Verona Airport

Garda Airports

Decarbonization Plan to 2045

December 2024

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1. INTRODUCTION

Verona Airport enjoys a strategic location in the Northeast area of Italy, nestled within one of Europe's most competitive basins in terms of company density, it serves as an optimal hub for airlines.

The management of Verona Airport is overseen by Aeroporto Valerio Catullo di Verona Villafranca S.p.A., the company that also manages Brescia Airport. In the fiscal year 2014, Save S.p.A. became a partner, incorporating Aeroporto Valerio Catullo di Verona Villafranca S.p.A. into the Save Group.

The company is composed of both public and private shareholders as shown below:

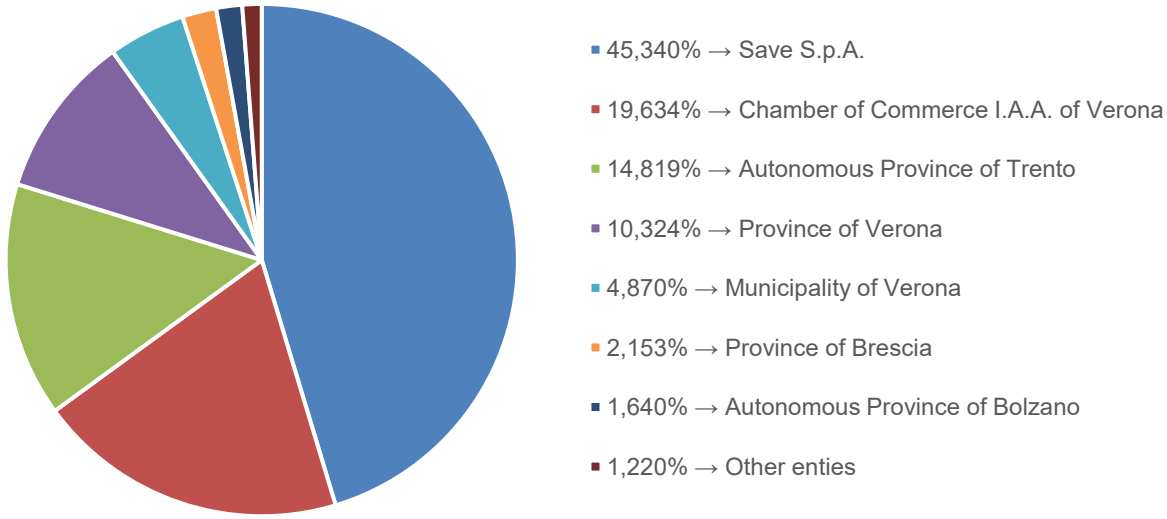

Figure 1 *- Corporate composition of Aeroporto Valerio Catullo di Verona Villafranca S.p.A. as at November 2024*

Climate change is one of the most pressing challenges that our world faces. Scientific assessments through the Intergovernmental Panel on Climate Change (IPCC) reports have shown that many of the worst consequences of climate change can be avoided by limiting global warming to 1,5 °C above preindustrial levels. The global temperature is already over 1 °C above pre-industrial levels and scenarios assessed by the IPCC indicate that limiting warming to 1,5 °C, with no or limited temperature overshoot, requires achieving at least net zero global carbon dioxide (CO_2) emissions in the early 2050s, along with deep and sustained global reductions in other greenhouse gas emissions (GHGs)[1].

The Veneto region, part of the Mediterranean "hot zone", is particularly vulnerable to the impacts of climate change, experiencing rapid temperature increases, flooding, sea level rise, coastal erosion, and glacier reduction.

[1] ISO Net Zero Guidelines IWA 42:2022 – Accelerating the transition to net zero

So, acknowledging the central role Save Group plays in the economic and social development of the surrounding area, it has been formulated an ESG (Environmental, Social and Governance) strategy, seeking to achieve the highest levels of sustainability and innovation. This strategy incorporates environmental, carbon dioxide emission reduction, social and passenger experience aspects, in addition to operational efficiency and economic considerations, in line with the Sustainable Development goals applicable to the Group's operations.

For the coming years, Save Group's goals are:

- design **energy-efficient systems** and **reduce the use of fossil fuels and non-renewable resources**;
- design infrastructures with high **Comfort & Wellbeing standards** in order to create an airport optimized for the **Customer Experience**;
- improve the **operational efficiency of the airport facility**.

In the context of a broader long-term vision of its environmental impacts, Verona Airport has begun a proceed of gradual reduction of its CO_{2e} emissions also joining the *Airport Carbon Accreditation* programme in the first years at level 2 "Reduction" until to upgrade to level 3+ "Neutrality" in November 2024.

The goal of this document is to provide a comprehensive overview of Verona Airport's decarbonization plan developed to achieve Net Zero Carbon Emissions[2] level for Scope 1 and 2 by 2045.

The European Green Deal aims to ensure zero emissions by 2050, making Europe the first climate-neutral continent in the world[3]. This involves reducing emissions through various measures such as transitioning to renewable energy, improving energy efficiency and implementing sustainable practices across all sectors.

Valerio Catullo Airport is committed to an absolute reduction in emissions, leading to the development of this Roadmap. This aligns with the IPCC's recommendations to limit global warming to 1.5°C.

[2] Condition in which human-caused residual GHG emissions (GHG emission that remains after taking all possible actions to implement emissions reductions) are balanced by human-led removals over a specified period and within specified boundaries

[3] European Commission, "The European Green Deal – a growth strategy that protects the climate". Available at https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/story-von-der-leyen-commission/european-green-deal_en

2. REGULATORY AND VOLUNTARY CONTEXT

2.1. Overview of Relevant Regulation

The decarbonization plan is designed to comply with and anticipate regulatory requirements. The aviation sector in 2022 contributed to global CO_2 emissions for 3,8% to 4% in Europe[4], faces significant challenges due to the increasing number of flights. This growth complicates efforts to mitigate climate change. In response, the 184 member states of the International Civil Aviation Organization (ICAO) adopted a long-term global aspirational goal (LTAG) in 2022, targeting Net Zero Carbon Emissions from international aviation by 2050[5]. Concurrently, the European Union, the European Parliament and the Council reached a political agreement on the ReFuelEU Aviation rules in 2023. These rules establish a timeline for a minimum Sustainable Aviation Fuel (SAF) blend-in shares, including sub-targets for synthetic fuels, through 2050[6]. These regulations are crucial as the latest IPCC report underscores the urgent need for action against climate change, which is already affecting weather patterns and causing extreme events globally[7].

2.2. Industry Best Practices

To ensure the decarbonization plan for Verona Airport is aligned with high standards and recognized practices, it is essential to reference industry best practices and initiatives. The analysis is based on benchmarking leading industry strategies and is considered to provide acceptable alignment with the IPCC 2°C pathway. The decarbonization plan is designed to be both ambitious and realistic.

Here are some key examples of decarbonization activities for a more environmentally sustainable aviation sector:

- **Sustainable Aviation Fuels (SAF):** SAFs are produced from sustainable resources such as waste oils and agricultural residues. They offer a viable and environmentally friendly alternative to conventional jet fuels[8]. The aviation industry is working towards developing the necessary infrastructure and logistics to accommodate this transition. Regulatory support and incentives from governments and aviation authorities are crucial to facilitate this shift;
- **Fleet Renewal and Disruptive Propulsion Technologies:** airlines and Original Equipment Manufacturers (OEMs) are prioritizing fleet renewal and investing in disruptive propulsion

[4] European Commission, “Reducing emissions from aviation”. Available at https://climate.ec.europa.eu/eu-action/transport/reducing-emissions-aviation_en
[5] ICAO, "Adoption of Long-Term Global Aspirational Goal," 2022. Available at: https://www.icao.int
[6] European Commission, “ReFuelEU Aviation”. Available at https://transport.ec.europa.eu/transport-modes/air/environment/refueleu-aviation_en
[7] IPCC, "Climate Change 2021: The Physical Science Basis," 2021. Available at: https://www.ipcc.ch/report/ar6/wg1
[8] European Commission, "RefuelEU aviation". Available at: https://eur-lex.europa.eu/EN/legal-content/summary/refueleu-aviation-sustainable-air-transport.html#:~:text=The%20regulation%20creates%20a%20strong%20and%20stable%20legal,generate%20lower%20life-cycle%20emissions%20than%20conventional%20fossil%20kerosene.

technologies to reduce emissions. This includes the development of more fuel-efficient aircraft and the adoption of electric and hybrid propulsion systems;

- **Operational Efficiency:** improving operational efficiency is a key focus for the aviation industry. This involves optimizing flight routes, reducing taxiing times and implementing advanced air traffic management systems to minimize fuel consumption and emissions;
- **Carbon Offsetting:** airlines and airports are investing in projects that offset their carbon emissions, such as reforestation and renewable energy initiatives;
- **Collaboration and Partnerships:** the aviation industry is collaborating with various stakeholders, including governments, research institutions, and other industries, to develop and implement sustainable practices. These partnerships help drive innovation and ensure a coordinated approach to decarbonization.

3. CURRENT EMISSIONS ANALYSIS

3.1. Emissions Mapping (Scope 1, 2 and 3)

To create an accurate account of its emissions, Verona Airport has identified major GHG emission sources following the guide published in the GHG Protocol Corporate Accounting and Reporting Standard, which lists GHG sources and activities along the value chain by scope for various industry sectors.

For Scope 3 calculations, the process relies on two additional documents, namely the "*Corporate Value Chain (Scope 3) Accounting and Reporting Standard – Supplement to the GHG Protocol Corporate Accounting and Reporting Standard*" and the "*Technical Guidance for Calculating Scope 3 Emissions - Supplement to the Corporate Value Chain (Scope 3) Accounting & Reporting Standard*" issued by the GHG Protocol.

The emission categories considered applicable are the following:

SCOPE 1: *direct GHG emissions airport operator*	
STATIONARY SOURCES	Fuels for heating production and emergency generators
MOBILE SOURCES	Fuels for company's vehicle fleet and machinery
FUGITIVE EMISSIONS	Refrigerant losses from the air conditioning units, fugitive emissions from de-icing chemicals
SCOPE 2: *indirect GHG emissions from purchased energy*	
ELECTRICITY	Electricity purchased from the national grid

SCOPE 3: *other indirect GHG emissions from upstream and downstream activities*	
Category 1 PURCHASED GOODS AND SERVICES	Goods, products and services that the airport operator purchases, considering their life cycle emissions
Category 2 CAPITAL GOODS	Upstream (i.e., cradle-to-gate) issues resulting from the production of the airport operator purchased or acquired capital assets
Category 3 FUEL AND ENERGY-RELATED ACTIVITIES (NOT IN SCOPE 1 OR 2)	Well-to-tank emissions of fuels and electricity that the airport operator purchases for its own use (and that is reported under Scope 1 and 2)
Category 5 WASTE GENERATED IN OPERATIONS	Waste disposal
Category 6 BUSINESS TRAVEL	Business travel by the airport operator's staff, but not commuting
Category 7 EMPLOYEE COMMUTING AND HOME OFFICE	Commuting by the airport operator's staff and working from home (remote)
Category 11 USE OF SOLD PRODUCTS	Aircraft full flight and APU use, fuel from engine testing, direct emissions from fuels by tenants, crew, tenant staff and passengers surface access
Category 13 DOWNSTREAM LEASED ASSETS	Energy and electricity emissions of assets of the airport tenants or partners or to which the airport supplies energy (their Scope 2 emissions)

Table 1 - *Emission sources according to GHG Protocol*

The following table displays 2023 Scope 1 emissions disaggregated by sources:

Emission Source	**2023 [tCO_{2e}]**
Stationary sources	1.256
Mobile combustion	117
Fugitive emissions	33
Total emissions Scope 1	**1.406**

Table 2 *- Scope 1 emissions [tCO_{2e}]*

By doing the calculations, the following assumption has been made regarding refrigerants losses. Gas amounts released in the atmosphere have been supposed equal to the total amount of gases added to the air conditioning units during the reporting year. GWPs have been calculated considering the refrigerant gases composition.

Scope 2 emissions are related to emissions due to electricity purchased by Aeroporto Valerio Catullo di Verona Villafranca S.p.A. but generated by third parties. Scope 2 emissions is calculated following two different approaches according to GHG Protocol Scope 2 Guidance:

- **location-based approach:** this method is based on an average emissions factor related to the national energy mix specific to the country where Verona Airport is located (Italy). The

higher the share of renewable energy is used within the Country the lower the associated emissions factor;

- **market-based approach:** this method reflects emissions from electricity sources and products that have been intentionally selected, with the emission factor directly associated with the type of electricity purchased. Under this approach, a zero-emission factor is applied to any share of renewable energy purchased with Guarantee of Origin (GO) certificates. The remaining purchased energy is accounted for using an emission factor that reflects the residual mix of the market. This approach is key to avoiding double-counting of the same amount of electricity from a particular energy source. The country's residual mix represents the share of electricity generation attributes available for disclosure after explicit tracking systems, such as GOs, have been accounted for.

As the purchased electricity by Verona Airport is covered by Guarantees of Origin (GOs) from May 2016, the Market-Based Scope 2 emissions are equal to zero.

Emission Source	2023 [tCO_{2e}]
Scope 2 *Location-based approach*	2.254
Scope 2 *Market-based approach*	0

***Table* 3 -** Scope 2 emissions [tCO*2e*]

The following table displays 2023 Scope 3 emissions disaggregated by production activity:

Emission Source	2023 [tCO_{2e}]
Category 1 PURCHASED GOODS AND SERVICES	2.723
Category 2 CAPITAL GOODS	12.553
Category 3 FUEL AND ENERGY-RELATED ACTIVITIES (NOT IN SCOPE 1 OR 2)	756
Category 5 WASTE GENERATED IN OPERATIONS	556
Category 6 BUSINESS TRAVEL	3
Category 7 EMPLOYEE COMMUTING AND HOME OFFICE	14.430
Category 11 USE OF SOLD PRODUCTS	261.177
Category 13 DOWNSTREAM LEASED ASSETS	230 Location-based approach 26 Market-based approach

Emission Source	2023 [tCO_{2e}]
Total emissions Scope 3	**292.428 Location-based approach** **292.224 Market-based approach**

Table 4 - *Scope 3 emissions [tCO_{2e}]*

Emission Source	2023 [tCO_{2e}]
Scope 1	1.406
Scope 2 *Location-based approach*	2.254
Scope 3 *Location-based approach*	292.428
Total emissions *Location-based approach*	**296.088**

Table 5 *- Total emissions location-based approach [tCO_{2e}]*

Emission Source	2023 [tCO_{2e}]
Scope 1	1.406
Scope 2 *Market-based approach*	0
Scope 3 *Market-based approach*	292.224
Total emissions *Market-based approach*	**293.630**

Table 6 *- Total emissions market-based approach [tCO_{2e}]*

By pointing out that scope 3 emissions refer to other indirect GHG emissions from upstream and downstream activities, data from 2023 shows that the aircraft full flights contribute significantly with about 80% and passenger access is the following source (less than 10%).

3.2. *Methodologies*

The airport's operations are inherently diverse, involving various operators such as handlers, commercial businesses, freight forwarders and State entities, all utilizing the airport's infrastructure and facilities. Nevertheless, data collection to define the emissions and decarbonization pathway was conducted through specific forms mainly based on primary evidence. This ensured that the decarbonization plan adhered to both regulatory requirements and voluntary commitments, anticipating future regulatory demands and aligning with the broader objectives of global agreements, such as the Paris Agreement.

GHG emissions reported by Verona Airport are expressed in CO_{2e}. CO_{2e} is the universal unit of measurement to indicate the global warming potential (GWP) of GHGs, expressed in terms of the GWP of one unit of carbon dioxide. The GWPs used in the calculation of CO_{2e} are based on the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) over a 100-

year period. While for refrigerant gases, the GWP associated with those gases has been considered.

In addition to using the GHG Protocol as a framework, the Group has also drawn from the *Airport Carbon Accreditation* certification to ensure a robust and comprehensive approach to calculating its GHG emissions.

The methodology involves the application of documented emission factors (hereinafter also "EF"), which are ratios calculated by relating GHG emissions to a proxy measure of activity at an emissions source. The applied formula is as follows:

$$GHG\ Emissions = A * EF * GWP$$

where:

- **GHG emissions**: the quantity of GHGs measured in metric tonnes of $CO_{2equivalent}$;
- **A**: activity data which measures burned fuel (kg, m^3, l, or tonnes), energy (MJ or kWh) or the amount of refilled refrigerant gases (kg);
- **EF**: emission factor. It is the quantity of GHG emissions per unit of activity data;
- **GWP**: Global Warming Potential (IPCC, AR6).

The following sections illustrate the primary data and the emission factors applied, by emission source. The main sources of the emission factors used are identified based on the following databases:

- **DEFRA (Department for Environment, Food and Rural Affairs)**: it is a UK government department; its wide database contains EF for Scope 1, Scope 2 and Scope 3 emissions;
- **AIB**: The European Attribute Mix (EAM) and the residual mixes for all countries and the related supporting materials by the Association of Issuing Bodies are reported. It was used to calculate Market-Based GHG emissions from the electricity purchased by third parties that have not an electricity supply certificate by GOs;
- **NIR (National Inventory Report)**: these emission factors are based on methodologies for reporting national greenhouse gas inventories;
- **CRF (Common Reporting Format)**: these emission factors are based on standardized data tables containing mainly quantitative information;
- **EPA**: the emission factors are based on Environmental Protection Agency methodologies for EEIO spend-based accounting;
- **EXIOBASE:** detailed multi-regional environmentally extended input-output database that was used to provide conversion factors for the spend-based methodology.

4. DECARBONIZATION PLAN AND IMPLEMENTATION

4.1. Actions for Reducing Scope 1 and 2 emissions

The Decarbonization Plan seeks to ensure that the airport's development is consistent with the goals for sustainable growth in Europe.

The Strategic Framework for emission reductions has taken into account the age of the facilities and focuses on the integration of renewable energy sources, the development of green infrastructure, and energy efficiency initiatives to reduce Scope 1 and 2 emissions.

The following actions represent the market-based approach to highlight the completeness of the internal choices.

Action	Description	Year of implementation	Related actions	CO_{2e} emissions reduction *vs* BAU scenario in 2045
Scope 1 – Heating Electrification	Heating electrification is a crucial measure for reducing Scope 1 emissions from stationary facilities. Heat pumps have the ability to extract heat from a cold source and give it back to a warmer source, using electricity. If the electricity consumed is produced by a renewable source, the process is CO_2 emissions free. Comparing with BAU scenario in 2045 this solution will remove the consumption of about 700.000 Smc of natural gas	This approach focuses on gradually replacing of the oldest thermal plant at the first step with high-efficiency electric heating systems, transitioning away from fossil fuels and significantly cutting direct greenhouse gas emissions. The replacement of the oldest thermal plant will start in 2026. The process will be concluded in 2045 when the thermal plant serving the extension of the terminal (Romeo Project) will be replaced. In the meantime, also the plant of the hangar will be substituted	This action involves electrification, leading to an increase in electricity consumption, which will be mitigated by expanding photovoltaic capacity and fully covering the residual consumption with GOs	1.415 tCO_{2e}
Scope 1 – Emergency Generators HVO	HVO (Hydrotreated Vegetable Oil) is one of the main renewable liquid fuels already available for end users. Generators powered by HVO provides similar performance to running on diesel including similar rated power output, transient response, start-up time and NO_x emissions. Switching to HVO will reduce lifecycle greenhouse gas emissions compared to diesel	Starting in 2030, the company plans to convert existing emergency generators from diesel to HVO	Because of the age of some existing generators, some of them will be replaced	8 tCO_{2e}

Action	Description	Year of implementation	Related actions	CO_{2e} emissions reduction *vs* BAU scenario in 2045
Scope 1 – Electric Fleet	During operation, electric vehicles don't produce CO_{2e} emissions and if charging activity use electricity from renewable sources, this allows to decarbonize this source. It will be introduced full electric cars to replace those previously fuelled by gasoline, LPG and diesel. 50% of vehicles and machinery part of the ground support equipment (such as tractors and ambulifts for example) it will be composed of full electric vehicles/machinery	The reduction actions will begin in 2025 with the introduction of battery electric vehicles (BEVs)	This action involves electrification, which will lead to an increase in electricity consumption, mitigated by the expansion of photovoltaic capacity and the use of Guarantees of Origin (GOs). Additionally, charging stations (22-50 kW) have been planned to support this transition, with all assets relying on internal supply as a precautionary measure to align with both decarbonization goals and the financial plan	74 tCO_{2e}
Scope 1 – Alternative-Fuel (HVO) Fleet	For vehicles and machinery part of the ground support equipment that do not have now a viable full electric alternative or in those case where the annual use does not justify the investment (such as deicers for example), the solution will be adopted evaluate the use of HVO	The reduction actions begin in 2026 with the introduction of HVO	An HVO fuelling station will be required within the facility. This will involve converting the existing diesel fuelling station to HVO, ensuring supply for both the company's own fleet and third-party handlers, contributing to Scope 3 Category 11 emissions reductions	49 tCO_{2e}
Scope 2 – Purchase of electricity certified by Guarantee of Origin (GOs)	Electricity supply certified by GOs is one of the primary initiatives for decarbonizing electricity consumption. Starting in 2016, a program for an electricity supply certified by GOs was implemented to ensure that electricity comes from renewable sources. This strategy will continue and the required amount of GOs will take into account changes in consumption and interventions on an annual basis	This action will be maintained as it is already active since May 2016	N/A	0 tCO_{2e} (action already in progress so it defines the BAU scenario)
Scope 2 – Installation of Photovoltaic (PV) Systems	Producing electricity from a renewable source as solar has the positive impact to eliminate GHG emissions.	The actions will be implemented between 2025 and 2040	N/A	0 tCO_{2e} (align to the strategy of electricity supply certified by GOs)

Action	Description	Year of implementation	Related actions	CO_{2e} emissions reduction *vs* BAU scenario in 2045
	Moreover, photovoltaic plant electricity production contributes to reduce the amount of electricity supplier from the national grid. Photovoltaic systems are planned both on the roof of the terminal and on the roof of some buildings. In addition, in an airside area the possibility to install a ground-based photovoltaic plant it will also evaluate. Annual production of about 5.500 MWh has been estimated when all plants will be in operation			
Scope 2 – LED Lighting Systems Installation	LED lighting systems have been adopted as part of energy efficiency measures and they are a cost-effective form of lighting that can significantly reduce energy consumption (and consequently energy demand) compared to traditional lighting. This intervention will contribute to a reduction up to about 300.000 kWh/year when all the new system will be in operation	Beginning in 2024. Reductions are expected in the very coming years as lighting systems are gradually replaced, in the next three-year period	N/A	0 tCO_{2e} (align to the strategy of electricity supply certified by GOs)

Table 7 - *Actions for Reducing Scope 1 and 2 emissions*

The initiatives detailed within Scope 1 and Scope 2 collectively illustrate a comprehensive and proactive framework for CO_{2e} emission reduction. By prioritizing the shift towards electrification and integrating renewable energy solutions, these measures facilitate substantial reductions in both direct and indirect emissions, thereby aligning with long-term sustainability objectives and significantly curbing the corporate carbon footprint.

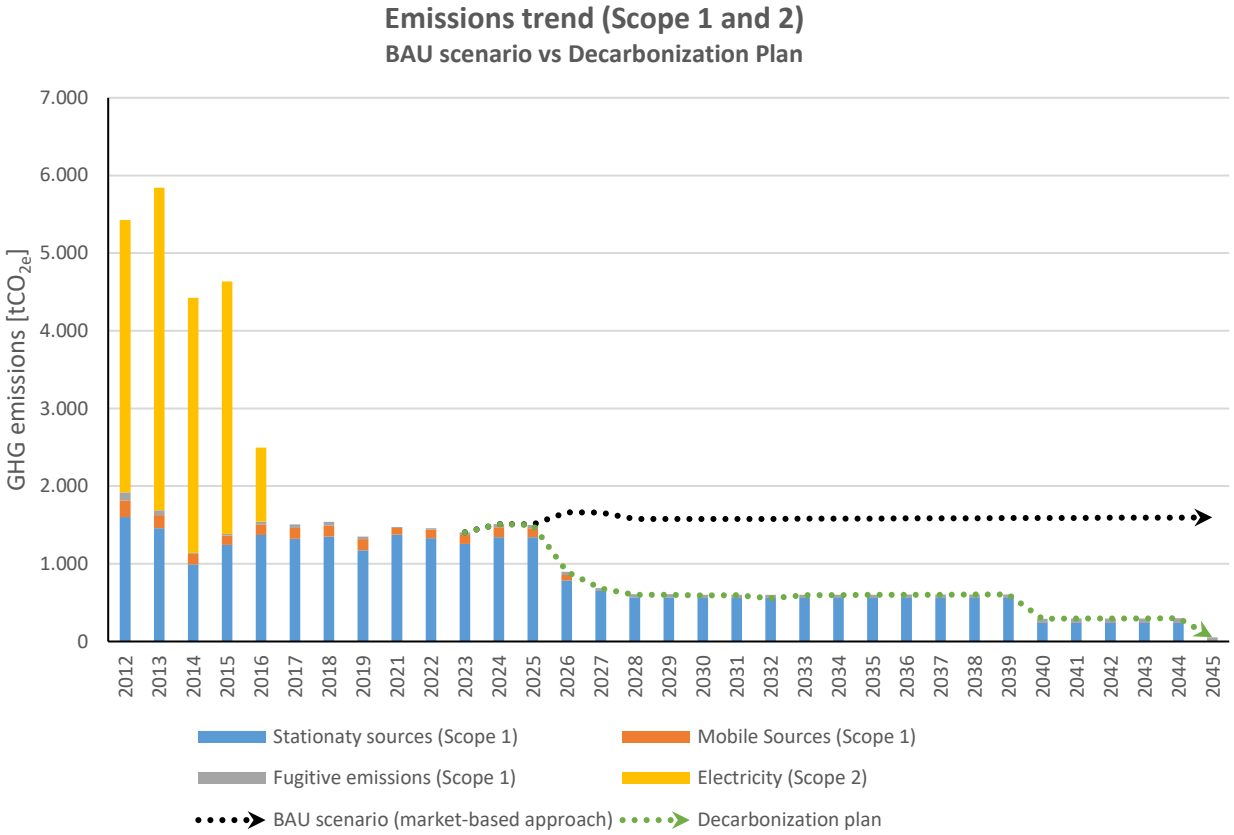

Figure 2 - *Scope 1 and 2 emissions - BAU scenario vs Decarbonization plan [tC_{O2e}]*

The Business-as-Usual (BAU) growth scenario details CO_{2e} emissions projections for Scope 1 and 2 until 2035 (year of mid-term goal) and subsequently until 2045 (Net Zero Carbon Emissions goal). These projections are based on increase in passenger numbers and the planned expansion of the airport facilities, including a new area of the terminal by the next year.

In the medium term, Verona Airport aims to achieve a -89% reduction in Scope 1 and 2 emissions by 2035 compared to 2012, the baseline. In the long term, the airport is targeting Net Zero Carbon Emissions for Scope 1 and 2 (emissions produced by sources where the airport has a direct control) by 2045.

These targets are aligned with the European Union's climate objectives which emphasize the importance of reducing greenhouse gas emissions to mitigate climate change.

4.2. Actions for Reducing Scope 3 emissions

Additionally, Verona Airport has developed a strategy to cooperate with stakeholders to reduce Scope 3 emissions, which encompass the indirect emissions that occur within the airport's value chain, such as those from flights, passenger access and supply chain activities.

Develop a sustainable procurement program help the company to reduce emissions from the purchase of goods and capital assets. This involves selecting suppliers based on their environmental compatibility and certifications, ensuring that the products and services procured have a lower carbon footprint.

Supply electricity to stationary aircraft by 400 Hz and install Pre-Conditioned Air (PCA) systems to provide heating and cooling to aircraft allow airlines do not use Auxiliary Power Units (APUs). Moreover, 400 Hz and PCA systems use electricity from the airport's grid, which can be sourced from renewable energy, further reducing emissions.

Some airport operators could take advantage of the HVO filling station which will be installed in the airport premises.

Studies are underway for the feasibility of a rail connection between the airport and Verona Porta Nuova Station and Garda Lake. This will facilitate low-emission travel options for passengers and improve connectivity, accessibility and intermobility.

5. CONCLUSIONS AND RECOMMENDATIONS

Reaching Verona Airport's climate targets by 2045 will require sustained effort and dedication from the entire organization and its stakeholders. Ensuring that all strategic actions align with these climate commitments, including investments in sustainable technologies and infrastructure, is crucial.

Given that many of these actions are capital-intensive and may take several years to fully implement, a timely and proactive approach to these climate initiatives is essential. This commitment to a greener future underscores the importance of aligning immediate actions with long-term sustainability goals.

By setting these ambitious targets and taking decisive actions, Verona Airport is answering the call to action within the aviation sector, actively contributing to the broader effort to create a sustainable future for aviation.