

**Sustainable Development in Aviation Industry  
and the case of Turkish Airlines**

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## **Abstract**

Within changing world, sustainable development globally has become an important strategic goal for all sectors.

Sustainable development seeks to protect, develop and balance social, economic and environmental goals and resources in order to secure comfort and welfare of present and future generations. The significance level of these related goals and sources is very high. Threats and hazards such as limited resources around the globe, overly population increase, global warming, damaging of ozone layer, decreasing of live species and environmental pollution dramatically reveal the importance of sustainable development.

United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol which was signed in 1997 came into force in 2005. In this context, aviation industry is a good sample for sustainability. Fuels used in consist of non-renewable resources so contribute to climate change negatively. But, at the same time, that industry makes very valuable and unique contributions to the sustainable development aimed by global society. These contributions are realized social, economical and environmental dimensions.

Aviation industry is the safest and most efficient type in public transportation. Over long distances and beyond geographical barriers, no alternative one exist so. It offers affordable transportation services to the nations, regions and individuals with wide transportation network. Furthermore, by promoting cultural and social ties, it facilitates exchange of educational experiences.

Economically, aviation industry encourages economic development by facilitating access of regional and global markets, involving with these markets and increasing market share. At the same time, aviation industry leading to the development of trade, travel and tourism sector provides improving of income distribution by creating employment around the globe.

This industry pioneers to the electronic transportation. Highly savings got at ticketing and other documentation transactions by adopting to the electronic system. Decrease in the level of aircraft noise-footprint at a 20 db in recent years, an increase in fuel efficiency of 70 percent in last 40 years – today's newest aircraft technology often matches the energy consumption of modern cars and in some cases (depending on speed and distance)-, coming down Carbon emission ratios dramatically, alternative fuel systems as biofuels and less service required space area compared to other transportation types can be taken as outstanding environmental effects of this industry.

Turkish Airlines (THY) showed an outstanding performance both economically and socially for the last years. Now, being a member of Star Alliance Group, it has a wide flight network around the globe with generated fleet. Furthermore, the company works to make contributions to the sustainable future.

**Keywords:** Sustainable Development in Aviation Industry; Sustainable Aviation; Carbon Emission; Turkish Airlines Case;

## **1. INTRODUCTION**

Today, world deals with not only the countries' GDP values or other economic data's but environmental issues and social benefits also. Climatic changes threat the future at a significant degree higher than ever. Nowadays, world consumes its resources rashly, but could future generations reach these resources easily is a problem the world faced. Similar issues appear to be problem the world faces in this century.

Aviation industry plays essential role both in economic, social and environmental respect. As air transportation developed, trade volume will increase, good transportation volume will continue to be positive, cultures will socialize as a result of increased tourism traffic and time will be used more efficiently. By performing all of them, using resources less and effectively, being environmentally sensitive creates the critic points of this industry. To survive in this industry depends on "Sustainability" and companies should change and design strategies towards to the "green coloured" strategies. At this stage, institutions as IACO, IATA, UN, EU help companies by creating and regulating rules, standards and systems as KYOTO or European Union Emission Trading Scheme ETS.

In this sense, this paper examines the importance of sustainable development for aviation industry. However, we examine Turkish Airlines as a case study in the context of how it has become an international effective player in recent years, strategic alliances that have made and contributions to the sustainability efforts.

## **2. Environmental Issues Associated with Aviation**

Civil aviation, like most other economic activities, gives rise to environmental problems of various kinds. In 1999, the ICAO (International Civil Aviation Organization) Secretariat compiled an inventory of environmental problems what may be associated with civil aviation, to assist the ICAO Council in identifying future priorities in the environmental. It was assumed that "the environment" means all those natural and man-made surroundings which may be adversely affected by the presence of civil aviation, but which are not directly involved in the aviation itself<sup>10</sup>. Issues include:

### **2.1. Aircraft noise**

Historically, noise has been the external impact of aviation with the highest profile. There have been substantial reductions in the noise generated by new aircraft and in the overall noise at many airports. However, at most airports, the frequency and total number of movements is expected to increase in the future. For some people near airports, aircraft noise is a significant nuisance affecting their quality of life. There is considerable variation in individual reactions. Aircraft noise can also have impacts on sleep.<sup>11</sup>

Significant progress has been achieved in reducing the noise impact around many airports, arising from reductions in both engine and airframe noise as well as improvements in

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<sup>10</sup> [http://www.un.org/esa/sustdev/csd/csd9\\_bp9.pdf](http://www.un.org/esa/sustdev/csd/csd9_bp9.pdf)

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[http://www.desd.org.uk/UserFiles/File/new\\_articles/pro\\_body\\_participation/sustainable\\_aviation/Sustainable-Aviation-full-document.pdf](http://www.desd.org.uk/UserFiles/File/new_articles/pro_body_participation/sustainable_aviation/Sustainable-Aviation-full-document.pdf)

operational procedures. Today's aircraft are typically 75% quieter than jets in the 1960.12 Research initiatives target a further 50% reduction by 2020. The number of people exposed to aircraft noise worldwide has gone down – by about 35% between 1998 and 2004. IATA (The Air Transportation Association) has developed a policy on night flights. According to this policy, Night time operational restrictions are increasing, especially in Europe. At some airports, night flights are completely banned. These restrictions can have a serious impact on the economy, next-day delivery services, home-based charters, freight services and intercontinental flights. They can also increase daytime congestion.13 According to Air Transport Action Group (ATAG) data, The South African horn made infamous at 2010 World Cup, the vuvuzela, at blast is rated at 127 decibels. An A380 on the other hand takes off with a relative whisper at 82 db.14 This shows us the latest improvements in aircraft engine technologies.

## 2.2. Carbon Emissions & Fresh Air

Air pollution arising from airline and airport operations has a variety of sources, including aircraft engines, apron vehicles, ground transportation, refueling and power generation equipment. These can pose a problem at a local scale, where increasingly stringent environmental quality standards are being imposed, and at a global level, where increasing concern is being expressed about the significance of the contribution of aircraft engine emissions to the problem of global warming.15 With regard to climate change, IPCC Report16 estimates that aircraft contribute about 3.5 per cent of the total radiative forcing by all human activities and that this proportion is likely to increase. The emissions from aircraft of relevance for climate change include carbon dioxide (CO<sub>2</sub>), water vapour nitrogen oxides (NO<sub>x</sub>), sulphur oxides and soot.

In the context of environment, technological advancements, operational measures, and air traffic management can all improve emissions and fuel efficiency. Acc. to IATA data, new aircrafts are 70% more fuel efficient than 40 years ago and 20% better than 10 years ago. Airlines are aiming for a further 25% fuel efficiency improvement by 2020. By 2050, net aviation carbon emission is aimed to be half of what it was in 2005. Modern aircraft achieve fuel efficiencies of 3.5 liters per 100 passenger km. The A380 and B787 are aiming for 3 liters per 100 passenger km – better than a compact car! Aircraft engine emissions are directly related to fuel burn. Each kilogram of fuel saved reduces carbon dioxide (CO<sub>2</sub>) emissions by 3.16 kg. So the key for airlines to minimize their environmental impact is to use fuel more efficiently. IATA airlines improved their fuel efficiency by 3.1% in 2006 and 2007. IATA

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13 [http://www.iata.org/whatwedo/environment/Pages/aircraft\\_noise.aspx](http://www.iata.org/whatwedo/environment/Pages/aircraft_noise.aspx)

14 <http://www.atag.org/facts-and-figures.html>

15 Upham P. Maughan J. Raper D. And Thomas C. (2003) Towards Sustainable Development , Earthscan Publications, 115

16 <http://www.ipcc.ch/ipccreports/sres/aviation/index.php?idp=22>

airlines have adopted a voluntary fuel efficiency goal. This is to reduce fuel consumption and CO<sub>2</sub> emissions (per revenue tonne kilometer) by at least 25% by 2020, compared to 2005 levels.<sup>17</sup>

ICAO projections states that the commercial aircraft fleet is expected to increase to about 47,500 by 2036, of which more than 44,000 (94 %) aircraft will be new generation technology.<sup>18</sup> Acc. to ATAG, today, global aviation industry produces around 2 % of all human-induced carbon dioxide (CO<sub>2</sub>) emissions. Aviation is responsible for 12 % of CO<sub>2</sub> emissions from all transport sources, compared to 74 % from road transport. And around 80 % of aviation CO<sub>2</sub> emissions are emitted from flights over 1,500 kilometers, for which there is no practical alternative mode of transport<sup>19</sup>. The Figure below indicates passenger air traffic fuel consumption per 100 km. It shows that fuel consumption will decrease in subsequent years due to increasing technology and new generated engines and aircrafts.

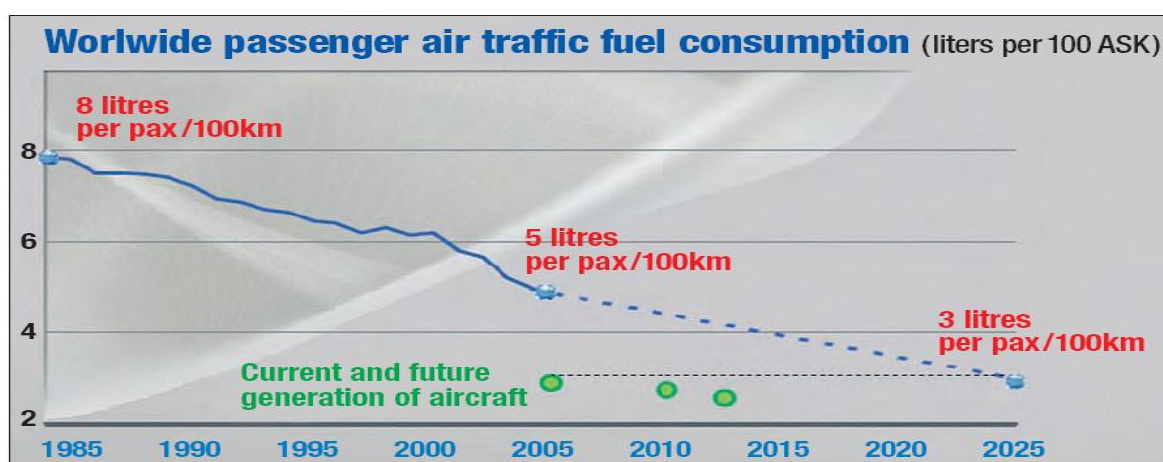


Figure 1: Air Traffic fuel efficiency trend and today's aircraft (source: ICCAIA)<sup>20</sup>

### 2.3. Alternative Fuels

Because of both economic and environmental issues, aviation industry should seek ways for diversification of current fuels and should produce alternative fuels. The International Air Transportation Association (IATA) is dedicated to support its members and the industry to reduce the emission of CO<sub>2</sub>. Alternative fuels, particularly sustainable biofuels, have been identified as one of the key elements in helping achieve this goal. Biofuels derived from sustainable oil crops such as jatropha, camelina and algae or from wood and waste biomass can reduce the overall carbon footprint by around 80% over their full lifecycle. Biofuels test flights carried out by seven airlines have proven biofuels work and can be mixed with existing jet fuel. The industry is now working on finalizing technical certification so biofuels can be

<sup>17</sup> [http://www.iata.org/whatwedo/environment/pages/fuel\\_efficiency.aspx](http://www.iata.org/whatwedo/environment/pages/fuel_efficiency.aspx)

<sup>18</sup> [http://legacy.icao.int/icao/en/env2010/Pubs/EnvReport2010/ICAO\\_EnvReport10-Ch2\\_en.pdf](http://legacy.icao.int/icao/en/env2010/Pubs/EnvReport2010/ICAO_EnvReport10-Ch2_en.pdf)

<sup>19</sup> <http://www.atag.org/facts-and-figures.html>

<sup>20</sup> [http://legacy.icao.int/icao/en/env2010/Pubs/EnvReport2010/ICAO\\_EnvReport10-Ch2\\_en.pdf](http://legacy.icao.int/icao/en/env2010/Pubs/EnvReport2010/ICAO_EnvReport10-Ch2_en.pdf)

used for passenger flights.<sup>21</sup> If the industry were to get 6 % of its fuel supply from alternative fuels by 2020, this would reduce current carbon footprint by 5 %.<sup>22</sup> Objectives are as follows: building a long-term sustainable, environmentally friendly and cost competitive aviation industry.

### 3. Social and Economic Factors

Aviation industry is the safest and most efficient type in public transportation. Over long distances and beyond geographical barriers, no alternative one exist so. It offers affordable transportation services to the nations, regions and individuals with wide transportation network. Furthermore, by promoting cultural and social ties, it facilitates exchange of educational experiences. However, developments at aircraft Technologies and at fuels affect the social life directly. People lives near airports expose high noise than to other people, so night sleep can be a torture for them. But recent developments decreased the noise problem at a significant level about 35 % between 1998 to 2004.<sup>23</sup> And also, low carbon emission will affect social life in a positive manner too.

There is a general acceptance that there is a positive, mutually supportive relationship between aviation and economy.<sup>24</sup> Aviation supports some 56.6 million jobs around the world or it carries 35% of the world's cargo by value.

According to ATAG report 2010<sup>25</sup>; Airlines transport over 2.6 billion passengers annually with revenue passenger kilometers (RPK) totaling nearly 5 trillion in 2010. The USA followed by China and then the UK were the top three countries in terms of RPK. Aviation is indispensable for tourism, which is a major engine of economic growth, particularly in developing economies. Globally, 51% of international tourists travel by air. Connectivity contributes to improved productivity by encouraging investment and innovation; improving business operations and efficiency; and allowing companies to attract high quality employees. Aviation's global economic impact (direct, indirect, induced and tourism catalytic) is estimated at \$2.2 trillion, equivalent to 3.5% of world gross domestic product (GDP).

It provides 8.4 million direct jobs: airlines, air navigation service providers and airports directly employ 7.6 million people and the civil aerospace industry (manufacture of aircraft systems, frames and engines) employs 0.8 million people. There are 9.3 million indirect jobs generated through purchases of goods and services from companies in its supply chain. Industry employees support 4.4 million induced jobs through spending. Aviation-enabled tourism generates around 34.5 million jobs globally.

The world's airlines carry over 2.6 billion passengers a year and 48 million tonnes of freight in 2010. Providing these services generates 8.4 million direct jobs within the air transport

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21 <http://www.iata.org/whatwedo/environment/Pages/alternative-fuels.aspx>

22 <http://www.atag.org/facts-and-figures.html>

23 [http://www.iata.org/whatwedo/environment/pages/aircraft\\_noise.aspx](http://www.iata.org/whatwedo/environment/pages/aircraft_noise.aspx)

24 Upham P. Maughan J. Raper D. And Thomas C. (2003) Towards Sustainable Development , Earthscan Publications, 39

25 <http://www.aviationbenefitsbeyondborders.org/download-abbb-report>

industry and contributes \$539 billion to global GDP. Compared with the GDP contribution of other sectors, the global air transport industry is larger than the pharmaceuticals (\$445 billion), the textiles (\$236 billion) or the automotive industries (\$484 billion) and around half as big as the global chemicals (\$977 billion) and food and beverage (\$1,162 billion) sectors. In fact, if air transport were a country, its GDP would rank it 19th in the world, roughly equal to that of Switzerland or Poland.

In 2030, forecasts suggest that there will be nearly 6 billion passengers and aviation will support nearly 82 million jobs and \$6.9 trillion in economic activity.

#### **4. Turkish Airlines**

Turkish Airlines Incorporation that was established in 1933 and named shortly THY was called The State Airlines Administration when first established. It has taken action as incorporation that it is called today. At first it started to fly by using 5 aircrafts. The first international voyage Atina was flown in 1947. Turkish Airlines offered about 50% of shares to the public in 2006 and they were traded at Istanbul Stock Exchange. In addition, it had 50% of partnership in Sun Express centered in Antalya by making an agreement with German airline Lufthansa in 1989 and invested in Sarajevo airline Bosnia and Herzegovina Airlines by purchasing 49% of shares. Company established AnadoluJet centered in Ankara to serve all people in Turkey in 2008. It joined oldest airlines alliance of world, Star Alliance, by making an agreement in Istanbul in 2008. On the other hand, Turkish Airlines was named Turkish Airlines Cargo has taken action its cargo service in 1936 and changed its name to TURKISH CARGO in 2000. Turkish Airlines that owned 6 cargo aircrafts had totally 179 aircrafts. Company grows by purchasing new aircrafts continuously and also develops its cargo services. At the end of 2011 it reached of totally 189 cities including 40 cities for domestic and 149 cities for international. Simultaneously it has 2 technical maintenance centers in Istanbul. Turkish Airlines Technical Incorporation that is one of these centers was established in Atatürk Airport in 2006 and has become an important technical maintenance point in air transportation. Other center, Aviation Maintenance Repair and Modification Center Incorporation (HABOM), was founded in Sabiha Gökçen Airport in 2011.

After World War II with global economy, aviation industry also developed rapidly. With increasing population and income level, there were changes in travel expenditures and behaviours. As a results of these developments, new infrastructure, routes, airfares and offers was served up in aviation industry. The importance of social, economical and environmental purposes and preservation, improvement and balancement of resources were understood. For these purposes, Turkish Airlines shows improvements in terms of sustainable development that global community aims.

When mentioned about sustainable development, firstly, development without effecting environment adversely might be mentioned. World is under threat of greenhouse gases such as carbon dioxide, methane and ozone. In this sense, Turkish Airlines tries to decrease the amount of carbon dioxide caused by aircrafts and other activities. Because of Fuel-Saving Project implemented in 2008, Turkish Airlines saved jet fuels about 78.371.439 \$ and decreased carbon dioxide emission about 201.700 tons.

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26 <http://turkishairlines.com/tr-tr/kurumsal/tarihce>

Aviation industry was joined to the Carbon Emission Trading System that was valid from 1 January 2012. In this context, Turkish Airlines has to comply with regulations of European Emission Trading Scheme (EU-ETS) as other airlines operating flights to Europe<sup>27</sup>.

Temel Kotil, General Manager of Turkish Airlines, said that they were working with International Air Transport Association about fuel-saving. So, less fuel usage at flights, 30 million \$ fuel-saving per year and significantly decreasing amount of carbon dioxide emission was aimed<sup>28</sup>.

Activities about decreasing of damages to the environment and human health that derives from airport facilities were initiated by Directorate General of Civil Aviation. In 2010, for luggage transportation, vehicles with electricity started to be used instead of vehicles with fuel at airports with heavy traffic. If airport facilities met certain conditions in the context of this project, airports are taken to the category of "Green Airport" and facilities that met conditions provide discounts in the service recipe<sup>29</sup>.

Aviation industry in Turkey has grown substantially for last decade. There were liberalization steps in the industry that was closed to the open competition and under the monopoly of Turkish Airlines until 2002<sup>30</sup>. Between 2002-2010, average annual growth was 16% for air traffic and 25,5% for passenger traffic<sup>31</sup>.

In 2009, while the aviation industry in the world downsized, Turkish Airlines continued to develop and increased by 11%. Turkish Airlines carried 10,4 million passengers in 2003, raised the number of passengers to 22,5 million in 2008, 25,1 million in 2009, 29,1 million in 2010 and 32,6 million in 2011<sup>32</sup>. In 2011, among the member airlines of Association of European Airlines, it ranged fourth with 8,7% market share in terms of number of passengers and fifth with 7,3% market share in terms of seat kilometers offered. While total number of passengers of member airlines increased by 4,2%, Turkish Airlines raised by 15,6%. In addition, Turkish Airlines is market leader in air cargo transportation in Turkey. It increased its market share by 64% in 2011<sup>33</sup>.

Turkish Airlines implements efficiency-oriented employment program. Its total number of personnel was 10.239 people in 2003 and raised by 15.491 people in 2011. To become the best airline in the world, the best cabin crew is required as a return of differentiation in the service concept. From this point, Turkish Airlines applied "Service Quality and Increasing Passenger Satisfaction Programme" since August, 2010<sup>34</sup>.

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27 <http://turkishairlines.com/tr-TR/faaliyet-raporu/2010/pdf/tr-thy2010.pdf>

28 <http://hurriyet.com.tr/ekonomi/15229951.asp>

29 <http://shgm.gov.tr/greenairport.pdf>

30 <http://invest.gov.tr/tr-TR/infocenter/publications/Documents/TURIZM.SEKTORU.pdf>

31 <http://shgm.gov.tr/doc4/2010fr.pdf>

32 <http://turkishairlines.com/tr-tr/kurumsal/basin-odasi/THY/yolcu-sayisi>

33 [http://thy.com/download/investor\\_relations/annual\\_reports/faaliyet\\_raporu\\_aralik\\_2011.pdf](http://thy.com/download/investor_relations/annual_reports/faaliyet_raporu_aralik_2011.pdf)

34 <http://turkishairlines.com/tr-tr/kurumsal/basin-odasi/THY/is-gucu>



Company also gives promotion tickets, companion tickets and opportunity to upgrade to the members with Miles&Smiles Programme. At the same time, call center which is one of the most important marketing and sales channel were included in the service as of 2009<sup>35</sup>.

Turkish Airlines achieved significant successes in context of brand investments. Sponsorship of Euroleague, FC Barcelona and Manchester United has provided a great advantage in the European market. There were other sports sponsorships. On the other hand, Kevin Costner, Caroline Wozniacki, Kobe Bryant and Novak Djokovic were brand face of Turkish Airlines with the slogan of “Globally Yours” and company has increased brand awareness. In the sense of financial discipline, one of the most important keys of sustainable development, Turkish Airlines applies long-term value-based growth programme and effective cost management. Aviation Week Magazine, leading broadcasting organizations of aviation industry, identified Turkish Airlines as the best airline from the point of financial situation in 2010. It has given “The Best Airline of Europe”, “The Best Airline of South Europe” and “The Best Premium Economy Seat” by “Skytrax World Airline Awards” organization, known as the Oscars of aviation industry. Turkish Do&Co catering company, joint of Turkish Airlines, was awarded as the best of world with the catering service in economy class. Furthermore, it achieves “The Best Market Leader” of 2010 in the context of Air Transport World Airline Industry Achievement Awards, accepted one of the most prestigious awards of aviation industry<sup>36</sup>.

Turkish Airlines also sustains activities about culture, art and social responsibility. It has supported Istanbul, 2010 European Capital of Culture, as “Capital Sponsorship”. According to the contract with Turkish Red Crescent, company contributes victims of natural catastrophes. Moreover, by planting 5.000 saplings it made up “THY Technical Commemorative Forest” in Kurtköy and Kemerburgaz<sup>37</sup>.

## 5.CONCLUSION

This paper has attempted to show how sustainable development in aviation industry is important for global world. Sustainable development seeks to protect, develop and balance social, economic and environmental goals and resources in order to secure comfort and welfare of present and future generations. Aviation industry is the safest and most efficient transport type. Industry meets the society’s air transport needs by establishing relationship with employees, local communities, customers and industry partners. A competitive and commercial viable aviation industry makes a positive contribution to the world economy. Aviation industry generates \$2.2 trillion in 2010 and it equals to 3.5% per cent of global GDP. Around the world industry supports 56.6 million jobs. Emission is a huge problem standing that the future generations will face tragically. New aircrafts are 70 % more fuel efficient than 40 years ago and 20 % better than 10 years ago. In 2050, industry aims to decrease carbon emission to be half of what it was 2005.

The importance of social, economical and environmental purposes and preservation, improvement and balancement of resources were understood. For these purposes, Turkish

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35 <http://turkishairlines.com/tr-TR/faaliyet-raporu/2010/pdf/tr-thy2010.pdf>

36 [http://thy.com/download/investor\\_relations/annual\\_reports/faaliyet\\_raporu\\_aralik\\_2011.pdf](http://thy.com/download/investor_relations/annual_reports/faaliyet_raporu_aralik_2011.pdf)

37 <http://turkishairlines.com/tr-TR/faaliyet-raporu/2010/pdf/tr-thy2010.pdf>

Airlines shows improvements in terms of sustainable development that global community aims. With its new generation aircrafts, Turkish Airlines tries to decrease the amount of carbon dioxide caused by aircrafts and other activities and fuel consumption. Hence, it has taken important steps about the sustainability by being a member of European Emission Trading Scheme. In the sense of financial discipline, one of the most important keys of sustainable development, Turkish Airlines has got remarkable performance by performing the economic aspects of sustainable development. Company has to fulfil conditions what the sustainability requires so it may survive in the market and become number one in aviation industry around the world.

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