 140+ aircraft; MEHAIR 5 firm +5 options (Feb 2026); first flight targeted 2027
ZeroAvia ZA600	9-19 (retrofit)	Hydrogen fuel cell	Multiple investors; EU Innovation Fund	Scaled back sharply in 2026 (workforce halved, refocused on ZA600)
Elektra Solar Scylax E10	10	All-electric	Independent / seeking funding	In development since c.2019, not yet certified; certification basis not publicly disclosed
NOEMI (formerly Elfly)	9	All-electric seaplane	Nordic Seaplanes (MOU); Innovation Norway plus private match	Reported slowdown earlier in 2026, then EUR7m secured July 2026 for flight testing; first flight targeted end 2027
Maeve Jet	76-100	Hybrid-electric	SkyWest Airlines (investment, pre-collapse)	Maeve and parent Green Transition Alliance declared bankrupt 28 May 2026 after a EUR20m bridge round failed; SkyWest/Delta fleet plans disrupted
Elysian E9X	88-100	All-electric	Dutch National Growth Fund; ProLogium (battery MOU, Jun 2026)	~USD10m raised to date vs. company's own EUR5-10bn certification/industrialisation estimate
Aura Aero ERA	19	Hybrid-electric	Pan Européenne Air Service (1 firm order + 3 options); ~700 LOIs from 16 operators	EUR340m raised to date (incl. EUR50m Apr 2026 round); first flight slipped to mid-2027, certification to 2028, EIS c.2029
Vaeridion Microliner	9	All-electric	ASL Group (order, 10 aircraft, terms not disclosed); 100+ LOIs (Jun 2026); World Fund-led EUR14m Series A (Dec 2024); EIB (advisory, not equity); Deutsche Aircraft (MoU, Sep 2025); Aura Aero (collaboration)	First manufacturing/test facility opened Oberpfaffenhofen, Mar 2026; second EASA pre-application contract, Jul 2026; first flight now c. mid-2028 (earlier 2027), EIS 2030

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JEKTA PHA-ZE 100	19	All-electric / hydrogen fuel cell option	Gayo Aviation (LOI, 10 aircraft, Mar 2023); ZeroAvia (fuel-cell partnership, Jul 2024)	Conditional order book claimed at USD1.35bn (2026), CEO expects USD2bn by year end; no public capital-raised figure found; subscale flight testing from Jan 2026; Part 23 certification targeted 2029
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Table 2: Programme comparison, technical characteristics (as of September 2026)

Programme	Certification basis	MTOW	Range / endurance	Battery / power
Heart Aerospace ES-36 / X1	Part 25 (pivoted from 19-seat Part 23 ES-19)	Not disclosed (same as ES-30)	109nm (125mi/200km) all-electric; 647nm (745mi/1,200km) hybrid	Series hybrid-electric: twin powertrains, each a 1.65MW electric motor with a megawatt-class turbogenerator; battery capacity not disclosed
Beta Technologies ALIA CTOL (CX300)	Part 23	Not disclosed	336nm (demonstrated range)	All-electric; not disclosed
Evio 810	Part 25	39,000kg	500nm max (200-300nm typical mission)	Parallel hybrid (Pratt & Whitney Canada propulsion); power not disclosed
Electra EL9 Ultra Short	Part 23	Not disclosed	330nm commercial (9 pax+baggage or 3,000lb cargo); 1,100nm max ferry range (empty, IFR reserves)	Hybrid-electric (Safran TG600)
Ampaire Eco Caravan (AMP-H570)	Part 33/Part 23 STC (retrofit of certified Cessna Grand Caravan airframe)	Cessna Grand Caravan baseline	Not disclosed	Hybrid-electric retrofit powertrain
MD Aircraft MDA1 eViator	CS-23 Amdt.6, Level 3, Low Speed	approx. 4.6 tonnes	up to 400km/216nm (technical range); payload 918kg	All-electric, swappable Power Bay (CCS2 charging); battery kWh not disclosed
Tidal Flight Polaris	Part 23	approx. 5,670kg	1,034nm	Hybrid-electric (DeltaHawk fuel engine, generator, and battery)
ZeroAvia ZA600	Retrofit powertrain, 9-19 seat aircraft	n/a (retrofit)	Not disclosed	Hydrogen fuel cell
Elektra Solar Scylax E10	Part 23	3,500kg	approx. 300km (500km targeted within 10yrs)	All-electric, 2x300kW motors

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NOEMI (formerly Elfly)	CS-23 Level 3	5,670kg	60min flight time (ex. reserves) at up to 100kts; 800m water take-off/landing	400kWh battery, 1,200kW max power
Elysian E9X	Part 25 scale (88-100 seats)	>80t after Apr 2026 redesign	750km (~405nm) current disclosed range; stated future target 1,000km (aspirational, battery-density-dependent)	All-electric
Aura Aero ERA	CS-23/Part 23	Not disclosed	900nm (1,500km per Aura's own published figure)	Hybrid-electric
Vaeridion Microliner	CS-23 (EASA pathway; level not stated)	5,700kg / 12,500lb	215nm (400km) + commercial IFR reserves; useful load 1,000kg	All-electric: two electric motors driving one propeller; battery capacity and power not disclosed; charging under 40 minutes
JEKTA PHA-ZE 100	Part 23	approx. 19,000lb/8,600kg	approx. 1hr + 30min reserve (battery); 500-600km with ZeroAvia fuel cell variant	All-electric baseline; hydrogen fuel cell variant w/ ZeroAvia

Telling capital depth apart from paper commitment, as this section has tried to do for every named programme, is exactly what the diligence operators, lessors, and financiers need before committing to any one of them. It is a discipline ALTEA applies to every programme we are asked to assess. The number of 'not disclosed' cells in the table above is itself a data point: this is a sector still short of the basic technical transparency Section 5 argues lessors and appraisers will need.

One further point is worth making, not as a critique of any single programme but as a broader point about how figures like these should be read. Publicly published performance specifications in this sector are rarely accompanied by the underlying weight and energy assumptions that would let an outsider judge how achievable they are. One can simply compare a claimed battery capacity against publicly known ranges for current aviation battery specific energy. That basic, non-specialist check can suggest that the weight of the pack represents a significant share of an aircraft's stated maximum take-off weight, leaving a tight margin for payload, motors, and structure. Similarly, it is often unclear what a declared range assumes: whether it is an absolute maximum or allows for VFR or IFR reserves, and, for the smaller types especially, whether it assumes an aircraft equipped for and operating in icing conditions. This is not a rigorous engineering assessment, and specifications at this stage of development are routinely described by their own manufacturers as subject to change. It is a reminder that published performance numbers across this sector deserve the same kind of informed scrutiny that a lessor, financier, or operator would apply before committing capital, rather than being taken at face value.

An ALTEA Insight:

The Financing Mismatch

Strip away the individual company stories and a structural pattern emerges. Certification of a genuinely new propulsion architecture and platforms takes eight to ten years or more from clean-sheet design to entry into service. Venture capital, by contrast, is built around a five to seven-year return horizon. That mismatch, not battery chemistry, nor motor reliability, is the single best predictor of which programmes have struggled and which have found stable ground in 2026. Put bluntly, the capital structure funding most of this sector is not built to reward the companies most likely to succeed. It is built to reward whichever company can tell the most convincing five-year story, and that selection pressure is a large part of why the industry keeps being surprised by overpromising and under-delivery.

The scale of that mismatch is worth putting in numbers. A clean-sheet Part 23 aircraft (the certification basis most of the programmes in this paper are pursuing) has historically cost on the order of USD100m to develop, before adding the cost of a genuinely novel propulsion system on top. A clean-sheet Part 25 transport-category aircraft, the basis Heart accepted when it moved to its 30-seat ES-30 (now the 36-seat ES-36), runs into the billions of dollars to develop and industrialise. Elysian's own public estimate for its considerably larger E9X puts that figure at around USD10bn, on top of an initial ~USD345m prototype phase. That is close to two orders of magnitude apart. Venture capital operates comfortably in the first range and nowhere near the second, which is exactly why the certification-basis choice described in Section 3 is also, in effect, a choice about what kind of capital a programme will need to survive.

“The capital structure funding most of this sector is not built to reward the companies most likely to succeed. It is built to reward whichever company can tell the most convincing five-year story.”

The industry's timelines add a further twist. Independent tracking by Ishka Airfinance found 16 of 48 new propulsion products with public entry-into-service targets have already slipped, by 16 months on average, spread evenly across battery-electric, hybrid-electric, and hydrogen designs. Established manufacturers are not exempt. The ICCT has tracked similar slippage at Airbus, whose hydrogen ambitions have moved from a 2035 target to an expected 2040 to 2045, and at Embraer, whose Energia hybrid-electric family has slipped roughly five years to around 2040. The pattern is not that start-ups are uniquely optimistic; established manufacturers slip by similar margins. The difference is what happens next. Airbus and Embraer absorb a five to ten year delay and continue. Universal Hydrogen flew the largest aircraft ever powered by hydrogen-electric propulsion and folded within a year, not because the technology failed, but because its funding runway could not stretch to match the slip. Optimism is common across this industry. Surviving the gap between the

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optimistic date and the real one is not, and that gap is a funding problem before it is a technical one.

The pattern bears this out directly. The programmes that have visibly stabilised, Heart with airline commitments, Beta with an airline term sheet, Evio with Boeing, are exactly the ones that have attracted capital or customers with a longer time horizon than a typical venture fund. The mismatch between capital patience and certification reality is not a general industry headwind; it is becoming the dividing line between which programmes survive independently and which need a strategic anchor.

There is also a less obvious shift. A conventional turboprop OEM largely sells an airframe once, and the aftermarket, engine MRO, spares, upgrades, is spread across a wide ecosystem of third parties. An electric or hybrid aircraft OEM is structurally different: it typically controls battery replacement, the software managing the powertrain, and health monitoring. That is a far larger share of the aircraft's lifetime value sitting inside a single company's control, a dynamic already visible in how engine OEMs and, more recently, advanced-air-mobility manufacturers have built aftermarket-first business models. Applied to the regional aircraft segment specifically, this has real implications: for the business cases of the new OEMs, for how lessors underwrite residual value, for how aftermarket competition (or the lack of it) develops, and for whether OEMs are incentivised to build for longevity or for recurring revenue. This is an argument that does not appear to have been made for this segment, and it deserves more attention than it has had.

OEMs have a genuine answer to this, and it deserves stating before it is challenged. Battery technology is improving quickly enough that a replacement pack fitted five or ten years into an aircraft's life is not simply a like-for-like swap: it can bring meaningfully more energy density, and therefore more range or payload, than the pack it replaces. On that argument, a mandatory battery purchase is less a pure cost than a periodic capability upgrade the airframe could not otherwise receive, closer to buying a new engine standard than replacing a worn-out part.

BETA Technologies' own IPO prospectus (SEC Form S-1) puts real numbers behind this debate, and it is worth working through carefully rather than taking the headline figure at face value. BETA estimates that an aircraft operated for 20 years will need 18 to 20 sets of replacement batteries, generating around USD13m in revenue per aircraft at current-year pricing with 2.5% annual escalation. That is not a footnote in BETA's own business model: the company has told the market its aftermarket battery business could eventually generate up to three times the revenue of the aircraft itself. ALTEA's own calculation from those figures implies a current-year price per pack of somewhere around USD500,000 to USD565,000, depending on where in the 18-to-20 range the true figure sits. What the prospectus does not do, at least as disclosed, is address the other side of that transaction. There is no mention of an exchange or core-return structure, and no credit anywhere in the model for the value of the pack being removed, typically still holding 80% or more of its original capacity. That does not make the projection wrong. It does mean the model, as published, is silent on a question this paper thinks the industry has to answer: who captures the value sitting in a removed pack, and does the aircraft's original buyer see any of it back?



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Follow that logic one step further and a second consequence appears. An OEM that already controls the battery, the software, and the health monitoring starts every negotiation with a traditional operator, lessor, or financier from a stronger position than a conventional turboprop OEM ever did. Power-by-the-hour structures, floated in Section 2 as one way this risk could be absorbed differently, would let an OEM capture more of the aftermarket and data revenue directly, reducing, though not eliminating, a traditional lessor's role as intermediary. That does not make independent lessors obsolete: capital efficiency, multi-asset diversification, and residual-value underwriting are still real functions an OEM's own balance sheet is not built to replace. It does mean the terms on which lessors participate, and what share of an asset's lifetime value they can expect to capture, are shifting in the OEM's favour by default. Operators and lessors need to negotiate for a different starting position now, while the market structure is still being set.

“Optimism is common across this industry. Surviving the gap between the optimistic date and the real one is not, and that gap is a funding problem before it is a technical one.”

There is a more immediate, practical version of the same problem. The standard tool aircraft appraisers use to set a residual value, comparing an asset against recent transactions of the same type, does not really exist yet for any of the aircraft named in this paper: there is no meaningful transaction history to compare against. In its absence, appraisers and valuers are thrown back on engineering fundamentals that only the OEM currently holds in any depth. In practice, that means OEMs sharing data in a form built for underwriting rather than marketing. That covers battery degradation curves and cycle life under real dispatch conditions, not laboratory conditions, and residual pack value assumptions at the point of removal, not just at delivery. It also covers exchange or core-return economics, if any exist, spelled out rather than left silent, as BETA's own current filing leaves them. Finally, it means enough of the underlying cost and performance assumptions for an outsider to reproduce a manufacturer's own economics independently, the same standard this paper has tried to apply to every claim in it. Equally, many of these OEMs are young companies with limited institutional experience of aviation finance, and may not yet know what an appraiser or a lessor actually needs to see to put a defensible number on an asset. Building that channel, in both directions, is not a detail to solve later. Without it, every residual-value assumption in this paper, and every one an operator or lessor will be asked to sign up to, is closer to a guess than an estimate.

The operating-cost case for electric and hybrid aircraft deserves the same scrutiny as the order books. The promise is straightforward. Electricity costs far less per flight hour than jet fuel, and an electric motor has far fewer moving parts and far less thermal stress than a gas turbine, so its maintenance should cost less as well. Manufacturers are already building their sales case on this. Heart, for example, targets operating costs at least 40% lower than legacy regional aircraft for the ES-36, and JSX's chief executive points to the absence of the cycle sensitivity that drives wear on turbfans and turboprops over short sectors. Both are statements by a manufacturer and a prospective customer rather than independent findings, and Heart's published comparison sets the 36-seat ES-36 against a 48-seat turboprop and a 50-seat regional jet without stating its basis in

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the material published with the announcement. Hybrids also carry a turbogenerator, so they keep some of the turbine maintenance and fuel cost that a pure electric aircraft avoids. How much of the saving survives depends on how much of each mission is flown on battery.

Low energy and maintenance cost per flight hour is only half the picture. The other half is battery replacement cost, cycle life under real dispatch profiles, and the residual-value assumptions that sit behind any lease, and that half is far less visible in the marketing material than the first.

For an operator, the practical question is therefore not whether electricity costs less than jet fuel, which it plainly does. It is what the whole cost of a flight hour looks like once packs are worn, replaced, and valued, on its own routes and at its own utilisation. Evaluating that carefully, before a fleet decision rather than after it, is where independent operator-side analysis has most to offer, and it is work ALTEA does.

None of this argues for waiting, whether it is operating economics, battery replacement economics, OEM revenue capture, second-life value, or a wholly new asset class (like REGENT's) testing the edges of the same market. These are solvable design and structuring questions, not reasons to sit on the sidelines. Every one of them is better answered by operators, lessors, OEMs, and financiers working out the allocation together, with ALTEA helping structure exactly that conversation, than by any one party guessing alone. That is precisely the sort of question the next section puts on the table.

An ALTEA Insight:

Open Questions for the Industry

Rather than resolve these, we are putting them on the table, because how they get answered will shape which operators, lessors, and communities actually benefit from this technology, and on what timeline.

- Who should underwrite early-technology risk on essential air service routes: governments, OEMs, or operators? Does today's financing structure get that allocation right?
- Who bears the risk if battery residual-value assumptions prove wrong: the operator, the lessor, or the OEM?
- What data do OEMs need to share with appraisers, valuers, and lessors, and do OEMs yet understand what that audience actually needs, to build credible residual-value models for aircraft with no transaction history to draw on?
- Does the OEM revenue-capture shift change how lessors and financiers should structure transactions, or how airlines negotiate long-term support agreements?
- How should operators evaluate the true operating economics of electric and hybrid aircraft, including battery replacement cost and cycle life, rather than relying on manufacturers' headline cost-saving claims?
- Does the operational reality of hybrid aircraft, dispatch reliability and maintenance burden, match what has been promised?
- How should essential connectivity be protected while new propulsion systems establish real-world reliability?
- Who pays for charging and hydrogen refuelling infrastructure buildout, and on whose timeline: airports, OEMs, or airlines?

An ALTEA Insight:

The ALTEA Difference

ALTEA works with operators, lessors, OEMs, financiers and public authorities who need clear-eyed advice on regional aircraft, new propulsion technologies, and the commercial structures that make them viable.

No single player in this ecosystem can solve these questions alone, which is exactly why they are worth setting out together. Operators, lessors, OEMs, financiers, and public authorities each hold part of the answer, and ALTEA's role is to help them allocate risk, data, and residual value deliberately rather than by default, so the technology actually reaches the routes that need it. We do not write papers for the sake of it. The questions raised in this Insight are exactly the issues we help clients resolve in practice. They include who should carry early-technology risk on thin routes, how residual values should be underwritten when the OEM controls a larger share of the aftermarket, and whether current financing horizons match certification reality. That work ranges from route-level economic modelling, operator-side evaluation of operating costs and battery economics, and residual-value analysis, through transaction structuring and risk allocation, to market assessments for manufacturers and infrastructure providers.

“We do not write papers for the sake of it. The questions raised in this Insight are exactly the issues we help clients resolve in practice.”



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About ALTEA: ALTEA is retained by those who want fresh thinking secured by experience in asset management; procurement and sales; financial solutions and design. Specialising in business jets, regional aircraft and helicopters, the expert team interprets knowledge and insight to achieve extraordinary results. Clients include financial institutions, operators, aircraft manufacturers, governments and private individuals who seek a blend of specialist knowledge, integrity, and inspiration to resolve complex and sensitive aircraft projects.

Let's Talk

If any of the open questions in this paper are live issues for your organisation, we would be glad to discuss them

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