SIDE EVENTS

8th MFW Mediterranean Forest Week

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ESTIMATION OF CARBON CREDITS FOR MODEL FOREST REPRESENTATIVES' TRAVEL

A Report on Emissions and Offset Costs

Mediterranean Model Forest Network

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Abstract

The objective of this report is to determine the carbon credits required for each passenger and representative for each Model Forests travelling in the 3rd to 8th of November 2024 to Barcelona for the Med Forum, which is taking place during the 8th Mediterranean Forest Week.

This comprehensive analysis is evaluating the carbon emissions associated with each individual's flight from their home country to the event location. By calculating the CO_2 emissions per passenger and translating these figures into the necessary amount of carbon credits. The report aims to provide an estimation of the credits needed to offset these emissions.

The report is referring to current prices for a compliance market represented by the European Union Emission Trading Scheme (EU ETS).

I – Calculate Carbon Emissions:

Air Travel

The release of carbon dioxide (CO_2) gas produced by the combustion of fossil fuels, such as aviation gasoline or jet fuel, in aircraft engines. These emissions are typically measured in kilograms (kg) or metric tons (tonnes) per flight[1].

Affected by:

1. **Flight Distance**
   - **Short-haul flights** (typically under 3700 km or 2300 miles) often have higher emissions per kilometer due to the significant fuel consumption during takeoff and landing. 0.115 kg CO_2
   - **Long-haul flights** (over 3700 km or 2300 miles) generally have lower emissions per kilometer as cruising is more fuel-efficient compared to takeoff and landing phases. 0.090 kg CO_2.[2]
2. **Aircraft Type**
3. **Passenger Load**
4. **Flight Efficiency**

Train travel

For our case, we considered travelling by an electric train in Spain (Renfe (Red Nacional de los Ferrocarriles Españoles); High-Speed Trains (AVE)). Electric trains generally have lower emissions compared to diesel trains, with a common emission factor of around 0.04 kg CO_2 per kilometer per passenger.

We calculated the carbon emissions for each representative traveling from their home country to Barcelona-El Prat International Airport, considering the flight distance and the relevant short/long-haul flight emission factors per

passenger kilometer (kg CO_2). For most flights, we applied an emission factor of 0.115 kg CO_2 per kilometer, which corresponds to short-haul flights (under 3,700 km or 2,300 miles). However, for the long-haul flight from Canada to Barcelona, we used an emission factor of 0.090 kg CO_2 per kilometer. Additionally, we considered train travel for the journey between Palencia and Barcelona which is serviced by electric trains with an average emission factor of around 0.04 kg CO_2 per kilometer per passenger (Table 1).

Equation used (per passenger)

- One way: CO_2 (Kg) emissions = Flight distance × Emission factor
- Round trip: CO_2(Kg) emissions = (Flight distance × Emission factor) × 2

Model forest	Numbers of Passengers	Departure	Destination	Flight / train Distance (km)	Emission Factor per Passenger Kilometer (kg CO2)	CO2 Emissions (kg CO2)	
						One way	Round trip (total)
MMFNS	6	Florence Airport, Peretola-Italy	**Barcelona-El Prat International Airport**	797,03	0,115	549,951	**1099,9**
IMFNS	1	International-Airport, Saint-Laurent, Montréal Canada		5898,79	**0.090**	530,891	**1061,78**
Ifrane MF	1	Rabat-Salé Airport-Morocco		1117,73	0,115	128,538	**257,077**
Mildet MF Initiative	1	Rabat-Salé Airport-Morocco		1117,73	0,115	128,538	**257,077**
Paca MF	1	Marseille Provence Airport-France		349,3	0,115	40,169	**80,339**
Montagne Fiorentine MF	1	Florence Airport, Peretola-Italy		797,03	0,115	91,658	**183,316**
Istria MF	1	Trieste Airport -Italy		1048,94	0,115	120,628	**241,256**
Tlemcen MF	1	Algiers H, B International Airport		516,4	0,115	59,386	**118,772**
Bucak MF	1	Antalya Airport-Türkiye		2505,13	0,115	288,089	**576,179**
Yalova MF	1	Istanbul International Airport-Türkiye		2240,84	0,115	257,696	**515,393**
Western Macedonia MF	1	Thessaloniki International Airport Makedonia-Greece		1757,12	0,115	202,068	**404,137**
Valle Aterno MF	1	Rome Fiumicino Airport-Italy		848,22	0,115	97,545	**195,09**
Oborniki MF Poland	1	Warsaw Chopin Airport-Poland		1869,72	0,115	215,017	**430,035**
Shouf MF Initiative Libanon	1	Beirut International Airport		3036,86	0,115	349,238	**698,477**
VoskopojaMF Initiative	1	Tirana International Airport-Albania		1469,89	0,115	169,037	**338,075**
Palencia candidate MF	1	Palencia **(By Train)**	Barcelona Event Venue	675.49	0.04	27,019	**54,039**
					Total	3255,476	**6510,95**

Table 1: Model Forest Representatives flights CO_2 Emissions (Kg CO_2)

II – Carbon Credit

A carbon offset - or carbon credit - is a reduction in greenhouse gas emissions to compensate for emissions made somewhere else. Credits are traceable, tradable and finite: When they are purchased by airline passengers, they are retired forever. This revenue funds activities that protect or restore forests, often supporting local communities with alternative livelihood opportunities that keep trees standing, and it helps fund programs to do so in perpetuity.[3]

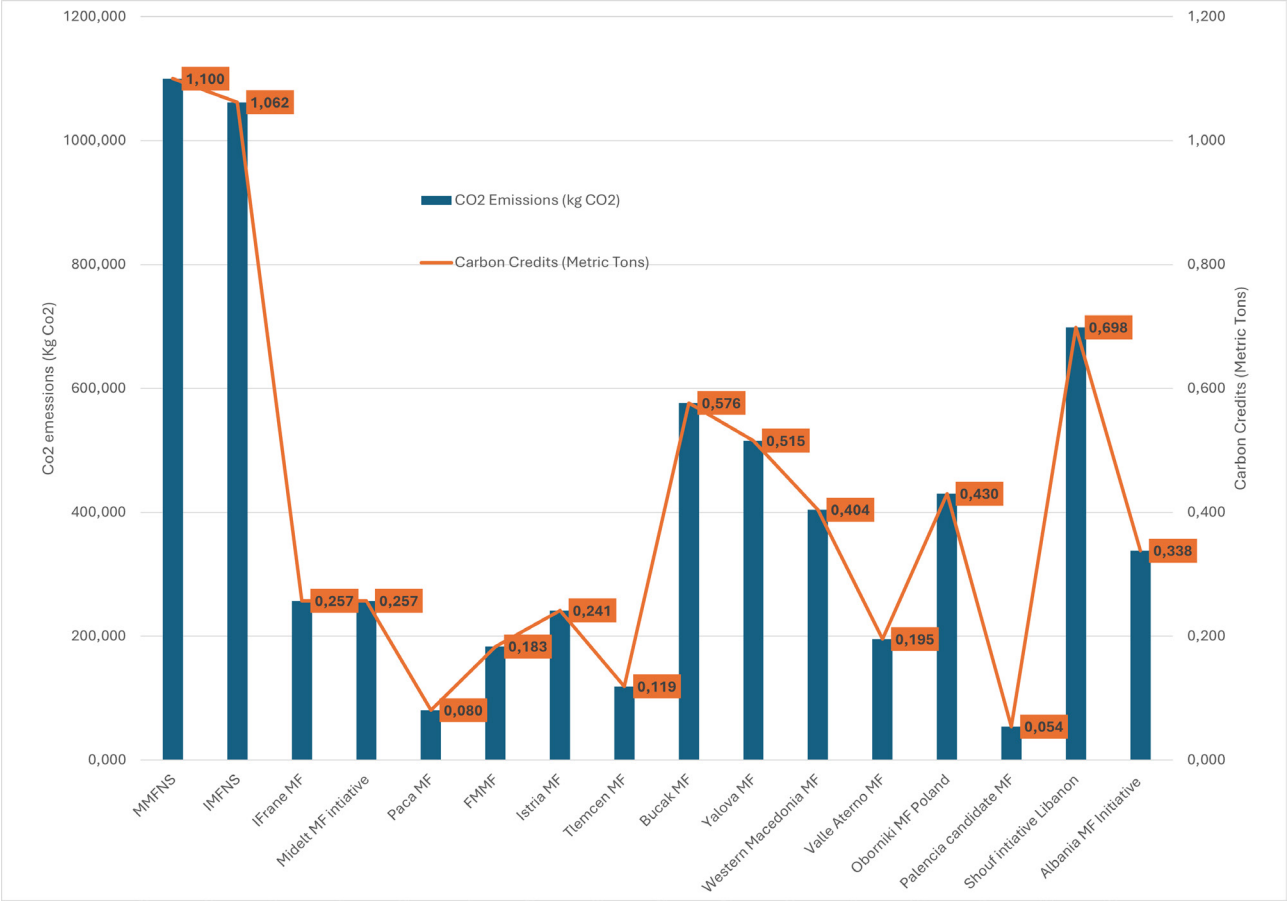
Once we have the total emissions of Carbon in Kg for round trip flight/train (total), we convert this figure into metric tons by dividing by 1000 (Table 2; Graph 1):

Equation used (per passenger)

$$\text{Total } CO_2 \text{ Emissions (metric tons)} = \frac{\text{Total } CO_2 \text{ Emissions (kg)}}{1.000}$$

Model forest	Numbers of Passengers	CO2 Emissions (kg CO2)	Carbon Credits (Metric Tons)
MMFNS (Italy)	6	1099,901	1,1
IMFNS (Canada)	1	1061,782	1,062
Ifrane MF (Morocco)	1	257,077	0,257
Mildet MF Initiative (Morocco)	1	257,077	0,257
Paca MF (France)	1	80,339	0,08
Montagne Fiorentine MF (Italy)	1	183,316	0,183
Istria MF (Croatia)	1	241,256	0,241
Tlemcen MF (Algeria)	1	118,772	0,119
Bucak MF (Türkiye)	1	576,179	0,576
Yalova MF (Türkiye)	1	515,393	0,515
Western Macedonia MF (Greece)	1	404,137	0,404
Valle Aterno MF (Italy)	1	195,09	0,195
Oborniki MF (Poland)	1	430,035	0,43
Palencia candidate MF (Spain)	1	54,039	0,054
Shouf MF Initiative (Libanon)	1	698,477	0,698
Voskopoja MF Initiative (Albania)	1	338,075	0,338
TOTAL	**21**	**6510,952**	**6,51**

Table 2: Model Forest Representatives flights CO_2 Emissions and Corresponding Carbon Credits



Graph 1: Comparison of CO_2 Emissions and Carbon Credits for Model Forests Flights

III – Estimating Carbon Emission Costs

To assess the financial impact of our carbon emissions, we utilized the EU Emissions Trading System (EU ETS) market to estimate the associated costs. This analysis helped us determine the total payments required for our emissions in 2024 and a forecasted cost for 2025.

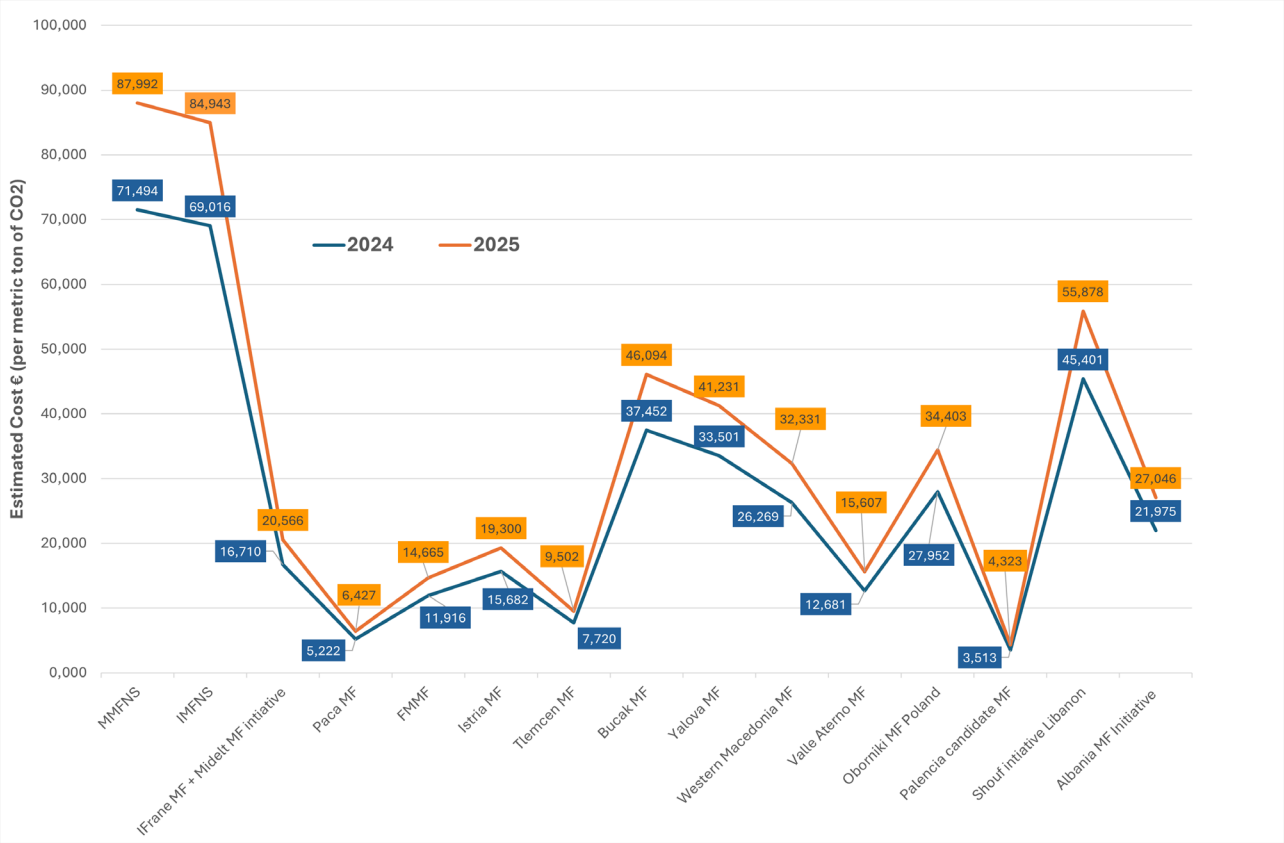
By leveraging EU ETS data, we have calculated the financial obligations tied to our emissions, providing a clear picture of our environmental responsibility for the present and near future (Table 3; Graph 2).

What is the EU ETS?

The EU ETS is a cornerstone of the EU's climate policy and its key tool to reduce greenhouse gas emissions cost-effectively. It is the world's first carbon market and remains among the largest ones globally. [4]

Model forest	Carbon Credits (Metric Tons)	Estimated Cost € EU ETS	
		2024	**2025** (Forecast)
		65€ / 1 carbon credit	**80€ /** 1 carbon credit
MMFNS (Italy)	1,1	71,494	87,992
IMFNS (Canada)	1,062	69,016	84,943
Ifrane MF (Morocco)	0,257	16,71	20,566
Mildet MF Initiative (Morocco)	0,257	16,71	20,566
Paca MF (France)	0,08	5,222	6,427
Montagne Fiorentine MF (Italy)	0,183	11,916	14,665
Istria MF (Croatia)	0,241	15,682	19,3
Tlemcen MF (Algeria)	0,119	7,72	9,502
Bucak MF (Türkiye)	0,576	37,452	46,094
Yalova MF (Türkiye)	0,515	33,501	41,231
Western Macedonia MF (Greece)	0,404	26,269	32,331
Valle Aterno MF (Italy)	0,195	12,681	15,607
Oborniki MF (Poland)	0,43	27,952	34,403
Palencia candidate MF (Spain)	0,054	3,513	4,323
Shouf intiative (Libanon)	0,698	45,401	55,878
Voskopoja MF Initiative (Albania)	0,338	21,975	27,046
TOTAL	**6,51**	**423,214**	**520,874**

Table 3: Model Forest Representatives flights CO_2 Emissions and Corresponding Carbon Credits



Graph 2: Carbon Credits Cost in EU ETS market in euro € for 2024 and 2025

We utilized the EU Emissions Trading System (EU ETS) market to estimate the costs associated with our carbon emissions, arriving at a total payment:

- **2024:** 423,214 euros.
- **2025:** (Forecast): 520,874 euros based on EU ETS carbon allowance price projections published by Ian Tiseo on May 8, 2024, on Statista.com. [5]

As part of our commitment to sustainability and our duty as an organisation, the Mediterranean Model Forest Network (MMFN) will allocate these funds toward carbon compensation by supporting one of our projects in forest restoration, afforestation, or environmental education within our Mediterranean Model Forest network in 2025. This initiative underscores our dedication to mitigating climate change and promoting environmental stewardship across the region.

Conclusion

This report estimates the carbon credits needed to offset the emissions of Model Forest representatives travelling to the Med Forum in Barcelona from November 3rd to 8th.

By calculating CO2 emissions based on flight distance and using a short/ long -haul emission factor, we determined the required carbon credits for each representative.

In summary, Accurate carbon credit estimation is crucial for effective sustainability planning. This analysis not only supports the Med Forum's environmental goals but also aligns with the broader mission of the Mediterranean Model Forest Network (MMFN) to promote sustainable forestry practices and mitigate climate change.

References

(1) IPCC Special Report on Aviation and the Global Atmosphere: https://www.ipcc.ch/report/aviation-and-the-global-atmosphere-2/

(2) European Environment Agency (EEA) : https://www.eea.europa.eu/en/topics/in-depth/transport-and-mobility

(3) Source: Conservation international - What are carbon credits: https://www.conservation.org/retire-carbon-credits

(4) EU Emissions Trading System (EU ETS): https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en

(5) Forecast European Union Emissions Trading System (EU-ETS) average carbon allowance prices from 2024 to 2035: https://www.statista.com/statistics/1401657/forecast-average-carbon-price-eu-emissions-trading-system/#:~:text=European%20Union%20Emissions%20Trading%20System,dioxide%20(tCO%E2%82%82e)%20in%202024