

LE BOURGET 2015

Contents

REACH: Aviation hopes to streamline approval for 'mission critical' chemicals.....p.1

Aviation industry looks for more than hot air on emissions talks.....p.2

Engine executive:
Using technology to trim aircraft emissions...p.4

While airlines pay for pollution, airports fly in a different class.....p.5

Vraneš: Cutting aviation emissions starts on the ground.....p.7

Clean Sky: Aviation researchers test radical ideas in a conservative industry.....p.8

Trouble on Europe's flanks lift interest in drones and military aircraft.....p.9



With the support of



The aviation industry says finding alternatives to chemicals that protect aircraft and parts from corrosion could take years. [Timothy Spence]

REACH: Aviation hopes to streamline approval for 'mission critical' chemicals

When the European Commission began working on landmark legislation to regulate potentially dangerous chemicals, it barely appeared on the aviation industry's radar screen.

Today, aircraft producers and airlines are struggling with the regulatory requirements of what would become known as the REACH regulation, which obliges companies to replace chemicals deemed a risk to human health and the environment or to seek regulatory authorisation for exemptions.

Aviation representatives say the law has created a costly and complicated process for a range of substances, including those used to prevent corrosion in critical parts, while identifying alternatives could take years.

"The materials we use today are based on good experience and service experience gathered over many, many years," said Steve George, chairman of the working group on REACH at the

Aerospace and Defence Industries Association of Europe.

"As an industry, we have a duty to our customers and operators to provide a safe product. And it is true, we are very conservative in making replacements, but then again the users of our products would expect us to be exactly conservative," George told EurActiv.

The Association of European Airlines (AEA), which represents passenger carriers, has said it is "committed to the objectives set out in the REACH legislation" and will seek replacements for SVHCs, or "substances of very high concern" identified by the chemicals regulation.

"Until then, however, REACH in its existing form will impose an unacceptable burden on the aviation industry and jeopardise European competitiveness," AEA said in a briefing prepared last year.

Aviation, pharmaceuticals and several other sectors are working with the European Commission and ECHA to develop a streamlined approval process for compounds deemed critical to production and safety. A deal is possible later this year.

A model or a mess?

REACH set out both the legal framework and a regulatory authority, the European Chemicals Agency (ECHA), when it became law 8 years ago. Its critics are numerous, including

Continued from Page 1

some health groups that argue the law doesn't go far enough to protect people and the environment.

Nonetheless, the Registration, Evaluation, Authorisation and Restriction of Chemicals regulation is held up as a global model. In the United States, lawmakers are considering whether to strengthen the four-decade old Toxic Substances Control Act to include stronger disclosure requirements like those prescribed by REACH.

In Europe, these requirements have created headaches that the aviation business never anticipated when the legislation was working its way through the Brussels policy mill a decade ago. The risk-averse sector is particularly concerned about a family of chromates, including chromium trioxide and chromic acids that are seen as "mission critical" substances in preventing corrosion in aluminium and other metals.

'In denial'

"Many of the companies in our industry were to some extent in denial because REACH is chemicals legislation," George said, adding that early drafts did not include requirements to report on chemicals used throughout the supply chain. "That was a late addition. So to some extent this was not seen as a regulation we were particularly concerned about at that time, for good

reason. You have to make choices where you put your efforts, and this [REACH] did not appear to be directly applicable."

The chromates are among the current 31 chemicals for which industrial users must find substitutes, or request authorisation from EU regulators to continue their use. In the case of chromium trioxide and the acids, the application deadline is March 2016 and the "sunset" date for the substances is September 2017.

Exposure to chromium has been shown to cause respiratory and skin problems, and at higher levels, is believed to elevate the risk of cancer. Those most exposed to risks are labourers involved in application and manufacturing.

According to ECHA, "applicants must assess the risks, the suitability of possible alternatives and the socio-economic benefits of continued use." Aircraft manufacturers must work with suppliers to identify what substances they use and to go through an approval process that can take up to three years once a chemical is added to the authorisation list.

Supply chain spaghetti

The industry says compliance is daunting. Aircraft manufacturing involves global supply networks that are often intertwined. Tracing and then registering chemicals used in millions of parts along a lengthy supply chain, firms

claim, is problematic.

"There is an awful lot that we don't know about some of the components in our products, three, four or five layers [down] our supply chain, and that gives us a concern in terms our continuity," said George.

European regulators, including those overseeing aviation and REACH, have acknowledged that the industry has been especially hard hit by the need to account for chemicals throughout the supply chain. "This is where the main difficulty is for them," explained Thierry Nicot, team leader for authorisation at ECHA's Risk Management Implementation Unit.

ECHA and the European Aviation Safety Agency in Cologne worked with industry groups to help juggle the need to meet REACH regulatory requirements without jeopardising airworthiness standards. The aviation industry created two consortia to help meet regulatory demands for chromium trioxide and chromium VI.

Still, industry officials tell EurActiv that they are concerned about the addition of other substances used in parts and manufacturing, leading to further reporting and approval procedures that could stretch out for years. Another concern is that suppliers will fail to meet all their REACH obligations in time, or simply not want the hassle, potentially affecting product delivery.

Aviation industry looks for more than hot air on emissions talks

With steady growth projected for decades to come, the aviation industry is banking on a global

regulatory framework for curtailing carbon output to avoid a mishmash of regional policies like Europe's emissions trading scheme.

As international negotiators talk, industry officials say they are already acting to dramatically improve aircraft efficiency and curtail carbon dioxide emissions that are linked to Earth's temperature rise.

"This industry is more proactive

than any other industry in reducing emissions," Bob Lange, a senior vice president at Airbus, told EurActiv at the Paris Air Show.

Aircraft producers and their suppliers are jockeying to promote their green credentials at the trade pageant at the 101-old Le Bourget airfield. The industry now accounts for about 2 percent of global carbon emissions, a figure that is expected to rise steadily

Continued on Page 3

Continued from Page 2

amid projections that air traffic will double by 2030, with rapidly growing Asian markets leading the way.

The event comes six months ahead of the United Nations' Climate Change Conference (COP21) which is tasked with producing a greenhouse gas-reducing successor to the 1997 Kyoto Protocol. COP21 is also taking place at Le Bourget.

But today's Le Bourget crowd is more focused on what happens in October 2016. That is when the assembly of the International Civil Aviation Organization (ICAO) is expected to consider a market-based system aimed at capping aviation emissions, after years of bureaucratic inaction and disagreement over the scope of a framework.

'Encouraging pace' on ICAO talks

Plane manufacturers and airlines are holding out hope that ICAO will produce a global market-based measure, or MBM, to avoid a hotchpotch of regional regulations like the EU's Emissions Trading System (ETS), which has regulated aviation emissions within Europe since 2012.

And last week, the Obama administration announced that aviation CO₂ emissions pose a threat to public health, vowing to take steps to regulate the industry if the ICAO talks fail.

The ICAO negotiations are "moving ahead at a very encouraging pace," said Michael McGill, executive director of the Air Transport Action Group, which represents the aircraft, engine and parts manufacturers.

"We fully believe that a global scheme developed under ICAO is absolutely appropriate for a global industry like the aviation industry, and that's why we've been really supportive of the ICAO process to develop the MBM," McGill told EurActiv.

Crowded skies ahead

Still, a combination of technological progress and regulatory measures will



Growth in emerging markets like China will lead to a rise in aviation emissions despite steady improvements in engine efficiency. [Timothy Spence]

only slow the inevitable rise in emissions produced by an industry that has remained immune from economic and political shocks.

Some 32,000 new aircraft will be built over the next 20 years, according to Airbus. It's main plane-making rival Boeing released forecasts on Tuesday showing that the number of passenger planes in the air will double, to more than 43,000, in the same period.

The European Commission projects that global international aviation emissions will be around 70 percent higher in 2020 than in 2005. ICAO estimates on the conservative side that emissions will rise 300% by 2050.

Some studies suggest that even the most ambitious efforts to curtail greenhouse gas emissions don't go far enough because they focus on a single gas – CO₂.

Researchers at the German Aerospace Center, or DLR, are calling for a common market-based approach to cutting carbon along with nitrogen and other emissions produced from burning aviation fuel.

"For decades, we have been seeing a significant increase in carbon dioxide emissions from aviation, and this trend has continued since 1990, the reference year for the Kyoto Protocol," Robert Sausen, a researcher at DLR's Institute of Atmospheric Physics and an author

of the study, said in releasing the study ahead of the Paris Air Show. "In addition to this, the aircraft emissions of species affecting climate, such as nitrogen oxides, oxides of sulphur, water vapour and carbon particulates, have been increasing because of aviation."

The authors say that global CO₂ emissions from aviation were responsible for around 1.6 percent of global warming in 2005, but the figure jumps to 4.9 percent when the other aviation pollutants are considered.

CO₂, NO_x – or nitric oxide (NO) and nitrogen dioxide (NO₂) – and sulfur oxides (SO_x) are among the emissions produced by burning aircraft fuel and all contribute to climate change.

The DLR study's concerns about other emissions are nothing new. Scientists who drafted the 1999 aviation report for the Intergovernmental Panel on Climate Change (IPCC) also warned about the impact of a cocktail of greenhouse gases. That report encouraged further review of ways to reduce emissions, including market-based measures.

The EU, United States and ICAO have all taken steps to set nitrogen standards for aircraft engines, and researchers involved in the EU-funded Clean Sky innovation project contend that engines

Continued on Page 4

Continued from Page 3

in the early stages of development will drastically reduce both carbon and nitrogen output – though it could be years before those technologies are commercially viable.

The DLR team says that with anticipated growth in the aviation industry, “the implementation of global or at least internationally coordinated instruments for the reduction of the non-CO₂ impact of international aviation on climate change seems to be necessary expeditiously”.

Other emissions overlooked

Tim Johnson, director of the Aviation Environment Federation in London, doesn't see that happening. He told EurActiv that “the debate over CO₂ has been so fraught – bear in mind that ICAO has been reviewing this now since 1998 and it's now 2015 – that I think it's desperate to find a starting point and that's the reason why we have focused on the CO₂ emissions”.

ATAG's McGill worries that progress made on CO₂ could come crashing down if the ICAO negotiations were expanded. “At this stage, if there was an attempt to broaden the scope of the [ICAO] agreement it would set us back many, many years in the negotiations, and we don't believe that's in anyone's interest let alone from an environmental perspective,” he said.

The DLR researchers recommend a cap-and-trade scheme for all aviation emissions. In addition, Sausen and his colleagues call for changes in flight patterns and air traffic control improvements to reduce delays and congestion, which cost airlines money and elevate pollution levels.

Assuming a deal is reached by the major aviation countries to reduce CO₂ and other emissions, the DLR team envisions “the temperature change induced by aviation could be reduced by up to 70 percent in the year 2100 compared to the business-as-usual development.”

INTERVIEW

Engine executive: Using technology to trim aircraft emissions

Building aircraft propulsion systems involves a balancing act between reducing fuel use and addressing noise and air pollution, a leading engine executive tells EurActiv at the Paris Air Show.



Alan H. Epstein [Pratt & Whitney]

Dr. Alan H. Epstein is Vice President for Technology and Environment for Pratt & Whitney, the Connecticut-based aircraft engine manufacturing division of United Technologies Corp. He answered EurActiv's questions by e-mail.

The US Environmental Protection Agency announced in an endangerment finding that aviation CO₂ emissions contribute to climate change, and thus pose a threat to public health. Although the agency did not announce compliance measures at this stage, what is your industry doing to prepare for what seems inevitable – whether the standards come from the EPA itself, the EU's trading scheme, or through a global agreement?

We are closely monitoring any developments regarding the EPA's

future regulations. We strongly support working with-in the ICAO framework since aviation is the most international of endeavours. That said, the [Pratt & Whitney] PurePower engine is exceeding specifications and setting new performance standards for fuel burn, noise and weight – while also delivering the lowest emissions in its class – 50 percent lower than today's aircraft. To put that in perspective, the PurePower engine will deliver a more than 16 percent engine fuel burn reduction, which has a direct, positive impact on CO₂ [carbon dioxide] emissions reduction. The engine reduces regulated emissions by more than 50 percent, and will reduce CO₂ emissions at a level equivalent to planting almost 1 million trees or taking 3 million cars off the road every year.

We look forward to the working with ICAO and the EPA to craft environmentally effective, economically rational regulations, and we are confident that our engine will continue to deliver the highest benefits to our customers and the environment.

The aviation industry is committed to carbon-neutral growth by 2020. How do you score its progress so far?

In many regions of the world, we have done very well by introducing new, fuel-efficient equipment and improving operations. In North America for example, last year commercial aviation carried 20 percent more passengers than in 2005, yet used less fuel. Nevertheless, there is more to do.

Our approach has four pillars:

- The first is more efficient airplanes and engines. New efficient airplanes are taking to the sky. For example, the Airbus A320neo will enter service later this year and the Bombardier CSeries next year. Powered by Pratt & Whitney's PurePower® Geared Turbofan™

Continued on Page 5

Continued from Page 4

engines, these aircraft offer 15 to 20 percent better fuel economy than today's fleet.

- The second pillar is improved operations, such as air traffic management.
- The third is the introduction of sustainable alternative and biofuels. Such fuels have been approved for use, and manufactures are starting production ramp up. Cost is a prohibitive issue, and there are significant research investments underway to address that.
- The final pillar is market based measures (MBM), using carbon offsets in the short run until sufficient alternative fuel production become available. An international MBM system is being developed within ICAO [International Civil Aviation Organization, an arm of the United Nations], and we expect it will be

voted on in the next ICAO assembly in 2016.

There's a bit of irony in the focus on carbon emissions. Modern jet engines are more efficient in part because they burn fuel at higher pressure and temperatures, so you get more energy from every drop of fuel. That means a reduction in CO₂, but doesn't that increase other greenhouse gases, such as nitrous oxide? What can be done to find a balance - in other words, reduce the side effects of an aircraft engine's emissions cocktail?

I don't think there is an inherent contradiction. Airplane design is about balance and trade-offs. Since the 1960s, concern for the environment has involved finding a balance between noise, emissions for local air quality (NOx [oxides of nitrogen], smoke, etc.) and fuel burn (economics). We now have fuel burn for climate change. So, the same concerns but perhaps the best balanced solution will change.

Every new generation of propulsion brings significant improvements in efficiency – cleaner, quieter and more reliable. What the future will bring – for instance, the machines that will be built in the 2020s.

The machines in the 2020s need to be better still. The rule of thumb is that each new generation of airplane needs to burn 10 to 15 percent less fuel. Much of that comes from engine improvements, so here at P&W we are working on technologies to deliver 10 to 15 percent better fuel for the 2020s. We call this Gen2 geared turbofan technology. In addition to fuel burn (and, thus, CO₂) improvements, we know these engines must deliver lower noise and emissions such as NOx. Let me emphasize these are technologies so far. An engine cannot be designed until an airplane company decides on a size and application, but whatever the application, P&W is working to be ready to meet these needs.

While airlines pay for pollution, airports fly in a different class

Today's passenger aircraft are becoming ever more efficient, driven by regulations like the EU's emissions trading scheme and airlines looking to squeeze profit out of every drop of fuel saved.

Yet on the ground, airports operate in a different class. New findings from a European Union-funded research project show that commercial airports use as much energy as a small city, and up to one-fifth of that may be wasted.

Aircraft operating within the EU, along with energy and industrial sectors,

fall under the Emissions Trading System that aims to cut emissions. While an EU law (Regulation 598) on regulating airport noise is due to take effect in a year, there is no similar EU legislation on emissions, and some political leaders want to change that.

Sergi Alegre Calero, the vice-mayor of El Prat de Llobregat, home to Barcelona's airport, is one of them. Alluding to the ETS and other pollution laws, he says: "It has happened in the car industry, it's going to happen in the shipping industry, it's happening in building and construction, so [airports] cannot get out of that."

Calero is president of the Airport Regions Conference (ARC), which represents European municipalities close to international airfields. He favours an EU mandate to cap airport emissions, though he says the legislation should give airfield operators and communities leeway in how they comply.

Going green

Aviation contributes 2 percent of the world's carbon emissions, and airports are believed to account for about 5 percent of that figure. Even in the absence of EU-wide mandates, many of the EU's busiest airports have already taken steps to reduce their environmental footprint.

The Airports Council International's Europe operation, which represents 450 fields in 45 countries, has voluntary standards aimed at slashing the environmental impact of ground operations. The group identifies 20 European airports carbon-neutral.

They've achieved this partly through operational improvements for aircraft, switching to hybrid and electric service fleets, improving public transport links and providing terminal-to-aircraft power

Continued on Page 6

Continued from Page 5

links so planes don't have to use on-board generators while parked at gates.

Olivier Jankovec, director general of the Airports Council International in Europe and Angela Gittens, worldwide director of ACI, said in a recent joint statement on airports certified by its Airport Carbon Accreditation programme: "An impressive 1.67 billion air passengers now travel through airports certified at one of the 4 levels of the programme - equivalent to 26.5 percent of global air passenger traffic. Most promisingly we are seeing a lot of airports moving up the levels of the programme - making real progress in the way they manage their carbon footprints."

But a new study suggests that airports also waste significant amounts of energy, and by taking relatively inexpensive steps, they could save money, cut energy consumption and reduce emissions.

The EU-CASCADE energy project study focused only on heating and

cooling systems, the biggest single energy consumer at an airport.

Researchers working at airports in Milan and Rome found that up to 20 percent of energy is wasted either through poor maintenance or inefficient use of climate control systems, such as heating or cooling vast terminals during times when there are few passengers, and pumping heat and cold air into terminals at the same time.

The project team from Germany, Italy, Ireland and Serbia installed hundreds of advanced sensors and meters at Malpensa and Fiumicino airports to monitor temperature, pressure and power consumption as part of their research.

Mike Brogan, the chief operating officer of the Enerit energy firm in Ireland that is part of the project team, said that in addition to reducing energy use that contributes to emissions, there are "large potential savings" at big airports - he estimates up to €500,000 annually for heating and cooling alone.

Brogan said making airports more energy efficient has inherent challenges because of exceptional security and safety requirements under which they operate. Still, the CASCADE research suggests that there may be additional areas for savings beyond heating and cooling.

"Although such critical transportation infrastructure has to operate according to the highest safety and security regulations, resulting in special requirements when it comes to lighting, it is often a case that lighting is operated wastefully without actual necessity," Professor Sanja Vraneš, director general of the Institute Mihajlo Pupin in Belgrade, told EurActiv in an e-mail.

Improving energy management and "smart lighting" "would unlock enormous energy/cost saving potential" without major investment. "A significant part of the solution would be also in the design of airports, allowing them to harvest as much as possible of renewable energy and natural light," she said.



Researchers found that improving the efficiency of heating and cooling at airports can slash energy use and carbon emissions. [Aeroporti di Roma]

INTERVIEW

Vraneš: Cutting aviation emissions starts on the ground

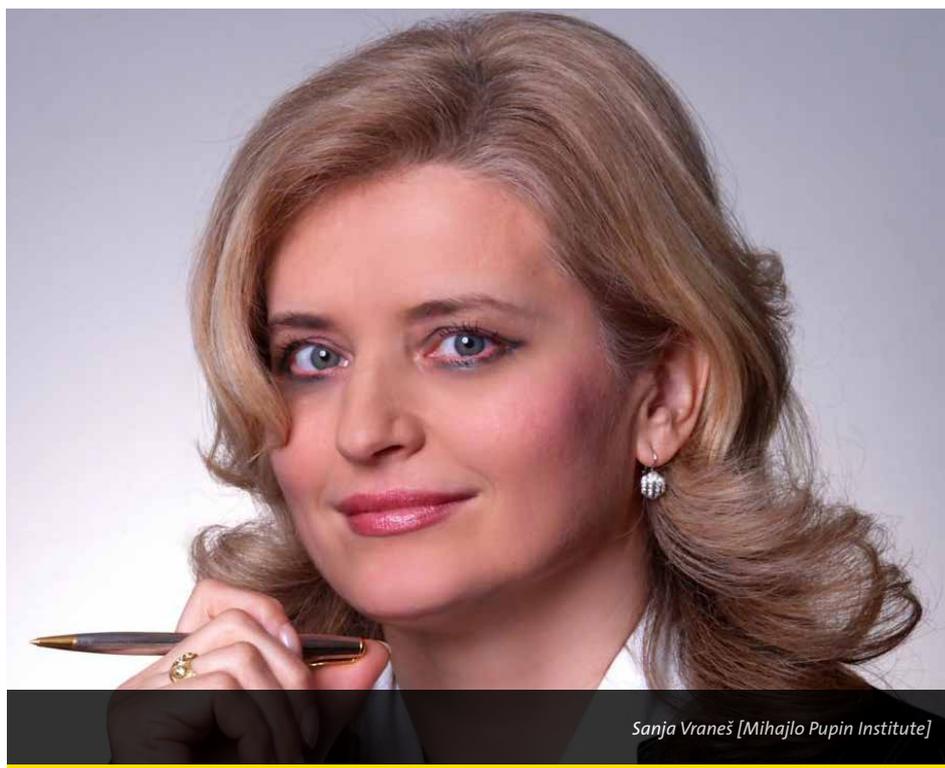
While airlines are under the gun to cut their greenhouse gas emissions, a new EU-financed study by researchers from Germany, Ireland, Italy and Serbia suggests that airports waste significant amounts of energy. By taking relatively inexpensive steps, airports could save money, cut energy consumption - and reduce emissions.

Professor Sanja Vraneš is director general of the Institute Mihajlo Pupin in Belgrade, part of the CASCADE airport energy project. She responded to EurActiv's questions by e-mail:

So much emphasis is put on cutting aviation emissions, and yet - as your report points out - there is plenty to do on the ground. Can more efficient airports help offset the impact of aircraft emissions?

All major airports are massive energy consumers with typical yearly consumption ranging from 100-300 GWh (as much as 30,000 to 100,000 households) making them equal to small towns. In such complex and big systems there is always enough room for more efficient operation. Considering the results of the technical characterization of the two major EU Hubs done in CASCADE, task led by the Mihajlo Pupin Institute, we realised that the most significant energy users, speaking in ISO 50001 terms, are HVAC systems and lighting.

When it comes to HVAC systems, which was the main focus of CASCADE, we also realised that there are plenty



Sanja Vraneš [Mihajlo Pupin Institute]

of opportunities to improve their operation without inducing additional capital costs. Typical faults in such systems are simultaneous heating and cooling, scheduling problems of drives like pumps and fans, deactivated or falsely set controls, lack of maintenance, etc. The solution lies in the development and application of advance ISO 50001 Energy Management system based on automated Fault Detection and Diagnosis (FDD) tools. CASCADE is proud to report as much as 20 percent of energy savings at the targeted systems yielding significant reductions in operation costs as well as green house gas emissions.

Your research focuses mainly on heating and cooling. But airports in general seem to be wasteful with lighting and often poorly designed to capture natural light. Are there other steps that can be taken to reduce energy consumption?

Lighting is indeed the second largest energy consumer in most airports (in some cases even the largest). Although such critical transportation infrastructure has to operate according to the highest safety and security regulations, resulting in special requirements when it comes to

lighting, it is often a case that lighting is operated wastefully (e.g. 100% capacity for 24/7 in some cases) without actual necessity.

Adding another component to the energy management system, offering smart lighting management, would unlock enormous energy/cost saving potential. Again, this would not require any significant investment costs as it would only require installation of luminosity and occupancy sensors as well as relay equipment for control of lighting devices. A significant part of the solution would be also in the design of airports, allowing them to harvest as much as possible of renewable energy and natural light.

How would you score airports in their use of renewable energy?

Although interest of airports for renewables is constantly rising, current installations are quite conservative for several reasons. First, any investment in renewables considers typical [return on investment] of 7-10 years or even more, making the airport management

Continued on Page 8

Continued from Page 7

reluctant for such undertaking. Secondly, if you consider typical energy consumption of an airport (100-300 GWh per year) any local renewable energy plant would only cover a small share of their needs.

In addition to this, an online survey conducted within CASCADE including as well major EU airports with over 10 million passengers per year showed that almost 64 percent of survey respondents did not have operating renewables at their site, while only one-third of them were operating PV plants. Also, considering that airports are often supplied with energy from local CHP [combined heat and power] plants (sometimes even the same company operates both), allowing them lower energy purchase prices, the only reasonable business model around the investment in renewables would be to sell the energy to the market, preferably at feed-in tariffs, acting as any other energy plant.

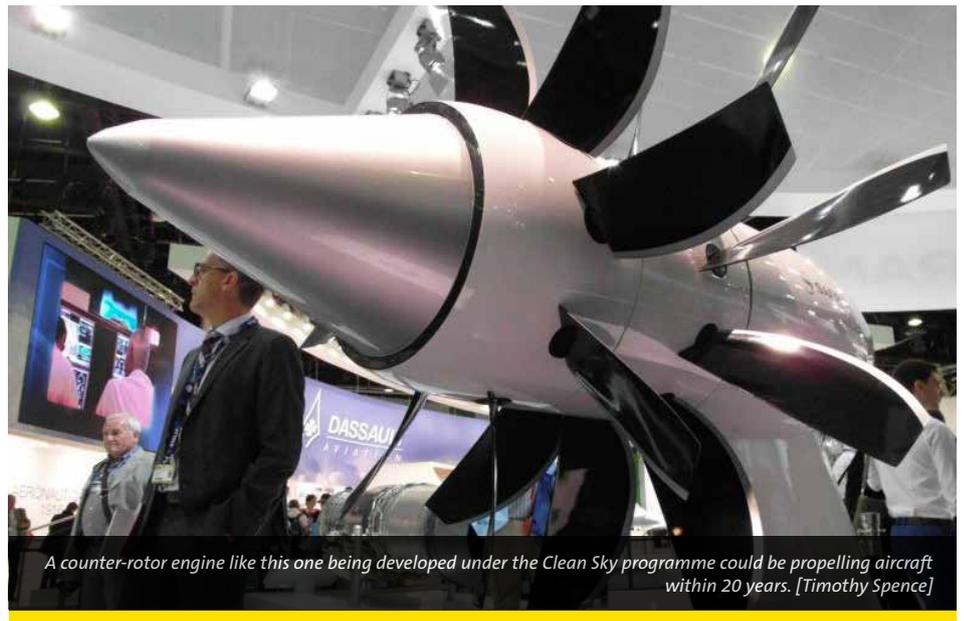
Are there good examples of airports within the EU that have taken steps to significantly reduce emissions - and bad examples?

The Airport Carbon Accreditation (ACA) scheme is a voluntary programme which was launched in June 2009 and provided a framework for assessing the carbon emissions from an airport in order to stimulate emissions reduction with the final goal of carbon neutrality (zero net emissions). It allows for easy and unambiguous benchmarking for over 500 EU airports currently taking part in Airports Council International (ACI). For instance, the main Milano's airport in Malpensa ... and Fiumicino airport in Rome ..., which were the pilots for CASCADE, fulfilled all criteria according to ACA and reached the maximal level of accreditation "Level 3+ (Neutrality)".

Unfortunately, there are much more bad examples throughout poorly developed countries.

Clean Sky: Aviation researchers test radical ideas in a conservative industry

European researchers foresee a time when people could travel across the globe in the equivalent's of today's hybrid cars – an airplane that uses fossil fuel when a burst of energy is needed, then switches to stored electricity while cruising to a landing.



A counter-rotor engine like this one being developed under the Clean Sky programme could be propelling aircraft within 20 years. [Timothy Spence]

It's not quite Star Trek, but the corporations and academics involved in helping to design next-generation aviation technologies hope the ideas being thrown about today with the help of European Union funding will reduce fossil fuel consumption and curtail the noise impact of a steadily growing industry.

Some of that future is on display this week at the Paris Air Show. Many of the same companies involved in the EU's Clean Sky research project are vying

here to promote current technologies as the greenest ever.

Businesses involved in the collaborative programme also see a benefit beyond reducing the industry's growing environmental footprint – future profits.

"This is an opportunity for European industry to gain competitiveness and technology," Gerhard Ebenhoch of MTU Aero Engines, a German firm, explained in a Clean Sky briefing in Paris.

Billions of investment

Clean Sky was launched in 2008 with €1.6 billion in funding split by the partner firms and the European Commission. The second phase, launched in 2014, has a budget of €4 billion over a decade. Its mission is to achieve a 30% reduction

in aviation carbon dioxide and nitrogen emissions and up to a 75% reduction in the industry's noise footprint.

"One can easily translate all the investment into a benefit for society, either jobs in education, knowledge growth, as well as allowing people to fly," said Axel Flaig, Airbus senior vice president for research and technology. The European aircraft maker is a partner in the Clean Sky along with some of

Continued on Page 9

Continued from Page 8

Europe's leading research centres and other aviation companies.

But achieving the Clean Sky goals will not be easy. Global commercial aviation is growing at a 5 percent annual clip and has managed to weather economic and political shocks of recent years.

It could take years to deploy some of the technologies developed over the programme's first eight years. Other outcomes offer more incremental improvements in performance, including some passengers may never see, such as new power storage technologies that reduce fossil fuel use in aircraft operations.

For Airbus' Flaig, who spoke to EurActiv at the Paris Air Show, Clean Sky offers two especially promising technological developments – one in propulsion and the other in aerodynamic wing design.

The first is part of Clean Sky's Sustainable and Green Engines (SAGE) project. Researchers have worked in recent years to develop open-rotor motors that tests suggest would lead to dramatic reductions in fuel use and emissions.

Snecma, a division of France's Safran Group, and Britain's Rolls-Royce have

both developed open rotor concepts. The experimental engines feature counter-rotating propellers, giving them the ungainly appearance of an advanced food mixer.

Radical ideas

"It's a very radical design," said Flaig, who explained that propellers in general are more efficient than jet engines. The advantage of a double set of blades is that the air passing through the first set changes direction "and you still have energy in flow. When you have a counter-rotating propeller, you also remove this energy and this makes it more efficient."

Researchers see additional efficiency by mounting these twin-blade engines on the back of the aircraft fuselage, thus reducing the wind drag that occurs with wing-mounted engines. Tests have shown the open rotors could cut emissions by 30 percent.

The SAGE project has had to overcome problems. The double set of blades made the engines heavy and noise, complicating the mission to develop quieter and more agile propulsion systems. Flaig says some of the early obstacles have been overcome

and that testing could begin in another decade. If successful, airplanes with open rotor motors could begin appearing on the tarmac in the 2030s.

Another Clean Sky venture is closer to taking flight. Researchers involved in the Smart Fixed Wing Aircraft (SFWA) project applied laminar coatings to shortened wings of a long-range Airbus carrier to reduce wind drag, cutting the noise profile and reducing fuel consumption by 8 percent.

The stubbier wings are being fitted on an A340 and the plane could be ready for test runs in 2017, Flaig said.

Flaig says the possibilities for innovation are as unlimited as the sky. He points to a group of university students who developed the concept of imbedding rechargeable batteries in aircraft skins made of composite metals, opening the door to hybrid propulsion.

Still, bringing such ideas to the market could take a generation or more in an industry as cautious as aviation. As Jeff Hobday of Clean Sky partner Rolls-Royce Plc explained at the Clean Sky briefing: "We're very risk averse and wisely so. So we have to be confident with the technology we are developing and the only way to do that is through flight and ground demonstrators."

Trouble on Europe's flanks lift interest in drones and military aircraft

A possible Greek exit from the eurozone, on-going tension with Russia, and a refugee crisis that is causing widening conflicts within the European Union. Added together they could become today's Waterloo. Yet for the aviation

industry participating in the biennial Paris Air Show this week, there is opportunity in these difficulties.

For starters, the latest round of eurozone instability could further weaken the currency and make European goods more attractive in a highly competitive global market. The troubles on the eastern and southern flanks of the EU are prompting governments to bulk up military spending after years of budget cutting – also good news for the industry.

"It's a perfect storm," an executive of one European air defence company told EurActiv. "We are beginning to realise that there is a real need for

deployable military capability as long as we have a Russia on steroids and civil wars in the Middle East that are driving people to risk their lives to come to Europe. We're getting a lot of [business] enquiries because of this instability."

The Paris Air Show has been dominated by competition between the world's aircraft superpowers for the sale of new or revamped passenger planes. Europe's Airbus on Thursday (18 June) announced 421 orders or planned purchases worth \$57 billion (€50 billion), while its American rival Boeing tallied 331 orders or

Continued on Page 10



Models of military aircraft draw a crowd at the Paris Air Show. [Timothy Spence]

Continued from Page 9

commitments worth \$50.2 billion (€44 billion).

On the political sidelines of the show, there was evident concern about Russian belligerence over Ukraine and the Kremlin's announcement on Tuesday that it would expand its nuclear arsenal.

Sweden's air force commander, General Micael Bydén, said in Paris that his country was backing out of a deal to loan eight fighter aircraft to Switzerland because of increased Russian incursions into Nordic airspace.

U.S. Air Force Secretary Deborah Lee James told journalists at the Le Bourget airfield that Washington was considering deploying advanced F-22 fighters to Europe as a riposte to Russia. This would follow earlier moves to strengthen its armed presence in NATO countries.

European governments are starting to spend on defence following years of financial hardship and budget cutting. Eastern countries have been especially keen on upgrading aircraft and air defence systems, industry officials here say.

"There has been a lot of interest from the Poles, the aviation executive told EurActiv, "and I'd say there is going to be a lot of cooperation with the Baltic [countries]."

Government in Estonia, Latvia and Lithuania have all announced significant increases in military spending and Poland is on course to exceed NATO's recommendation that 2 percent of GDP be spent on defence for the first time in years, according to the Stockholm International Peace Research Institute.

Also on the radar screen at Le Bourget are an arsenal of technologies that could be used in Mediterranean

refugee crisis operations. Some of the latest search aircraft, drones and surveillance technologies were on display at the Paris show.

Europe's statistics agency, Eurostat, reported on Thursday that some 185,000 people applied for asylum in the EU in the first three months of the year, up 86 percent from the same period in 2014. Although Kosovars made up the largest single group, at 26 percent, Syrians fleeing civil war accounted for 16 percent of the total, followed by refugees from Afghanistan.

Drone helicopters to the rescue

Italy's IDS is one company that has seen growing interest in two models of short-range drones that can be deployed from coastal patrol

Continued on Page 11

Continued from Page 10

boats. Though still in development, the Italian Red Cross and the country's coast guard and navy are considering the devices for surveillance, search-and-rescue operations and for use in the EU's EUNAVFOR anti-smuggling operation.

One unmanned aircraft, the IA-17 Manta, is already under consideration for coastal operations. The firm's SD-150 Hero helicopter is undergoing operational testing and is capable of both surveillance and delivering small amounts of medicine or relief, according to its manufacturer.

"In this way you can expand the range of patrol craft by 20 kilometres," said Giovanni Fumia, sales manager for the aeronautical division of IDS, as he explained the Manta. The triangular drone has an 8-hour operational capability. Both unmanned vehicles are compact – Hero is 3.3 meters in length and the Manta aircraft has a wingspan of 2.8 meters.

Competition for such equipment is growing.

Sweden's Saab produces a Skeldar line of drones and Austria's Schiebel offers a Camcopter 100 aimed at multi-use surveillance. Globally, the United States and Israel are the major suppliers of advanced drone technology.

Drone capabilities aren't cheap. IDS is expected to offer a package deal – two drone helicopters and a two-person control station – for around €2 million. Unmanned vehicles also face flight restrictions around civilian air traffic, limiting the market for anything other than official use.

"Once the regulations are clarified, there will be an explosion of these kinds of platforms, said Fumia. He noted they could be used by farmers to evaluate field conditions and by utility companies to monitor pipelines and power lines. Fumia says his company has already had interest from non-EU customers.

There's another challenge – remotely piloted aircraft are a politically charged issue in part because of the civilian toll taken by America's use of armed drones in search-and-kill missions. In a non-binding resolution last year, the European Parliament called on member states to ban the use of unmanned aircraft in extrajudicial killings and to establish ethical standards for their use. They also called for greater transparency in the use of EU funding for research and development of drone technology.

Advantages over human patrols

But Fumia sees many advantages, including the drones' ability to operate for several hours at a time, easy deployment, and their use in "quick action" operations to deliver medicines and relief supplies in crisis areas. Another advantage is the ability to operate in threatening environments without risk to pilots.

"We didn't think two years ago about medicine delivery," he said in describing the early development of the Hero helicopter, which can carry a payload of up to 50 kilograms, including fuel. "Now there are really no limits and how it can be used."

Another company, Airborne Technologies of Austria, announced at the Paris Air Show that it won a contract to outfit a Beechcraft King Air 250 aircraft with surveillance and radar systems for Croatia's coastal patrols. The technology is partly funded by the EU's Frontex border agency.

Helmut Gaschler, the firm's international sale manager, says its radio and surveillance platforms are mostly being used on police planes and helicopters. But the Croatian plane demonstrates that the technology could be deployed for Mediterranean search missions. "Politicians are now more aware that you need to protect the borders," he said.

For information on EurActiv Special Reports...

Contact us

Davide Patteri

paexecutive@euractiv.com
tel. +32(0)2 788 36 74

Arnaud Sonnet

publicaffairs@euractiv.com
tel. +32(0)2 226 58 17

Other relevant contacts:

Rick Zedník

ceo@euractiv.com
tel. +32(0)2 226 58 12

Timothy Spence

tspencemail@gmail.com
tel. +43 676 486 28 39