



The aim of the FAI Environmental Commission (EnvC) is the study of all air sports interaction with parts of the environment, considering air, land, sea, water, scenic views, wildlife, vegetation.

FAI ENVIRONMENTAL COMMISSION NEWSLETTER

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In this issue we are looking at the topic of electrically powered aircraft, with three pieces on the subject. But first we report on the outcome of nominations for the Angelo d'Arrigo Diploma.

Angelo D'Arrigo Diploma

An appropriate and worthy winner for 2015

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At its yearly meeting in January, the Environment Commission considered nominations for the first award of the Angelo d'Arrigo Diploma, which is awarded to the individual or organisation considered by the Commission to have contributed most to the defence of and respect for the environment affected by air sports.

The 2015 winner was the Ultralight Aviation Club based at Moscow Technical University of Civil Aviation (UAC MTUCA), for organising and supporting the aviation part of a project to regenerate the white crane or 'sterkh' population on the Yamal peninsular in north-west Siberia.

Sterkh nestlings are bred in nurseries and nesting locations on Yamal, but then have to travel long distances for their winter migration to India. On the way they become hunting targets in Afghanistan and Pakistan. The "Flight of Hope" project aims to escort the sterkh, over West Siberia and Kazakhstan, to south Uzbekistan, where, for the first time in the world, alternative wintering for the sterkh has been established.

Sterkhs are one of the five most intelligent birds in the world. It is very difficult even to count them in the wild nature. Serkhs are endemic, nesting only in Russia and they migrate in winter to warm regions. The experiment starts in winter, when scientists take eggs out of the nests (one egg out of every two) and put the eggs in the incubator. Newly born nestlings get accustomed right from the start to the roar of a working motor, to protect them from stress later.



For the Flight of Hope project, birds in flight are led by motorised ultralights known as "SEARCH-06 STERKH". Angelo d'Arrigo – in whose honour this Diploma was created and who had personal contacts with this group of ultralight pilots - took part in initial experiments in 2002, trying to teach the cranes to follow the ultralights. In 2005 UAC MTUCA joined the project and the first escort flight of an ultralight with sterkh down the Ob river happened in 2006. Today, the operation of escorting crane flocks along waterways over a distance of more than 1,200 km has become a regular practice and more

sterkhs are already being seen at Yamal.

A variety of other nominations were received for the Diploma.

Jean Botti, the Chief Technology Officer of Airbus Group, was nominated by France, for his leadership in the development of electric flight. Jean Botti persuaded the Airbus Executive Committee to trust small teams of young engineers to build experience and competence in a project to design and build a new electric-powered range of light aircraft, which may be the first step towards preparing the future of electric propulsion for larger aircraft. The E-FAN prototype (pictured) first flew in 2014 and a line of 2 and 4 seaters has been announced for 2017. This project can shape the whole industry on a scale which cannot be achieved by smaller manufacturers.



Italy recommended the **Pavullo Aero Club**, which has re-introduced to Italy the use of pulleys for launching gliders. By using pulleys, noise and atmospheric pollution have been eliminated and there is a remarkable energy saving compared with the tow-plane system. In addition to this change of system, the Pavullo Aero Club has successfully fought proposals for urban development on the airport. The people of Pavullo can now enjoy the green space of the airport, which has been opened to them. This includes a 4 km Nature Trail within the area of the airport, which is also used in winter for cross country skiing.

Finally, from the United Kingdom, **Fred To** was nominated for forming the British Human Powered Flight Club in 2014. At the initial human powered aircraft rally, teams competed for tasks such as duration, slalom, landing accuracy, and the FAI 1500 metre triangular course. The Club promotes aviation sport where the environmental impact of sporting and recreational aviation is minimised down to virtually zero. No fossil fuel is burnt either for take-off or during the flights. The first solar-powered aircraft were designed by people with experience on human powered aircraft and the existence of the club promotes more zero-carbon human-powered flight. The Club is already planning for rallies in 2015 and 2016.

Electric flight

Regulatory challenges of electric powered flight

Pierre Duval - *President, FAI Environmental Commission*

Electrical flying seems to be almost on our doorstep. Technically speaking.

As for the regulation, there's still a lot to do.

For aircraft pilots, have a look on your licence: it reads SEP or MEP - Single or Multi Engine PISTON. You cannot legally fly a non ultralight/microlight (below 472,5kg in Europe) with anything other than a traditional piston engine...or turbine/jet for the higher flyers.

Just as with the Licences, in the maintenance regulations nothing has been adapted to the new technologies being used in electric powered aircraft, such as high intensity currents or specific connectors. As no regulation exists yet to design, certify and build those machines, this is not yet a real problem.

What about Air Operations? And how should batteries, with their complex chemical components, be treated? Could they be dangerous goods? What about the “fuel” reserve and the capacity to “deep



discharge” batteries in case of emergency need? Many batteries of current technology (Lithium / Ion) should be used between 20 and 90% of their nominal capacity. If you charge them over 90% or discharge below 20%, you greatly reduce the life of a battery or you can even kill it. In case of emergency, you may think that this aspect is unimportant and that if using all the remaining capacity can save your day, you should do that. There is no equivalent in internal combustion engines with standard fuel. The Air Operations manual (AirOps)

should be rewritten to take this kind of situation into account.

Beyond dreams and noises, there is real work to be done so as to make electric flight part of our everyday flying routine!

We are lucky enough to be in a position to write a new chapter of flying history. This won't come easily as standards of quality, durability, safety and ergonomic

Airbus EFAN 2.0: It will be of great interest to see how Airbus features have been set so high after one century of flying.

will certify its basic electric trainer

But EASA, FAA and all worldwide aviation bodies have

this unique chance to build from scratch a system which could address masses. We have to make it right, quick.

CAFE Foundation 9th Conference

Michele Traverso - Aviation journalist - michele@micheletraverso.com

CAFE (Comparative Aircraft Flight Efficiency) foundation, the volunteer group that promotes advances in personal aviation, organised its 9th conference in Santa Rosa, California, on the present and future of electric flying. Called the “Woodstock of aviation” by an attendee, this is where garage innovation, corporate R&D, small university spin offs, Leonardesque engineers and NASA scientists can all be in the same room.

Lots of attention was, of course, on battery technology and their development. Attendees listened to risk mitigation solutions for thermal runaway, a known issue of li-ion battery packs, as well as solutions for unmanned systems.

Airbus announced at the conference that it's pouring 50 million euros into the eFan 2.0, a hybrid electric training aircraft sporting two ducted fans, on which it's been working for some time. It should hit the market before 2020.

Eric Raymond, designer and pilot of the Sunseeker Duo - the world's first twin-seater solar aircraft - presented his plane's hand built, carbon fiber structures and its many fascinating details.



Brien Seeley - a surgeon by trade and the CAFE Foundation's president - offered a compelling vision for the future of transportation. In the

future, he argued, light aircraft would fly two people on short hops to and from a myriad of football field-sized airfields, scattered around cities. The aircraft will be autonomous. To realise his vision, which is called Sky Transit, he's advocating the use of a money prize - a well proven way to leapfrog technologies.

CAFÉ is the place for any new project to be presented (FLY VOLT)

Slovenian plane maker Pipistrel illustrated the Alpha Electro, an economical trainer for future pilots. Solar Stratos will fly space tourists to the stratosphere, to chase the best sunsets, using a solar electric plane currently in development.

Here's a full speakers list: <http://eas2015.cafefoundation.org/speakers/>

More detailed accounts of specific talks can be found of the CAFE Foundation excellent blog <http://blog.cafefoundation.org/> looking for posts tagged EAS IX <http://blog.cafefoundation.org/?s=EAS+IX>

Why would AEROBATICS be the perfect “launch customer” for electric flying?

Pierre Duval –President, Environmental Commission - envc-president@fai.org

In the diversity of air sports, some have more luck than others in front of the non-flying crowd. Although it is one of the most spectacular ones, aerobatics (represented by CIVA within FAI) has two main challenges. On the one hand, the power variations of ever more powerful engines over any inhabited area may be seen as a deliberate provocation to local residents. On the other hand, in emerging countries, sport aviation does not have access to the diversity of low cost trainers used in countries where long established practices have led to the existence of a stock of older aircraft. Examples include former military aircraft like the Stampe or CAP 10 in France, Chipmunk in the UK and Canada, Yak 52 in Russia, Zlin in Czech Republic, Boeing Stearman in the USA, Bü131 and 133 in Germany and Switzerland etc... For sure, high end Extra or Sukhoi or CAP or US homebuilds and others are readily available, but they cost hundreds of thousands of dollars (or thousands of building hours) and they do not solve the noise issue.

We need to find an entry level 2 seater with aerobatic capability which could be bought at an affordable price and allow newcomers from new sporting aviation nations to be introduced to this form, this art, of flying. In addition, we need to solve the noise issue by using less power for the initial training programme or capability ramp up.

For sure, the growing LSA (Light Sport Aircraft) category would be a perfect match for this new class...if LSA aircraft could be authorized to fly aerobatics (with some engine modification allowing oil lubrication for negative G or inverted flying). It is not the case for now, and only ultralights compete in this field, with the risk of the structure not being strong enough because of the weight limitation, or costs being too high because of the use of exotic materials to get within weight limits. In addition, these ultralights cannot be



used for Private Pilot training and this greatly restricts their use. The good side of this is that, if and when they are authorized to fly aerobatics, we will learn how to create low powered/low noise/low emission aircraft for the next generation of LSA. These aircraft would not cover the full spectrum of modern aerobatics, but they would allow, in addition to “standard” Private Pilot training, to open the world of aerobatics to new pilots, a bit like Citabria and



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Decathlon have done in the US and RF-6 or Robin R-2160 in France.

Magnus Fusion: an aerobatic able ultralight but when do we have an LSA with same capacities?

The following step would certainly be to use these lightweight structure design capabilities to build the next generation of no emission/very low noise aerobatic aircraft: the electric powered ones. If staying on top of the airfield or in a reserved area nearby, the electric aircraft could train more pilots for less money than any other specialized trainer. When a standard flying lesson takes between 45 and 75 minutes, an aerobatic lesson is always less than 30 minutes long if flown over the airport or nearby. This is fully compatible with even current generation batteries capacity (which give approximately some 45 to 60 minutes flying capacity for 200 kg for medium to high power usage – real world, not marketing flyers...). Electric power & torque curves are a fantastic match for the need of aerobatics, with an instantaneous response to pilot's inputs. In addition, the same aircraft could be used, if properly designed, for initial training (flying patterns and teaching basic manoeuvres). We are not here yet, as regulatory, technical and safety issues are still ahead of us, but the direction is clear: electrons will fly inverted!

Ecological Aero Monitoring In Abkhazia

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The territories inhabited by people fall under perpetual dynamic and environmental impacts by various technological and natural factors in present days.

Negative effects on air, water and soil environment result in the formation of new patterns in the geophysical and ecological situation.

A special hardware and integrated software is applied to create and upgrade maps of these situations and distribute the scalar and vector parameters in time scale. It is installed on board light and ultralight aircraft and includes a digital aero camera, a digital laser aero scanner, a digital aero thermograph, as well as an earth-based multiplex measuring device for dynamic environment datum scaling, a seismic sensor and a ground penetrating radar.

For the technologically oriented readers, the main parameters are as follows: photography is 800 m x 920 m, pixel size on the ground is 0.15 m, scanning frequency is 90 Hz, pulse frequency is 150 kHz, scan angle is 60°, density of laser reflection points is 2 points per 1 sq.m. and the following software is used: ORIMA 2014 (ERDAS); LPS (ERDAS); OrthoVista; TerraSolid for MicroStation v8.i.

The work of Russian company "EcoGeoTec" on the creation of a coastal territory complex geo-base for the Republic of Abkhazia with a total area of 3 300 sq.km using An-2 aircraft can serve as a recent illustration of this technology.



The reasons for examining such a vast area were the unsatisfactory environmental condition of the resort zone and many places of cultural heritage, for example, Oldenburg Prince Park and the Central park of Gagra. Conditions in the area require immediate hydro amelioration measures due to water and soil imbalance caused by natural impacts.

The information which can be obtained by means of aerial survey and laser scanning can help to solve another problem, that is, to forecast the erosion of the sea beach area and the river banks of the country. The measuring data is processed at the Institute of Ecology (Abkhazian Academy of Sciences).

One step for man...Ecolabels and Buying Green

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Is being green only about solar panels, electric cars and LED lights? What is there to be done at your airfield or your home for sustainability?

My intention in writing this little piece, or maybe a series, is to give an idea about **what it takes to be “green”**. It isn't as difficult as many might think. It's not only about solar panels, green fuel and electric cars and so on. We can do little things that are easy, don't need great investments and have significant impact on our environment. These things may not even be in close connection with flying... Just think about it: it's already summer, high season at airfields and aero clubs. For example barbeque time ☺. Do you use plastic cups and tableware? Please don't! Do you drink bottled water? Watch this video (The story of bottled water: <https://www.youtube.com/watch?v=-Zn0qi80IIY>) and reconsider. Do you collect waste in a selective way? If yes, that's great! What

do you use to clean up the mess with? Maybe eco-labelled products? Let's take a look! Have you heard about **ecolabels**? Yes, probably you have already seen tons of little green leaves and signs on several products. Did you find out what they mean?

There are a few trustworthy labels that you should look for when you do the shopping. Ecolabels are environmental management tools to support **sustainable consumption**. They were designed to help consumers make the “green choice”. Ecolabels are awarded to products and services that fulfil the strictest environmental criteria. They are third party certified, so you can be sure that they do far less harm to the environment than “normal” products throughout their lifecycles. The criteria always include “fitness for use”, this ensures the best quality products. Almost every country has its own eco-labelling scheme, but the following labels are the most popular and prestigious ones in Europe: the Nordic Ecolabel (Denmark, Sweden, Norway, Iceland, Finland), the Blue Angel (Germany), EU Ecolabel (common ecolabel for all EU countries), NF Environment (France).



Look for these labels on cleaning products (all-purpose cleaners, dishwashing detergents etc.), cosmetic products, textiles, electronic equipment (PCs, notebooks, tablets, printers, MFDs), furniture, lubricants, paper products, sanitary paper products, campsites, hotels and many other product groups.

Better for you and better for the environment! Stay tuned for the next issue of the EnvC Newsletter to read about other labels and green to-dos!



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