

[Accueil » Industrie »](#)

INDUSTRIE

27<sup>th</sup> January 2025

By Gil Roy



# EcoPulse: Engineer's voice...



"For the first time, we managed to organize ways of proceeding and roles within a very small team to make and manage a demonstrator". **Didier Simeon EcoPulse project manager at Daher**

© Daher



[EcoPulse : paroles d'ingé... - Aerobuzz](#)

EcoPulse, or distributed hybrid-electric propulsion: time to take stock. For the first time, over a five-year period, Airbus, Safran and Daher pooled their know-how to develop a demonstrator and get it flying. The results exceeded expectations. A great professional adventure for the participants too. Here's what they have to say... [Bonus Video]

At the outset, the aim was to see how a distributed hybrid-electric propulsion aircraft could operate in flight. Airbus, Safran and Daher had given themselves five years to find out. The engineers from the three groups who took part in this adventure have made an encouraging assessment, as Vincent Chaperon, EcoPulse project manager at Safran Electrical Power, points out: "It's been a fantastic project".

Daher took a TBM 910 fuselage from the production line and "customized" it, as Didier Simeon, EcoPulse project manager at Daher, explains. Safran, which was responsible for the entire propulsion chain, from propeller to turbogenerator, took the components off the shelf, in particular the EngineUS 50kW electric motors integrated with a dual-position propeller so that it could be feathered when the electric motor was at a standstill.



*"We involved a lot of young people and new recruits in this project, to give them their first experience of the overall design of an aircraft."*

**Christophe Robin, Head of Design at Daher, and EcoPulse project leader at CORAC © Daher**

For its part, Airbus developed and supplied the 800-volt high-voltage battery which is one of the aircraft's two power sources. It also worked on the computer that manages the combination of hybridization and distributed propulsion flight controls. He also worked on modified aerodynamic shapes, acoustics, flight modelling and instrumentation.

All those involved in the project emphasize the quality of the teamwork: a multi-disciplinary team borrowing skills from all three partners. "We involved a lot of young people and new recruits in this project, to give them their first experience of the overall design of an aircraft," explains Christophe Robin, Head of Design at Daher, and EcoPulse project leader within CORAC. "For an engineer, it's just great to have the opportunity to work on a demonstrator, something concrete, and to feel like a real player", emphasizes William Llobregat, EcoPulse Project Manager at Airbus.



<https://www.youtube.com/watch?v=tUoHjKhv1SY>

We had to invent a new way of working together, as Didier Siméon [Daher] points out: "We determined ways of working, roles that didn't exist as the proto coordinator who was implemented for this project. And so, for the first time, we succeeded in organizing ways of proceeding and roles within a very small team to make and manage a demonstrator".



Over and above the very purpose of developing an innovative project linked to a short-term objective, the engineers and technicians had to question the way they operated. Accustomed to working within the more or less cumbersome structures of large industrial groups, they switched to start-up mode, which Pierre-Luc Regaud, EcoPulse project manager at Safran, is delighted to see: "The fact that Safran, a large company, can adapt to the CS23 regulations for small aircraft is proof of the flexibility and agility we have put in place".



*"It was really atypical, both in terms of the number of engines and the number of systems integrated into the aircraft.*

*It was really interesting, and out of the ordinary. **Thibaud Brouze, Daher deputy chief pilot***

*© J.M. Urlacher / Daher “.*

Safran has not waited long to put this experience to good use, particularly in its relations with light aircraft manufacturers who have opted for EngineUS electric engines. These include Aura Aero, Voltaero and Diamond Aircraft. The engine manufacturer acknowledges that it now has a better understanding of the expectations of these aircraft manufacturers' light aircraft teams, who are responsible for exploring and implementing novel solutions. And it understands this all the more because it has been there with EcoPulse.

As part of the EcoPulse project, Safran was in charge of the entire distribution and protection of electrical energy within the aircraft. We're talking about 800 volts here. This is unheard of in either general aviation or transport aviation, where the references are 28 volts or even 115 volts.



*"We were able to adapt our internal procedures to this type of project."*

**Pierre-Luc Regaud EcoPulse project manager at Safran.** © J.M. Urlacher / Daher

In particular, we had to insulate the electrical harnesses running around the tanks. "It's a challenge. We worked with Daher to develop shielding to prevent short-circuits from damaging the aircraft," explains Pierre-Luc Regaud [Safran]. "We commissioned Safran Tech to develop modelling tools". The partners drew on the internal resources of their respective groups.

"We developed a large part of the functional and dysfunctional tests on the Niort site [France]," continues Pierre-Luc Regaud. "The aim was to make sure that, once integrated into the aircraft, we didn't discover any new problems, compatibility or interface issues..."

While the integration of a complete 800 hp electrical system in an airframe designed to fly is the main challenge of the EcoPulse project, the implementation of propulsion is the other major area of exploration, which has also enabled us to take a major step forward in our understanding of the subject.

"This is the first time we've piloted an aircraft using thrust differentials, since there are three engines on each wing," explains Vincent Chaperon [Safran Electrical Power]. "The fact of playing on the non-common thrust, but on one side or the other, rather in differential, made it possible to pilot the aircraft without using the ailerons." Airbus developed fly-by-wire controls that enabled the flight test team to pilot the plane... using the engines. The result was conclusive.



*"One of the immediate benefits is the enormous experience gained by all the teams who have been involved since the beginning of the project."*

**Christophe Robin EcoPulse Project Manager at CORAC © Daher.**

Here again, experimentation is opening up new horizons. Directional control is made possible by the high responsiveness of electric motors, a feature not offered by turbines or internal combustion engines, for which regulation and responsiveness are too slow. Airbus supplied the necessary control loops.



"The various programs made it possible to perform in-flight maneuvers using a joystick and an additional throttle, roll and yaw. You could physically lock the controls, whether ailerons or flap, and generate roll and yaw via this fly control computer", summarizes EcoPulse test pilot Thibaut Brouze. "There were also programs to investigate performance, by applying several levels of power at different points on the wing, to see if we could gain drag or lift. The fact of being able to blow a little targeted on the canopy, different propeller blades, different powers, you can see the influence of this thrust on the wing's performance quite simply."



*"It's been a fantastic project."* **Vincent Chaperon EcoPulse project manager at Safran EP**  
© Daher.

For aircraft manufacturers, the energy transition calls into question the very design of aircraft. "We usually take an airframe, an engine and a propeller. You put it all together and it flies. Why, because we're in a configuration that's been the same for 100 years, since the beginning of aviation. The interactions between the engine, propeller and airframe are relatively weak and well known. When it comes to electric hybridization, and in particular propulsion distribution, things become completely different. In other words, the interactions between the propulsion system and the airframe become very important, even preponderant. So much so, as we were able to demonstrate with EcoPulse, that the aircraft can be piloted by motor effects alone. Christophe Robin [Daher]."

All the engineers and technicians who have worked with us over the past five years remember it as a new experience. They don't hesitate to say that it's been a real adventure. Pierre-Luc Regaud, EcoPulse project manager at Safran, sums it up best. "As soon as I graduated from engineering school, I wanted to be project manager for something that was going to fly. As an engine manufacturer, it's not often that you get to follow a project through to flight. This was a long-term project that lasted 5 years. And to see it fly at Daher, next to the factory, is very moving. It will be a great memory!"



*"For an engineer, it's just great to have the opportunity to work on a demonstrator, something concrete, to feel like a player too."* **William Llobregat EcoPulse Project Manager, Airbus**  
. © J.M. Urlacher / Daher



**Gil Roy**

Gil Roy founded Aerobuzz.fr in 2009. A professional journalist since 1981, his expertise in general aviation, air transport and sustainable development issues is widely recognized. He is editor-in-chief of Aerobuzz and author of 7 books. Gil Roy was awarded the Literary Prize of the Aéro-Club de France. He holds the Médaille de l'Aéronautique.





DAHER



# **TBM** **960** **DIGITAL** **POWER**

Our latest TBM very fast turboprop aircraft delivers the full benefits of digital power. Taking maximum advantage of today's turboprop technology, the single-engine TBM 960 provides high efficiency for more sustainability. In its Prestige cabin, passengers regulate temperature and ambient lighting with exactitude. Featuring outstanding safety systems such as the TBM e-copilot® and HomeSafe™ emergency autoland, the TBM 960 is the quintessential TBM.

**SAFETY & EFFICIENCY  
ARE OUR PRIORITIES.**

Visit us at [tbm.aero](http://tbm.aero) or

Contact a TBM expert  
in Switzerland:

+41 (0)79 890 02 02  
[www.swissflyaero.com](http://www.swissflyaero.com)

