How to become successfully 'net zero'

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Abstract

The aim of this paper is to show how important sustainable development is becoming for airports. The paper explores the current manner by which an airport needs to be much more virtuous, for example, by using the Airport Carbon Accreditation. But this carbon neutrality is only a first step that unfortunately many airports are not currently achieving. Airports must be more ambitious and reach the net zero level, which means carbon absorption and not offsetting. Many actions can be undertaken by airports in order to be compliant with social and environmental aspects that are key to the future. If airports do not cope with this trend, there is a major threat including one in the near future. In addition to reaching the net zero level, airports must be proactive in various fields in order to secure a better and a green future for airports. This can include measures for many stakeholders and better use of aircraft on land and airport accessibility.

Keywords

sustainable development, carbon neutral, environment, green airport

INTRODUCTION

During its General Assembly conference held in Limassol in June 2019, Airports Council International (ACI) Europe took a major initiative by unveiling a common objective for all European airports: the 'Net Zero' initiative. Behind these two words, there is a critical challenge: all European airports must intend to be fully carbon neutral before 2050 and be aligned with the European current green deal.

This is not only a challenge but also the ultimate commitment if airports want to continue to develop, attract people and be socially acceptable by a massive part

of stakeholders. The whole air transport sector is currently racing against the clock.

The first key issue is to provide the most efficient airliners. Both engine and aircraft manufacturers are working closely in order to provide less fuel consumption and carbon print. Imagine a world where there would be only chapter 2 aircraft with the current level of traffic. It could be a pure nightmare both for aircraft operators and also airport operators and neighbours. The airport world would be dominated by a large number of restrictions and curfews. Fortunately, for decades, dramatic improvements have been done. During a symposium hosted by ACI Europe in Brussels in January 2020, Willie Walsh, CEO of IAG, indicated that replacement of a B747-400 by a brand new A350 on the London–Toronto route was able to save 38 per cent of jet fuel and the same level in terms of CO_2. He also indicated that a 737-300 change by an A320Neo was able to save 50 per cent of CO_2. These examples are very interesting and they took into consideration not that old type of an aircraft. One can easily imagine the gap between the new generation of aircraft and older aircraft, such as B707 or DC10 aircraft.

The second key issue is for airlines to purchase or to rent these kinds of new-generation aircraft, and they have a key interest to do so to save costs.

The third and last key issue is the entire airport ecosystem, which includes not only the airport infrastructure but also all the entities, and these need to work together in order to handle successfully the air transport coactivities, such as handlers, fuel providers, retailers, food and beverages providers, rental car and many more. Of late, the first commitment of an airport has been to analyse on how to become 'green efficient'. This aim is mainly of a dual perspective concerned with both infrastructure and vehicles. For many airports, taking into consideration environmental issues is quite a recent one, and the first airport design to include a friendly environment was probably Munich airport. When the old 'Riem' airport closed its doors in 1992 and was replaced by the new one, it was said during the inaugural ceremony that for each Deutsche Mark spent for the construction, another Deutsche Mark was spent for environmental purposes.

Later, ACI Europe took the initiative to launch in 2009, the 'Airport Carbon Accreditation' (ACA) programme. This programme became so popular that it was extended to other areas and became a worldwide global programme in 2014. The goal of ACA was to promote a pathway to the carbon neutrality.

The current programme is divided into four levels.

According to the ACA, the first step is 'mapping' and helping the airport analyse its current situation in terms of carbon emissions.

The second step concerns itself with 'reduction'. It is a key stage that requires carbon management and progress towards a reduced carbon footprint. The airport must provide evidence of effective carbon-management procedures implemented, including target setting, and show that a reduction in the carbon footprint has occurred by analysing the carbon emissions data of consecutive years.

The third step is 'optimisation'. This step requires third-party engagement in carbon footprint reduction. Third parties include airlines and various service providers, for example, independent ground

handlers, catering companies, air traffic control and others working on the airport site. It also involves engagement of surface access modes (road, rail) with authorities and users.

The fourth and currently the last step is 'neutrality'. This step means that the airport has become carbon neutral. But neutrality does not mean that the airport has achieved a zero level of emission.

In most of the cases, neutrality is reached by offsetting, which is a good temporary solution but not 'the final' solution.

According to the independent company, WSP, which manages the programme, it is said that ten years after the launch of the programme, around 274 airports in 68 countries are involved in the programme; of these, 144 are present in Europe. Around 50 of them have attained level 3+, which means neutrality. More than 322,000 tonnes of CO_2 have been saved in emissions.

AIRPORT CARBON ACCREDITATION: A KEY STEP

These results look impressive, but there is a real challenge for airport operators as according to ACI World, there are currently 17,678 airports worldwide open to commercial traffic and more than twice the number for other purposes. So, it means that currently only a small proportion of airports are truly involved in this process. A real concern and a great opportunity!

It is difficult to imagine that a only a few airports are currently part of this programme. Is it a question of money? The author does not think so. For a small airport, the programme entitlement is just a question of less than US$2,000. It is probably because most of the airports believe that environment is first a topic to be solved by airlines and manufacturers, and they are partially right.

The carbon footprint is primarily issued by airlines, but airports also have a role and must take part in the chain to reduce emissions. In addition, it is observed that it is possible to work closely with airlines to manage the carbon emissions more efficiently when aircraft is not flying.

As it was said previously, the maximum level to be attained is currently 3+. ACI World is currently thinking of introducing three additional levels prior to 2030. Levels 4 and 4+ should be launched this year, and in addition, in a couple of years, the final level would be launched as Level 5, which means 'net zero'.

Prior to getting this Holy Grail of Level 5, airports must improve their position in terms of environment because today it is probably the best capital expenditure (CAPEX) they can provide.

Airports can not only save the planet but also, at the same time, be much more cost effective. It is possible to save energy by using light-emitting diode lamps, for example, use more cost-efficient heating or air-conditioning systems and so on. As it was said in the beginning, social acceptance of the airport will become more and more challenging. Clearly more and more people are becoming cautious about pollution from air transport and it is not only the ecological action groups, such as Extinction-Rebellion or Greenpeace, which are concerned. The paradox is that many people are not in favour of airport development; nevertheless, they continue using it. So airports must pay attention to this new paradigm. In addition, the coronavirus disease-2019 (COVID-19) has created a new environment where, for more than two months, people who usually lived with aircraft noise and

pollution are now living without them and only with bird chirpings. Due to this, they have become accustomed to less noise — probably a question of habitude. This is exactly what happened to the neighbours of Ciampino or Orly airports. These two airports were closed for three months from the end of March to the end of June. Nowadays, people are clearly more and more reluctant regarding airports. For example, Orly has a curfew and has an annual movement limitation of 250,000. People are currently complaining in order to have less than 200,000 movements. Hence, the situation is a tough one.

WHAT IS THE LIMIT OF ACA 3+?

As it was said previously, ACA Level 3+ means carbon neutrality, which is already a real challenge to attain. In France, only four airports have been awarded this level, which include Nice, Cannes, Saint-Tropez and Lyons Saint-Exupery.

But neutrality has been obtained, thanks to offsetting. The situation can, however, be different from one airport to another. For example, the reduction compensation to be met by Nice airport is about 71 g of CO_2 per passenger and year. It is four times more in Lyons. The offsetting is being done by planting trees all over the world, but this not enough.

When you have achieved Level 3+ with the lowest amount of CO_2 émissions, the hardest part lies in reaching the net zero level.

THE QUEST FOR NET ZERO

When you intend to reach net zero, it means that you have to reach the lowest level of CO_2 emissions and then absorb the remaining few grams of CO_2.

Figure 1 explains how the roadmap can be spectacular but also how difficult it is to improve the situation when you reach Level 3+ and you want to become net zero.

Ten years ago, Nice airport used to obtain 569 g of CO_2 per passenger. Thanks to a very active policy regarding energy management, it was possible to get tangible results, and five years after, the level of CO_2 per passenger has reached below 400 g. The key step to reduce carbon emissions drastically was to deal with our energy provider, Electricité De France, in order to purchase green energy. As Nice airport is located near the Alps, which has plenty of dams, it was possible to secure this green deal and to get impressive results with 124 g. Currently, Nice airport is at just around 100 g of CO_2 per passenger, but the real challenge lies in how to erase the remaining 100 g.

The roadmap shows that the airport is still using gas in three locations for heating purposes. Nice airport is intending to cut these furnaces and replace them with equipment using nonfossil energy sources, such as photovoltaic systems. In addition, many efforts can be done regarding vehicles used at the airport. First, the airport is increasing year by-year the number of electric vehicles dedicated for technical purposes. Around 80 per cent of them will be electrical in 2020, and 100 per cent of them would be so by 2022. But the airport is also working to reduce carbon emissions for executives. All vehicles from 2022 to 2027 will be hybrid ones and after 2027, they will be electric. At that time, it is likely that the level of carbon will be really low at about 10–15 g maximum. At this stage, the airport will have to absorb the remaining grams generated by two sources. The first one is

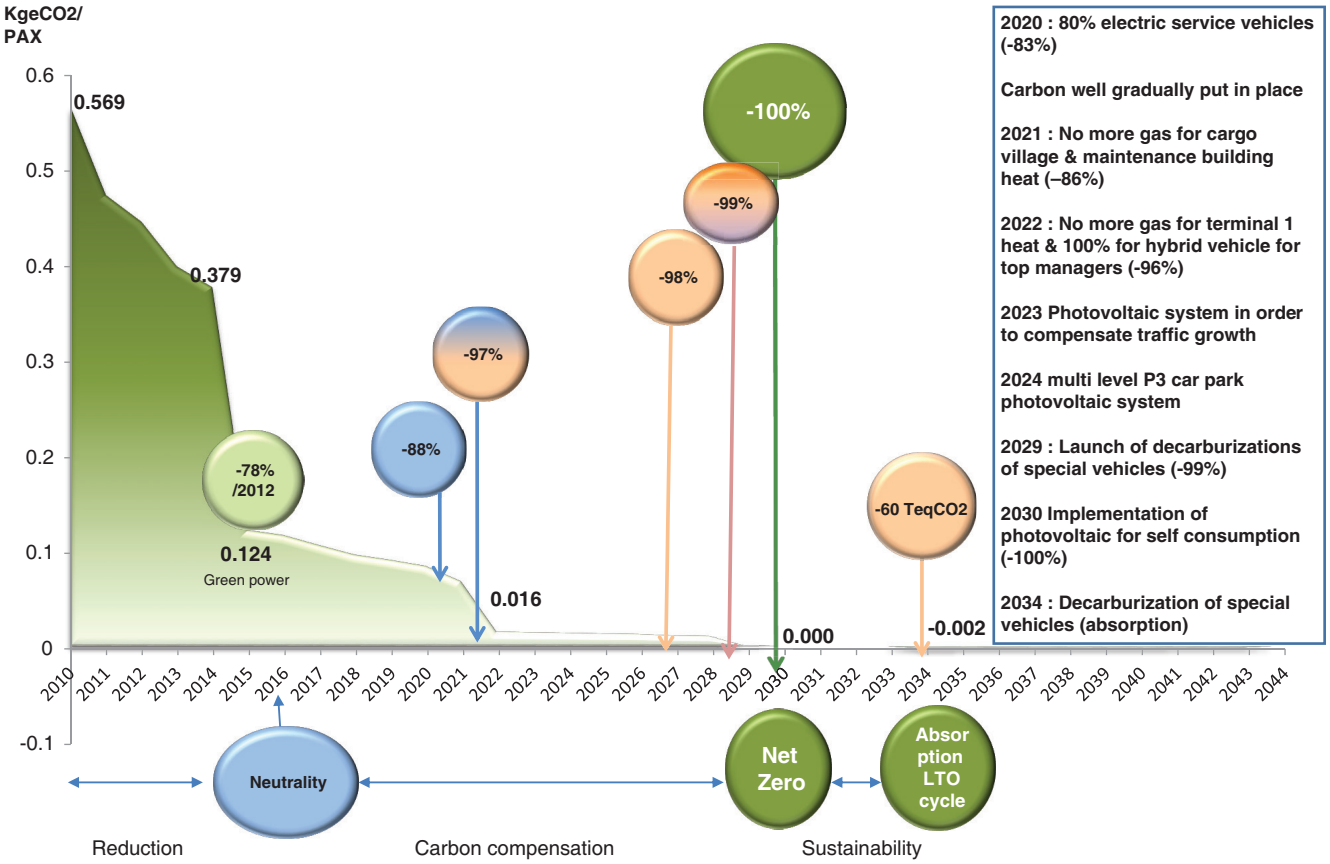

Figure 1 NICE Airport road map strategy to net zero emissions

the emergency power unit. At this stage, there is currently no technology to avoid fossil energy but some tests are underway as in Australia where TESLA is testing an electric emergency power supply. The second source mentioned is special vehicles, such as firefighting vehicles. Once again, there is currently no technology available to replace them. In late 2019, SCANIA had unveiled a hybrid truck. For these two aspects, it is believed that in ten years, the airport will get more reliable technology, but they will still probably have to absorb a small amount of CO_2. This will be done by planting trees close to the airport.

This is what they have done in their small gem 'Aeroport du Golfe de Saint Tropez'. This small airport is for *Groupe Aeroports de la Côte d'Azur*, a laboratory analysing net zero. More than 1,000 trees have been planted since January 2020. The trees are from local species including the cork oak, which has a very good footprint.

The ambition is to reach net zero in 2020, thanks to this initiative. In fact, the carbon footprint has drastically decreased year after year, and it was a good opportunity to reach the net zero level. Today, only three airports worldwide have reached the net zero level.

Luleå, Visby and Ronneby all located in Sweden and managed by SWEDAVIA group have already got the Holy Grail. They are handling 1.2 million, 470,000 and 220,000 passengers, respectively. It is not surprising to see Sweden as a pioneer of net zero because the entire country has the strategy to ban all fossil energies by 2045. It is interesting to see that they are typically small regional Atlantique airports as many others in Europe. If they are able to do so, everybody operating such airports will also be able to achieve such results.

Major airports will succeed but it will take some more time. Limassol, a major airports group, decided on a voluntary base to perform the net zero level not in 2050, but in 2030, and it is probably a key to double the efforts in this field to achieve the results.

SOCIAL AND ENVIRONMENTAL ACCEPTANCE IS THE KEY ISSUE FOR THE FUTURE

The 26th of June, 2020, was a milestone for the Aeroports de Paris Group with the reopening of Orly airport after three months of closure due to COVID-19. It was supposed to be a bright day for the recovery of air transport in France. However, a small group of activists named 'extinction-rebellion' illegally took control of one runway and blocked the traffic for more than one hour. The following Monday, the President of France, Mr Emmanuel Macron, received at the Elysée palace 150 people who are part of the 'Citizens Convention for Climate'; this is a small group of citizens selected by the French state randomly, and this group had to work for six months to propose specific actions in favour of the environment. Around 149 measures had been proposed and Président Macron accepted 146 of them, including the ban of domestic routes when a train has been able to complete the same route in less than four hours and also the ban of airport constructions or expansions. The French Government had already announced in May when it granted a state aid to the AF/KL group. It has been decided that Air France will have to close direct domestic services when train services are operating under 2:30 hours. An exception is for the Charles de Gaulle airport, which is considered as a hub.

These two examples show that air transport is now facing a crucial challenge and a major threat with regard to the environment. Illegal actions too must be firmly condemned because they also impact the safety and security pertaining to airports; the whole air transport sector must deal with this new paradigm.

As far as two propositions given by 'la convention citoyenne' are concerned, these represent major challenges to the air transport sector in France. More widely asked questions have, however, risen regarding the freedom to travel.

The first point is about airport expansion. As the air traffic is still growing in Europe, it means that some airports could become quickly saturated if it is not possible to expand them. It could be an opportunity for small and regional airports that can enhance their activities. As an example, in Britanny, the Lorient Airport, which has the capacity to grow, could take advantage of the situation regarding the saturation of the Nantes Atlantique Airport. The example of Nantes is a perfect one because the project begun in the seventies was to build a new airport as the existing airport was too close to the city. Finally, the decision to build this airport was taken in 2011, with a call for tender.

After many legal actions and illegal occupation of the land by activists, the current government decided, in 2018, to cancel this project and alternatively expand the Nantes Atlantique Airport, which is almost congested and has had no major capacity improvements since 1992. What would happen now if the proposition related to airport expansions of 'la convention citoyenne' becomes a reality?

The second point is about the decision already taken to cancel short-distance flights if the train is competent enough to cover the distance. The first step was announced by the French Ministry of Economy and Finance, Mr Le Maire. In France, the high-speed network is already well developed and nobody can today practically fly from Paris to Lille or to some small cities in France, such as Angoulème, Annecy or Valence, where flights used to exist prior the opening of these network lines. In fact, common sense helps. For example, according to the French Railways' and Lyon Airport's data, more than 90 per cent of the people are already being transported by train. People using flights to Charles de Gaulle Airport are mostly connecting passengers. There are also three daily services to Orly, which are also mostly used for domestic connections and for French overseas territories. So, if these flights are not so critical in number, they are important for connectivity. People do not use these services because they absolutely want to take a plane but because it is a better option serving their needs. One has to remember that if trains are perfect to reach downtown, they can be less attractive if you want to reach a specific suburb close to an airport. One also has to take into account another point. If it is decided to close routes, it will be necessary to introduce much more capacity in train services in order to compensate. As another example, the current Bordeaux–Orly route connects with Orly Airport's A320 aircraft family ten times daily. This represents roughly a daily offer of 3,600 seats. A TGV 'duplex' can accommodate 510 passengers. This shows that the French National Railway Company will have to increase frequencies on the route from about three to six daily additional services. (It is possible to link two 'duplex' trains. Will they do that?) If this is not done, Bordeaux will lose connectivity, and furthermore, they will lose connections accessible only from Orly to French overseas territories. In addition, there is also a more philosophical question, which is regarding the freedom to travel by whichever mode of transportation.

The latest example we can provide is a French law proposal issued by two members of Parliament, Mrs Delphine Batho and Mr François Ruffin. They intend to promote a law that could put in place an individual carbon quota in order to limit the use of aircraft. It is interesting to see that air transport industry is viewed as a transportation mode only dedicated for 'rich' people. They also intend to prohibit general aviation for leisure purposes. At this stage, this proposal of the law has a very low chance to be adopted, but it shows how deep and strong the debate is in France about the use of air transport.

Across these examples, one can see that the challenges air transport will face in the coming years will be huge. It will be really challenging to meet the political and economic expectations because today, the full ecological technology for the whole chain of air transport does not exist even if lot of progress has been already made like it was said.

So net zero is the first and quick challenge that airports must cope with but it is not the only one. Airports can also help other stakeholders to perform better and reduce the carbon footprint on the entire chain of air transport.

BEYOND NET ZERO

Airports can be and should be more proactive once they are involved in an environmental policy regarding the coactivity with their stakeholders.

The first point is to gather all stakeholders to develop a common culture. Airports provide the infrastructure but stakeholders provide potential pollution sources with technical engines, aircraft and so on.

Regarding technical engines, the purpose is quite simple. It consists of introducing a call for tenders for environmental procedures just in order to be sure that they willing comply. The typical example is the handler providers. You can expect significant improvements in this area. For example, many handling equipment can use solar power or electricity instead of fossil energy. This allows saving a large amount of money and restricting pollution.

Regarding aircraft, at first glance, the airport management can say that it is not part of its scope. In fact, they can do a lot in particular regarding the landing/take-off (LTO) cycle. Just remember that the LTO cycle includes the aircraft descent from 3,000 feet, the aircraft taxiing, then take-off and climb until 3,000 feet. This phase represents a distance of about 50 km around the airport and therefore a total of 100 km. During this phase, aircraft are burning a lot of energy and it is again possible to save tonnes of CO_2 by a voluntary policy.

Even with CORSIA, airlines are already beginning to reduce carbon emissions by compensating. More can be expected and done by the airport.

An airport can, for example, promote the single engine taxiing, which is a very good way to save carbon emissions. Some carriers have already adopted this procedure. In addition, airports can also promote the less emissive aircraft and provide bonus/malus policy. There is, for example, in many airports, a bonus/malus for the landing fees regarding aircraft noise but, in addition, airports can also introduce a new bonus/malus scheme for aircraft for not polluting.

As an example, Nice Airport intends to introduce a new bonus/malus scheme that would take into account three criteria. The first would depend on the aircraft engine efficiency, the second is in relation to the use of single engine taxiing and the third criteria would be the load factor, which must be over 80 per cent. This new policy could be implemented by the end of 2020, on the approval of the French regulation authority, which is responsible for all regulatory fees and charges.

Another way to perform better is the airport access. One has to keep in mind that an airport is not only dedicated to aircraft but is an interface between air and earth. It is key to provide alternative modes of transport. The first point is to solve the problem of airport access to the city by providing not only tramways or trolley lines but also bicycle paths (mostly for employees). Nice Airport used to have a poor 'green' access in the past. Now the airport is linked with twin tramway lines that connect the airport with the city centre and the west part of the city. For as low as €1, people are able to reach the airport and so able to save time and money but more

than all, CO_2 emissions are reduced. In addition, a network of bicycle paths allows a soft connection with all the French and Italian Riviera (Euro bicycle road #8). A train interface is also a must for medium and major airports. In Switzerland, for decades, it is possible to self-check in at a train station far away from an airport and then connect very easily via Zurich or Geneva airport. In France, only two airports are currently connected by rail. Roissy and Lyons airports are benefiting from long-distance service by providing high-speed train and local services. Soon, Nice Airport will also get a dedicated train station, and this will allow as a first step to connect with local services and as a second step with long-distance trains both to France and Italy. It is also important to convince other stakeholders, such as car rental companies, to offer their customers hybrid or electric cars. Currently, the offer is not satisfactory, but airports can be proactive by expecting rental car companies to provide more and more 'green' cars.

So if one is looking just at the present scenario, it is possible to perform a lot of actions in order to have a better situation.

But the near future seems to offer a lot of opportunities.

In terms of aircraft efficiency, it seems that in 15 years, new technologies will be offered and we could see zero-emission aircraft. At this stage, the future of aviation will be bright and never forget that a zero-emission aircraft will have a better footprint compared with a train, for example, because the infrastructure required is less important compared with the train. But prior to this, aircraft will be less and less emissive, and once again, airports can help by providing at least one tank of biofuel. According to NESTE (a leader for biofuel), the SAF (sustainable aviation fuel) is five times more expensive compared with jet a1 but provides 80 per cent of less emissions. To be efficient, it is mandatory to get subsidies and to provide much more. For the moment, the worldwide production covers less than 1 per cent of the needs for biofuel. In 2027, the current forecast is only about 2 per cent with a possibility to reach 10 per cent later for biofuel. Nevertheless, airports must be proactive in order to further expand the biofuel network.

CONCLUSION

As a conclusion, one of the key current issues is that the air transport industry is unaware of a real recession and what its impacts could be. Although we are currently experiencing the greatest crisis in the history of air transport, the trend of resilience of the industry has shown that it could take some years to recover, but none of the experts are predicting a long-term recession. In the past, air transport has experienced several crises but never with long-term effects. Environmental matters are a serious concern for the industry, and all players must place it as top priority. Otherwise, the industry could suffer with dramatic social impacts. It is time for all airports to act.