UNIVERSITY OF RIJEKA
FACULTY OF ECONOMICS AND BUSINESS

CARBON FOOTPRINT REPORT

2020

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DEAN'S FOREWORD

Faculty of Economics and Business University of Rijeka (EFRI), now for the fifth year in a row, is publishing its annual Carbon Footprint report as a protraction of European project LIFE Clim'Foot "Climate Management: Implementation of Public Policies for the Calculation and Reduction of Carbon Footprint of Business Entities". The project was implemented in five European Union countries – France, Italy, Greece, Hungary, and Croatia, and project coordinator is the French Environment and Energy Management Agency ADEME.

As an institution that value interdisciplinarity we believe that financial reports are not enough for a complete insight into the business operations of an institution and a company, nor do such information cover environmental and social aspects. The Faculty of Economics of the University of Rijeka is the first (and for now the only) higher education institution in Central and Eastern Europe (CEE) that has calculated its carbon footprint. Carbon footprint is calculated according to the national model based on Bilan Carbone, that is fully harmonised with international standards.

At the Faculty of Economics and Business University of Rijeka, we believe that the future should be based on sustainable growth and development. As a higher educational institution, it is our role and responsibility to act accordingly and guide the youth. For many years, we have been developing and participating in projects and programmes related to sustainable development, energy, and ecology, and the Faculty initiated a unique, multidisciplinary MBA „Energy Economics" carried out in co-operation with the Energy Institute *Hrvoje Požar*.

Aiming to operate transparently, we are pleased to present the fifth Carbon Footprint Report for 2020 compiled according to the Bilan Carbone model and in accordance with the Greenhouse Gas (GHG) Protocol.

UNIVERSITY OF RIJEKA
FACULTY OF ECONOMICS AND BUSINESS

Prof. Alen Host, PhD, Dean

UNIVERSITY OF RIJEKA

FACULTY OF ECONOMICS AND BUSINESS

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FACULTY OF ECONOMICS AND BUSINESS UNIVERSITY OF RIJEKA

At the end of the 19th and the beginning of the 20th century, in parallel with the growing development of trade, banking, industry and transport in Sušak (Rijeka), there was a need to establish a school that would train professional staff for bookkeeping, finance, administrative and other professional work. As a result, on December 17, 1909, the "Higher School of Commerce at the Royal Real Gymnasium" was founded in Sušak. The school covered the needs of education for the area of the Croatian Littoral area, Gorski Kotar, Istria and Dalmatia. In 1917, the school became independent and operated under the name of the Royal Trade Academy in Sušak, but remained in the same building as the gymnasium. The school was under the jurisdiction of the Ministry of Education, and from 1927 it was under the jurisdiction of the Ministry of Trade, Industry and Supply until 1948. By the Decree of the Government of the Banovina of Croatia from April 8, 1940 the official name of the school was changed to "Trade Academy in Sušak". That name remained until the Italian occupation, when part of the building was occupied by the Italian army, and in the other part a school called renamed to "Accademia Commerciale di Sussak" continued to operate. In 1946, the school was reorganized and merged with the Italian school "Istituto tecnico commerciale Leonardo da Vinci" in Rijeka, where it is still located today.

The modern Faculty of Economics and Business University of Rijeka (EFRI) was founded in 1961 as a part of the University of Zagreb. Since then, it has developed in accordance with the competitive and challenging environment. Together with several other constituents, the Faculty of Economics founded the University of Rijeka in 1973 and has since operated as part of Rijeka University. The Faculty of Economics and Business University of Rijeka is a modern faculty carrying out undergraduate, graduate, and postgraduate studies (doctoral and postgraduate) as well as lifelong education programmes in the field of Economics and Business. Since 2011, the Faculty has been carrying out the International Business programme carried out in English, and from the academic year 2015/2016, it also offers on-line Entrepreneurship study programme.

Since 2016, the Faculty has been the headquarters of the Confucius Institute and the first higher education institution (and still the only one) in Central and Eastern Europe to calculate its carbon footprint within the framework of the European LIFE Clime Foot project. Study programmes, lifelong learning programmes, mobility in the international academic community, cooperation with the entrepreneurs, provides professional growth and development of students for them to become successful and competitive in a dynamic economic environment.

The Faculty is a member of the AACSB, EFMD, CEEMAN, and EDAMBA organisations and ERASMUS, CEESENET, and NISPACEE academic networks, and in 2018, EFRI became a member of PRME (Principles for Responsible Management Education). PRME is an initiative supported by the United Nations (UN), and it was founded in 2007 as a platform for raising awareness about sustainability at faculties of Economics around the world and preparing today's Economics students to understand and become capable to contribute to positive changes in the future. As a voluntary initiative with over 650 signatories world-wide, PRME has become the largest organised link between the United Nations and higher education institutions in the field of Economics. PRME collaborates with faculties of Economics to provide future leaders the necessary skills for balancing economic goals with sustainability goals, and at the same time draws attention to sustainable development objectives and the harmonisation of academic institutions with the operations of the UN Global Compact.

Many years of work and effort to innovate the structure and increase the quality of the study program at Faculty of Economics and Business has been recognized by international accreditation institution EFMD. The Faculty has been awarded by EPAS accreditation. Only 115 study programs at higher education institutions in field of management, economics and business in the world have EPAS accreditation. Obtaining such prestigious accreditation places the Faculty in 10% of the world's best faculties of economics and business schools.

Faculty's mission

In the international business and scientific environment, and in cooperation with the community, by educating and developing entrepreneurially oriented and socially responsible leaders, managers and researchers, we contribute to the development of society and science.

The Faculty's Vision

Integration into the European area of higher education and European research area accompanied by overwhelming support for development of the economy. Integration can be seen through competitiveness of the study programmes, student exchange, academic and administrative personnel, joint international study and research projects. Lending support to the economy is achieved through drawing up useful educational programmes for the economy, joint, mutually advantageous research projects as well as widespread inclusion of student capacity. The Faculty will be recognised as a much sought-after and reliable higher education institution, a partner with the economy as well as with other national and international scientific and educational institutes and students. The Faculty will be an institute which will evolve continuously, be streamlined and upgraded with regard to study programmes, research and staff.

EFRI in numbers

59(111) years of tradition and experience

> **2000** active students

> **300** students enrolled into the English taught program

> **200** students enrolled into online studies

97,8 % of students are employed within two years of the completion of the study

1 Confucius Institute

2 research centres

CARBON FOOTPRINT

What is a carbon footprint and why is it important?

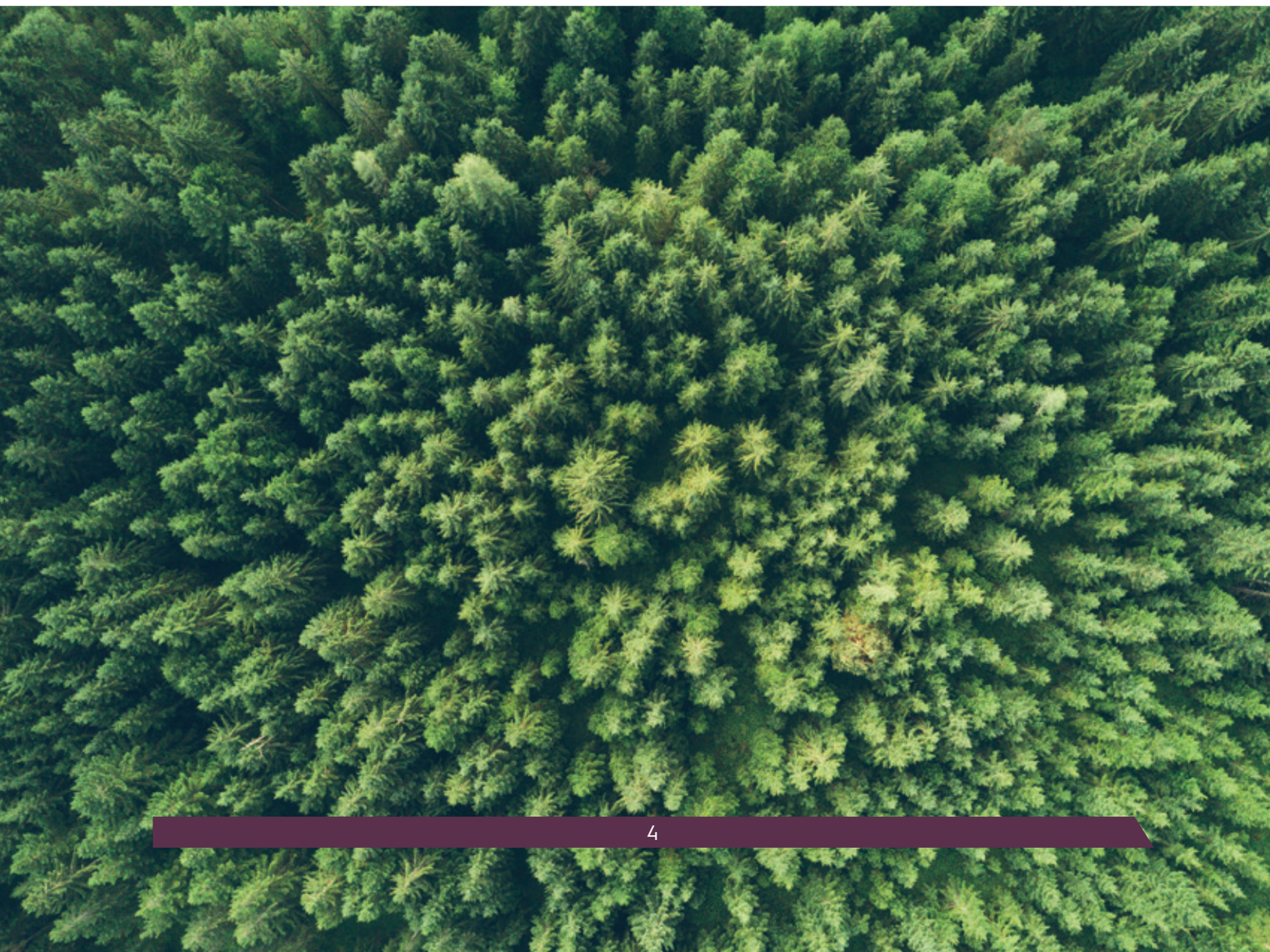
In terms of climate change, the so-called „footprint" is a metaphor for the overall effect of an individual, group, organisation or a company in terms of contributing to this change. In general, „carbon footprint" represents a totality of all greenhouse gases contributing to global warming, indirectly by their impact on the environment expressed by CO_2 coefficients. The carbon footprint refers to the following direct impacts of climate change:

- The rise in average global temperatures – the World Meteorological Organization confirmed that 2015 was the warmest year since the measurements started, and 14 of the 15 warmest years have occurred in this century, which is reflected in increasingly frequent and intense heat waves.
- Rising sea and ocean levels of – according to the 5th IPCC report (Intergovernmental Panel on Climate Change), the annual rise in sea/ocean levels was 1.7 mm in the 1900 – 2010 period and 3 mm in the 1993 – 2012 period.
- Changes in frequency and intensity of precipitation – more frequent occurrence of floods and/or long drought periods
- More frequent occurrence of climate extremes – strong winds of hurricane power, twisters, hurricanes, and typhoons…

Although labelled „carbon", the above-mentioned footprint does not refer exclusively to CO_2 emissions, but also other greenhouse gas emissions (GHG – Greenhouse Gas Emissions). The reason is that the very carbon dioxide (CO_2) has the most significant share in greenhouse gas emissions; it is generated by combustion of fossil fuels in households, factories or energy plants. Other greenhouse gases also have a significant impact. For example, methane (CH_4) has a 25 times stronger effect per kilogramme of mass than CO_2. Nitrous oxide (N_20), although produced in smaller quantities, has as much as 300 times stronger effect and is primarily generated from industrial processes and agriculture (large farms), and the gases used for cooling systems.

Which activities have an impact on the carbon footprint?

Carbon footprint refers to all activities of an individual or an entity (e.g. building, association, project, company, state). These activities represent direct Greenhouse gas emissions generated in production and transportation processes, in the heating/cooling process, and in the use of electricity. These effects are particularly pronounced in production and consumption of goods and services, i.e. in everyday economic processes. Each product and service, i.e. activity has a certain carbon footprint based on activities undertaken to make products and services available on the market. This means that every individual with his/her actions has an impact on the total carbon footprint of their home, i.e. organisation they operate, live, and work in. Each person/entity has the possibility to reduce carbon footprint by consciously applying the principles of sustainable development, environmental protection, and recycling of used materials. An individual carbon footprint is certainly important as a part of the overall footprint of an organisation, consequently the state, including its global contribution to sustainable development. Therefore, let us not think that carbon footprint is happening somewhere else and that it is someone else's responsibility – it is about us and what we do on daily basis for the environment, our own health and the well-being of the people around us!



THE LIFE CLIM'FOOT PROJECT

Project of the Faculty of Economics and Business University of Rijeka (EFRI) and Energy Institute Hrvoje Požar (EIHP)

The Faculty of Economics and Business University of Rijeka (EFRI) has become the first higher education institution in Central and Eastern Europe to calculate its carbon footprint. In order to establish a harmonised approach to carbon footprint calculation, the implementation of the three-year LIFE Clim'Foot project „Climate Governance: Implementing public policies to calculate and reduce organisations carbon footprint" has started in five European Union countries: France, Italy, Greece, Hungary, and Croatia, and the project coordinator is the French Environment and Energy Management Agency ADEME. The Croatian project partner is the Energy Institute Hrvoje Požar (EIHP), while the Faculty of Economics of the University of Rijeka (EFRI) has been participating in this European project from the very beginning. Project managers are Prof. Saša Žiković, PhD and Dejan Miljenović, PhD.

Within the project, a national model for calculating the carbon footprint of business entities was created and adapted to Croatian conditions. The calculation is based on the French Bilan Carbone model, and it is in line with international standards and recommendations of the European Commission. For the design of the model, a national database of greenhouse gas emission factors was developed, consisting of 172 national factors. Testing of national models for the calculation of carbon footprint on about a dozen selected business entities is underway. The Faculty of Economics of the University of Rijeka is one of the selected ones, that was the first to prepare all the necessary data with the assistance of EIHP, and calculated direct and indirect greenhouse gas emissions of all the flows of people, energy, and materials for which the Faculty is responsible or dependent on.

The carbon footprint calculation will enable us to get acquainted with the structure of greenhouse gas emissions and to select measures to reduce the carbon footprint.

In addition to the calculation, the project also includes the compilation of the Carbon Footprint Governance Strategy whose goal is maximum reduction of carbon footprint of a business entity per unit of invested funds by implementing the selected cost-effective measures, ultimately leading to a reduction of greenhouse gas emissions and mitigation. The Faculty of Economics of the University of Rijeka will, together with the EIHP, also participate in the drafting of the Carbon Footprint Governance Strategy. At the Faculty of Economics of the University of Rijeka (EFRI), we have for many years been developing and participating in programmes and projects related to sustainable development, energy, and ecology, and we are the founder of the unique, multidisciplinary MBA „Energy Economics" carried out in co-operation with the Energy Institute Hrvoje Požar.

Measurement methods

The carbon footprint calculation provides a general view of greenhouse gas emissions of the Faculty. The analysis has identified possible measures of energy use and overall carbon footprint. Monitoring business activities develops improvement measures and identifies possible problem areas. Carbon footprint calculation is calculated using standards and regulations such as the Greenhouse Gas (GHG) Protocol. Carbon footprint is monitored in three scopes of direct and indirect emissions in accordance with the GHG Protocol.

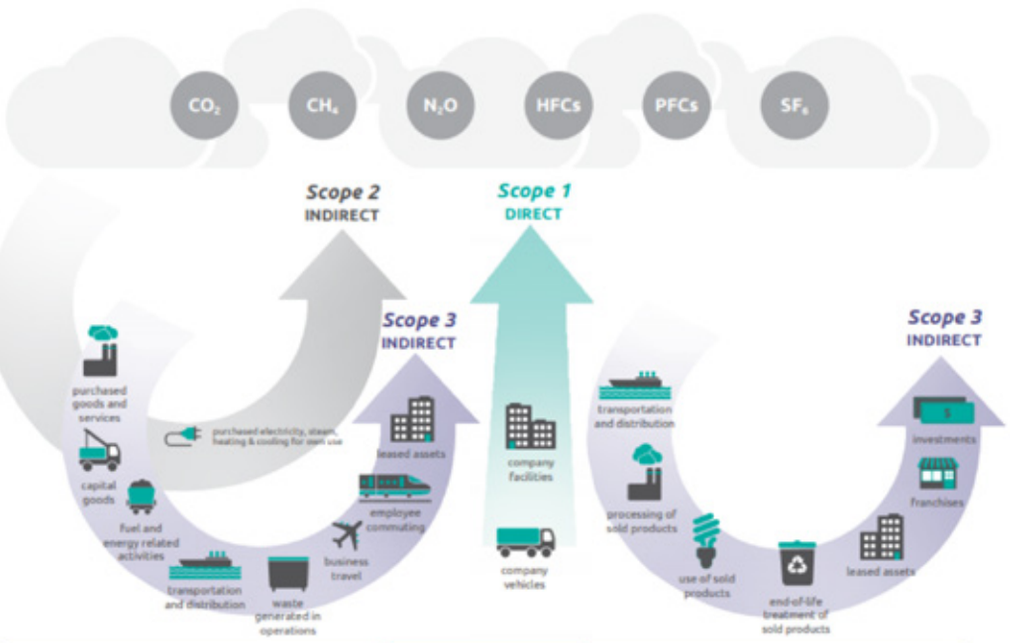
Scope 1: direct emissions (mandatory reporting) – includes all direct emissions from sources that are controlled by the entity; e.g. means of transport and energy production.

Scope 2: indirect emissions (mandatory reporting) – emissions from purchased energy, mainly electricity, heating from heating plants.

Scope 3: indirect emissions (voluntary reporting) – emissions generated by the activity of the entity, e.g. travel, waste.

The report presents the data for 2020.

Figure 1.: **Scopes of Carbon Footprint Calculation**



Source: **GHG Protocol, 2020.**

CO_2 EMISSION REDUCTION TARGETS

The overall carbon footprint of EFRI in 2016 was 992 tCO_2e. Also, 2016 is the baseline year for our measurements. In 2020 the overall carbon footprint was 273 tCO_2e. Compared to the previous year, it has decreased by 74%. Main cause of the reduction in emissions is due to pandemic caused by corona virus that has brought changes worldwide.

Encouraged by the LIFE Clim'Foot project we participate in, we decided to start the analysis of EFRI's activities and we want to devise and implement activities that will lead to a reduction of EFRI's greenhouse gas emissions in the future.

At the beginning of 2019, EFRI, through extensive meetings and interviews with all of our stakeholders, concluded that the target for the carbon footprint of the institution had been set in an inadequate way in the initial phase. If we look only at the total absolute values of CO_2 equivalent, we come to a situation where not taking any measures of energy efficiency and not taking measure to steer towards a sustainable business model, but solely by performing poorly and having fewer students, employees, lower research and teaching activities leads to a significant reduction in carbon footprint. Ain this way a failing institution is marked as a "successful" institution in terms of its carbon footprint. Such a distorted understanding and mis-measurement of performance and sustainability was not the goal of this project and definitely cannot be the basis for responsible and sustainable business of any institution. Analysing the performance of higher education institutions through several performance indicators makes for a more logical choice. Ratios such as carbon emissions to the number of employees, carbon emissions to the number of students or carbon emissions to scientific production provide a far better and more realistic insight into the success and sustainability of our type of institution. Indicators such as efficiency by number of employees and by number of students are understandable, easy to calculate and interpret. Efficiency in relation to scientific production is definitely a necessary indicator but there is an ongoing debate at a broader academic and global level on how to calculate and express the scientific productivity of an institution that is applicable globally and across all branches of science. For these reasons, we will continue to calculate and publish the absolute carbon footprint, but as a complementary measure, and we will pay special attention to carbon footprint performance indicators in relation to the number of employees and the number of students. As soon as there is a possibility of standardized and generally accepted methodology of calculating it, we will start publishing the carbon effectiveness in relation to scientific production.

Within the framework of the LIFE Clim'Foot project, EFRI set its short-term targets by 2020 and long-term targets by 2030:

- 4.1% less greenhouse gas emissions from the 2016 level until 2020,
- 15% less greenhouse gas emissions from the 2016 level until 2030.

Since 2019 this indicator has become auxiliary and has been replaced with two new indicators - carbon footprint efficiency per employee and carbon footprint efficiency per student.

Short term and long-term targets related to carbon footprint efficiency per employee are:

- 2% less greenhouse gas emissions from the 2016 level until 2020.
- 10% less greenhouse gas emissions form the 2016 level until 2030.

Short-term and long term target related to carbon footprint efficiency per student are:

- 10% less greenhouse gas emissions from the 2016 level until 2020.
- 25% less greenhouse gas emissions from the 2016 level until 2020.

Our targets are presented in the following table:

Table 1.: EFRI's Carbon Footprint-Related Targets

Year	Fixed target	Target	Reduction (in tCO_2e)	Intended carbon footprint (in tCO_2e)
1		Efficiency in relation with number of employees	Per employee	
2016.		Base year	9.73	
2020.	-2.0 %	Short-term target	- 0,195	9.53
2030.	-10.0 %	Long-term target	- 0,973	8.75
2		Efficiency in relation with number of students	Per student	
2016.		Base year	0,426	
2020.	-10.0 %	Short-term target	- 0,043	0.383
2030.	-25.0 %	Long-term target	- 0,106	0.319
3		Total		
2016.		Base year		991.9
2020.	-4.1 %	Short-term target	- 40.7	951.2
2030.	-15.0 %	Long-term target	- 148.8	843.1

Source: EFRI

OVERVIEW OF GREENHOUSE GAS EMISSIONS BY SCOPES

During the LIFE Clim'Foot project, but also after its completion, the activities of the Faculty of Economics of the University of Rijeka will be monitored, and overall carbon footprint of the Faculty will be calculated based on the activities. Table 2 shows the total greenhouse gas emissions in CO_2 equivalent, and intensity per employee in the period from 2016 to 2020.

Table 2.: CO_2 Emissions per Employee

	Total emissions	Rate of change	Number of employees	Intensity per employee	Rate of change
2016	992 t CO_2e	-	102	9,725 t CO_2e	-
2017	1.019 t CO_2e	+2,7%	100	10,19 t CO_2e	+4,7%
2018	996 t CO_2e	-2,3%	103	9,67 t CO_2e	-5,1%
2019	1.039 t CO_2e	+4,3%	108	9,62 t CO_2e	-0,5%
2020	273 t CO_2e	-73,7%	109	2,50 t CO_2e	-74,0%

Source: Own calculation based on the Bilan Carbone model

In 2016, which is also the baseline year for CO_2 analysis, total emissions were 992 tCO_2e. During 2017 they rose to 1,019 due to extremely cold and long winter, but in 2018 they decreased to 996 tCO_2e i.e. by 2,3%. In 2019 total emission have increased by 4,3% within 2018. More visitors and the realization of the energy efficiency project at the main building of the Faculty are the main cause of the increase in emissions in 2019. Within the energy efficiency project old windows have been replaced with highly efficient PVC windows. It was necessary in order to achieve the set targets in reducing the carbon footprint. During 2020 emissions were 273 tCO_2e which is reduction of 74%. The reason for this is pandemic caused by COVID 19 virus. All classes have been held online and all personal have been working remote. Daily migrations and business trips, which have accounted significant share of total emissions, have been reduced.

Emissions per employee, after a jump of 4,7% in 2017, have significantly decreased by 5,1% in 2018. In 2019 emission per employee have been reduced by 0,5%. That means that Faculty continued to increase its energy efficiency despite significant investments that will produce savings in the future. Emission per employee in 2020 was 2,5 t CO_2e which is reduction of 74%.

Table 3 shows greenhouse gas emissions in CO_2 equivalent, and intensity per each student in period 2016 – 2020.

Table 3.: CO_2 Emissions per Student

	Total emissions	Rate of change	Number of students	Intensity per student	Rate of change
2016	992 t CO_2e	-	2.330	0,426 t CO_2e	-
2017	1.019 t CO_2e	+2,7%	2.457	0,414 t CO_2e	-2,8%
2018	996 t CO2e	-2,3%	2.463	0,404 t CO_2e	-2,4%
2019	1.039 t CO2e	+4,3%	2.727	0,381 t CO_2e	-5,7%
2020	273 t CO_2e	-73,7%	2.663	0,103 t CO_2e	-73,0%

Source: Own calculation based on the Bilan Carbone model

Emissions per student, after a drop of 2,8% in 2017 was reduced by 2,4% in 2018. In 2019 there has been additional drop in emission per student for 5,7%. It means that EFRI has continued the energy efficiency despite significant investments that will show results in the future. In 2020 emission per student has decreased for 73% compared to the previous period.

Taking into account the above state figures, it can be concluded that EFRI has fulfilled its set goal to reduce CO_2 emissions by 2020 by 2.0%, i.e. to less than 9.53 t CO_2e per employee, by 10%, i.e. to less than 0.383 t CO_2e per student and by 4.1%%, i.e. to less than 951.2 t CO_2e of total emissions. Carbon footprint is calculated according to activity scopes, and the following table shows the measurement results. Table 4 and Figure 2 also show the contribution of each scope expressed in percentage and tonnes of CO_2.

Table 4.: Overview of CO_2 Emissions According to Calculation Scope

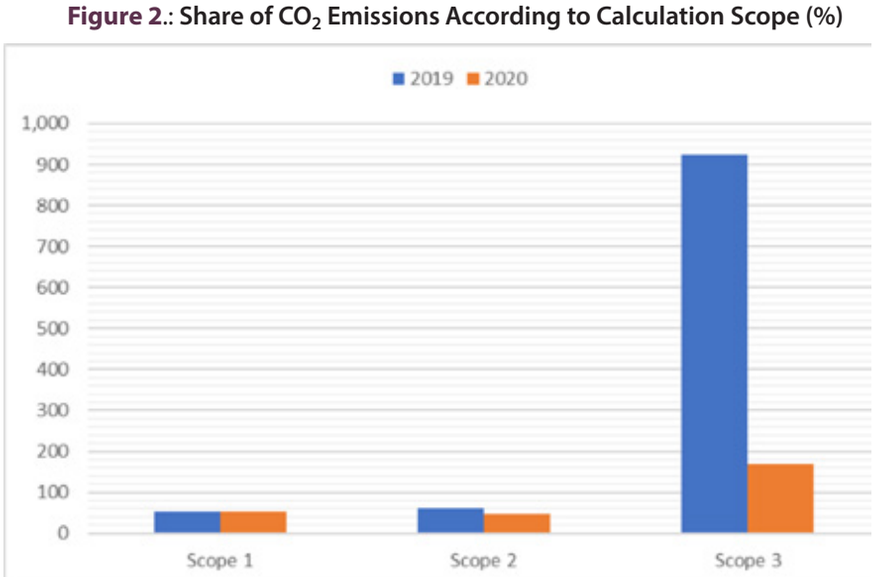
	2019		2020		Rate of change
	tCO_2e	%	tCO_2e	%	
Scope 1	54	5%	54	20%	0,0%
Scope 2	60	5%	49	18%	+24,0%
Scope 3	925	89%	170	62%	+443,0%
Total	1.039	100%	273	100%	

Source: Own calculation based on the Bilan Carbone model

Scope 3 has the largest share in the total carbon footprint with 62% of total emissions Travelling is the most significant element in this scope – daily migrations, business trips, and study trips, followed by capital goods, various input materials and produced waste.

Scope 2 includes emissions from the purchased electricity, and Scope 1 includes emissions from the production of energy for the heating of premises. However, the greatest change was recorded in Scope 3 due to decrease in travelling.

Figure 2.: Share of CO_2 Emissions According to Calculation Scope (%)



Source: Own calculation based on the Bilan Carbone model

RESULTS OF CO_2 EMISSIONS BY SOURCES

Table 5 shows the results of CO_2 emissions by sources. The previously presented Scopes of measurement of CO_2 level are now analysed in greater detail by sources.

Table 5.: CO_2 Emissions by Sources in 2018 and 2019 (tCO_2e)

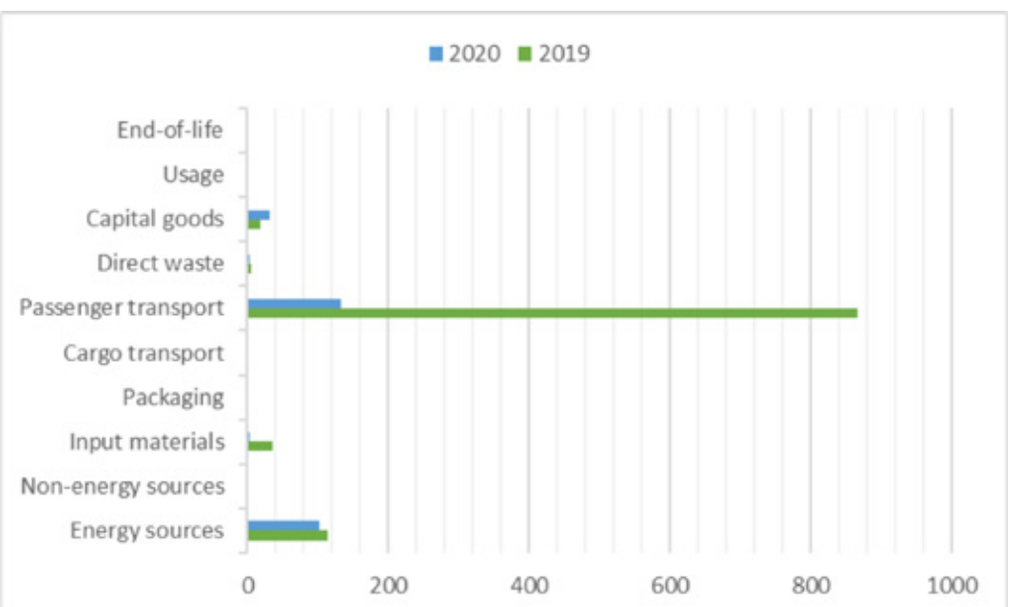
Sažetak CO_2e	Emissions				Rate of change
	2019		2020		
	t CO2e	%	t CO2e	%	
Energy sources	114	11%	103	38%	-9,7%
Non-energy sources	0		0		
Input materials	36	3%	4	1%	-89,2%
Packaging	0		0		
Cargo transport	0		0		
Passenger transport	867	84%	132	49%	-84,7%
Direct waste	4	0%	2	1%	-49,6%
Capital goods	18	2%	31	11%	+73,1%
Usage	0		0		
End-of-life	0		1	0%	
Total	**1039**	**100%**	**273**	**100%**	**-73,7%**

Source: Own calculation based on the Bilan Carbone model

Passenger transport contributes the most to the total carbon footprint. Despite the significant drop in 2020 it still contributes with 49% in total emission. Energy sources contribute with 38% in total emissions. The smallest share in total emission have input materials, capital goods and waste with 13%.

Figure 3 graphically shows the obtained results of CO_2 emissions by sources in 2019 and 2020.

Figure 3.: CO_2 Emissions by Sources in 2018 and 2019



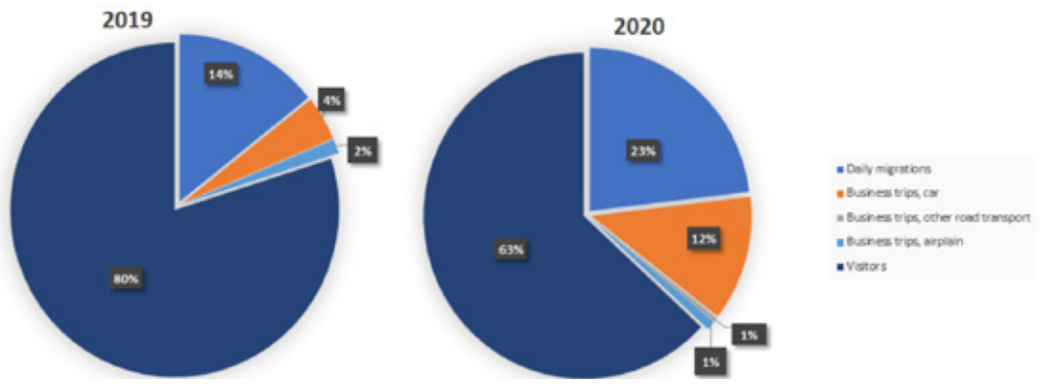
Source: Own calculation based on the Bilan Carbone model

Passenger transport

Passenger transport is the largest source of carbon footprint of the Faculty of Economics and Business of the University of Rijeka. Figure 4 shows the passenger transport structure during 2019 and 2020.

In 2020 daily migration mapped 30.622 kg CO_2e which is a drop of 75% compared to the previous year. The reason for this is pandemic caused by COVID 19 virus. The classes were completely held online. Teaching and administrative staff have been working remotely. Emissions arisen from business trips in 2019 were 49.750 kg CO_2e. However, business trips were cancelled, and scientific conferences and professional seminars were held online. This caused drop in emissions for 63% and they were 18.290 kg CO_2e. The calculation also includes student trips to student exchange and summer school, which is the most significant with 693.323 kg CO_2e in 2019. During 2020 the emissions from student trips and visitors decreased significantly and were 83.574 kg CO_2e.

Figure 4.: CO_2 Emissions in Passenger Transport in 2019 and 2020



Source: Own calculation based on the Bilan Carbone model

Energy sources

Energy sources participate in the overall carbon footprint of the Faculty with 38%. The structure of energy sources is shown in Figure 5.

Figure 5.: CO_2 Emissions in Energy Sources in 2019 and 2020 (tCO_2e)

Source: Own calculation based on the Bilan Carbone model

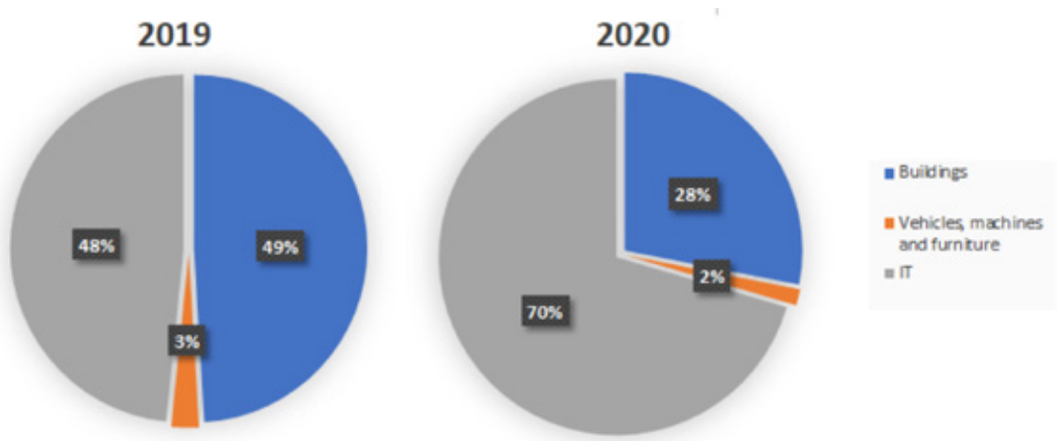
In this group, emissions are generated from fuel consumption (natural gas) and electricity usage. Fuel (natural gas) is an energy source used for heating the premises, and its consumption is higher in the autumn and winter days. Figure 5 shows that emissions from fuels (natural gas) are the same in 2020. Emissions generated from electricity usage have decreased in 2020 for 19% and the reason is that Faculty staff were working remotely.

Capital goods

This category includes buildings, vehicles, machines, and furniture as well as IT equipment owned by the Faculty and used daily. The model only includes the equipment and furniture in their five-year depreciation period. IT equipment is taken into consideration according to the value method, and furniture according to weight. In 2020 this group emitted 11% of total emissions of CO_2 .

Figure 6 shows the structure of CO_2 emissions in capital goods during 2019 and 2020.

Figure 6.: CO_2 Emissions in Capital Goods in 2019 and 2020



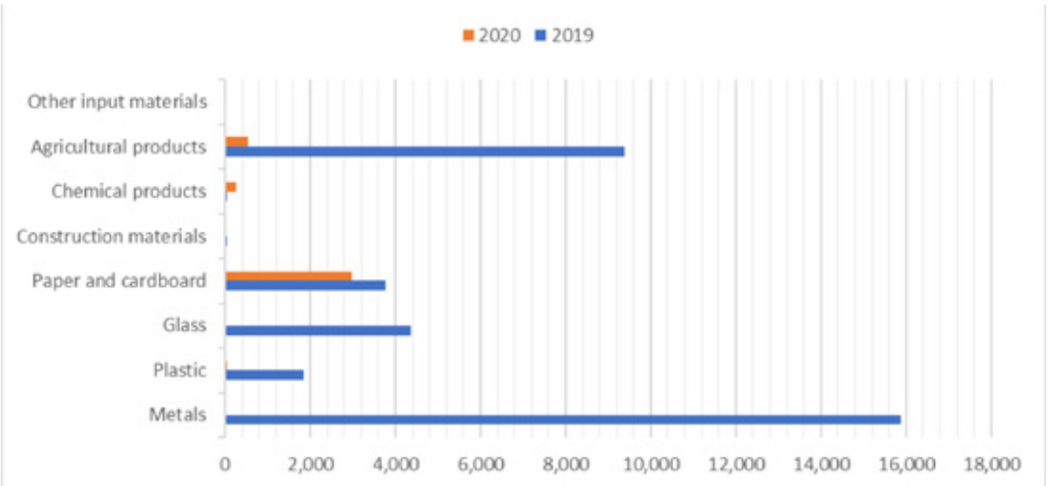
Source: **Own calculation based on the Bilan Carbone model**

The surface of the Faculty premises is 4.619 m^2 but since the main building was built more than 20 years ago only the Annex of the Faculty is included in calculation. The surface of the Annex is 373 m^2, and in both years they accounted for 8,747 kg CO_2e. The total weight of the furniture owned by the Faculty is 20 tonnes, but the furniture included in the calculation in 2020 weighs 1.253 kg and its allocation is 459 kg CO_2e. The total value of IT equipment is 206.844 EUR, the calculation includes IT equipment in the value of 119.739 EUR, and its allocation is 21.960 kg CO_2e. The most significant increase in CO_2 emissions is in the IT equipment group for 75% compared to the previous period. The reason for this increase is the purchase of the modern IT equipment so the teaching process could be performed without problems and interruptions.

Input materials

Input materials used in everyday activities of the Faculty account for only 1% of the overall emissions. Figure 7 shows the structure of CO_2 emissions.

Figure 7.: CO_2 Emissions in Input Materials in 2019 and 2020



Source: Own calculation based on the Bilan Carbone model

Agricultural products are a group that refers to the number of meals prepared in the Faculty canteen, and during 2019, 5.045 meals were prepared – meat dishes as well as vegetarian dishes. This resulted in the emissions of 9.394 kg CO_2e. In 2020 Faculty canteen has been closed due to epidemiological measures. The number of meals was reduced to 264 which resulted with 542 kg CO_2e.

Given that the Faculty is an educational institution that conducts written examinations, and that there are over 2000 active students, the Faculty is a relatively large consumer of paper. 4,1 tonnes of paper were consumed in 2019, resulting in the emission of 3,768 kg CO_2e. In 2020 the consumption of paper was reduced on 3,2 tonnes and CO_2 emission was reduced on 2.988 kg CO_2e.

During 2019 Faculty was renovated. The windows were replaced with new, energy efficient windows. The interior walls were renovated and thermal isolation was installed. This energy efficiency project was crucial in order to reduce Faculty's carbon footprint. The were not any significant changes in this category during 2020.

Direct waste

Direct waste is the lowest category in the carbon footprint calculation with the production of 3,9 tCO_2e in 2019, that in 2020 declined to 2 tCO_2e. It is mainly waste generated from daily activities that is recycled and/or disposed of on landfills.

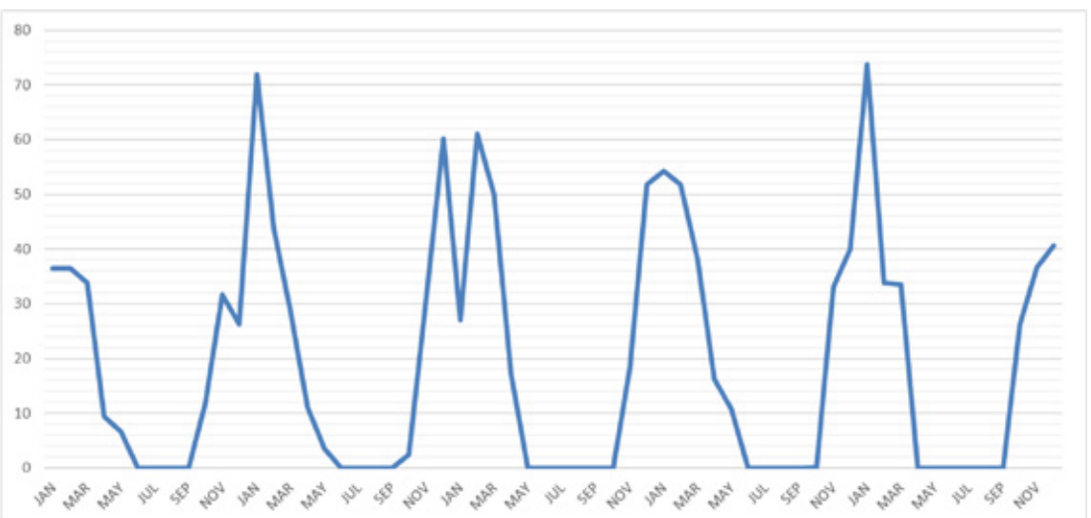
CONSUMPTION OF ENERGY SOURCES AT THE FACULTY OF ECONOMICS AND BUSINESS OF THE UNIVERSITY OF RIJEKA

In order to provide a simpler presentation of the results of carbon footprint measuring, this part of the report presents the consumption of energy sources in the period from 2016 to 2020.

Gas consumption

Figure 8 shows the dynamics of gas consumption in the period from 2016 to 2020.

Figure 8.: Gas Consumption in the Period from 2016 to 2020



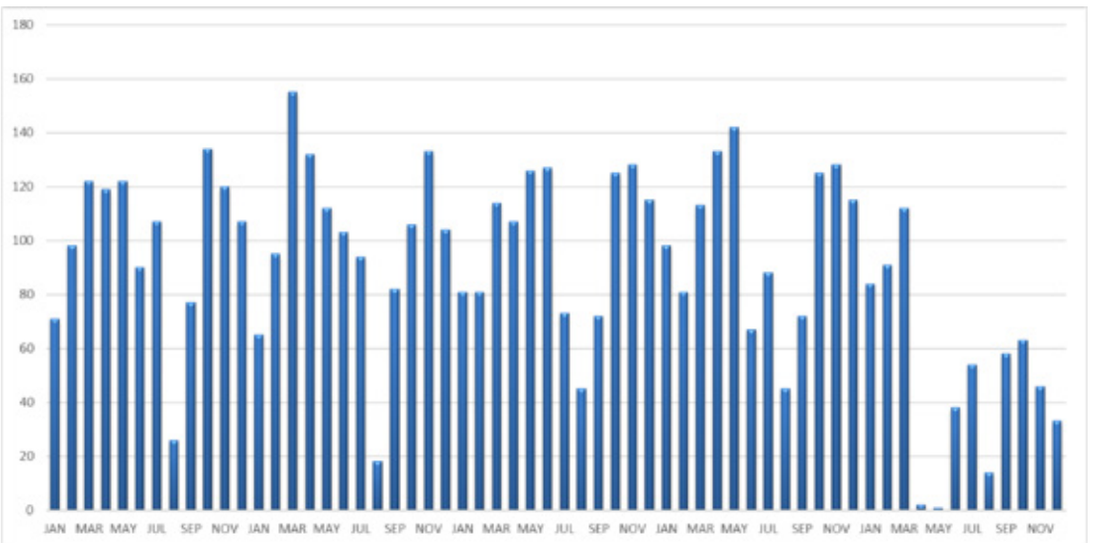
Source: **Own calculation**

Gas is an energy source used for heating of the Faculty's premises. This is why consumption is high during the winter months, and there is no consumption during the summer when there is no need for heating. During 2019 the highest consumption level was recorded in January and amounted 54,2 MWh. During 2020 maximum consumption level was recorded in January – 73,8 MWh which is the highest level of consumption in observed period.

Water consumption

Water is an energy source used in daily activities of the Faculty. Figure 9 shows the consumption dynamics in the period from 2016 to 2020.

Figure 9.: Water Consumption in the Period from 2016 to 2020 (m^3)



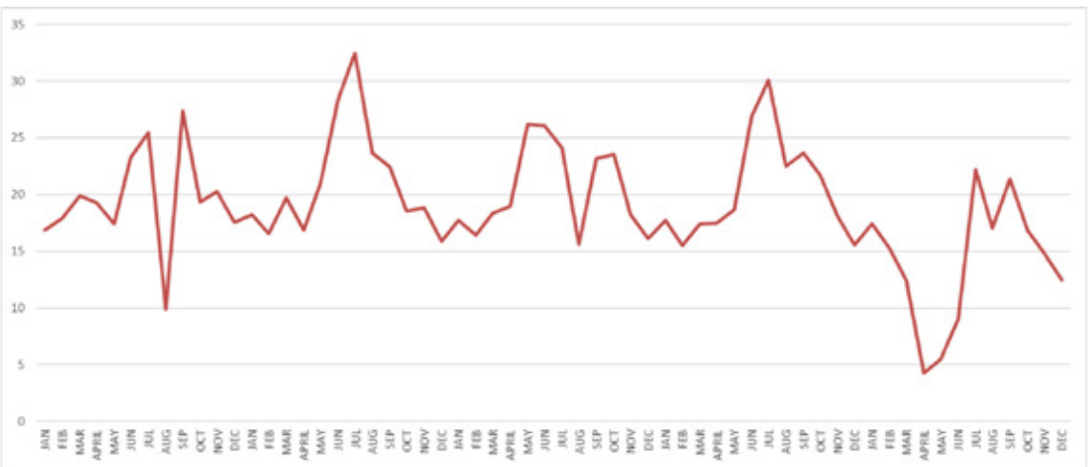
Source: Own calculation

The water consumption trend during the year does not record large deviations. Consumption is the lowest in August when the employees are on vacation and when activities are minimised. The highest consumption level in the observed period was recorded in March of 2017 when it was almost 160 m^3. The lowest consumption level was recorded in 2020, more precisely in April and May. In this period the Faculty was closed due to epidemiological measures and the total consumption was only 3 m^3.

Electricity consumption

Figure 10 shows electricity consumption in the period from 2016 to 2020.

Figure 10.: Electricity Consumption in the Period from 2016 to 2020 (MWh)



Source: Own calculation

Electricity consumption fluctuates during the year in accordance with heating and cooling seasons, holidays, and vacations. The highest levels were recorded during September and July due to more frequent use of air-conditioner. The highest consumption was recorded in July of 2017 – 32 MWh due to extremely warm summer months, and the lowest in April of 2020 – 4,2 MWh. The highest consumption during 2020 was 22,1 MWh recorded in July.

AIR QUALITY IN THE CITY OF RIJEKA

Air quality in Croatia is monitored at the local and national level through the network of measuring stations, and the data obtained are used to monitor and assess air quality and to take measures to prevent and reduce air pollution. The City of Rijeka, in co-operation with its partners, monitors the quality of drinking water, bathing water, and air. The results of air quality in the City of Rijeka during 2020 are presented below.

Figure 11.: CO – Carbon Monoxide Pollution (mg/m^3) – Maximum Daily Eight-Hour Values

Source: Croatian Agency for Environment and Nature, 2020

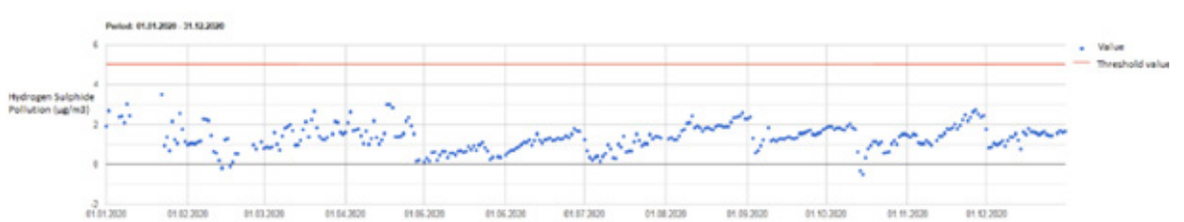
Carbon monoxide concentration is at a low level and far below the threshold value; the area therefore belongs to the Ist category of air quality, i.e. clean or slightly polluted by carbon monoxide.

Figure 12.: Benzene Pollution (µg/m3) – Daily Values

Source: Croatian Agency for Environment and Nature, 2020

The threshold value of benzene concentration in the air is 5 µg/m^3. All levels during 2020 were at lower levels, on average about 1 µg/m^3 and the exceedance of the threshold value were recorded during September and October. According to this parameter air quality is in the 1st category.

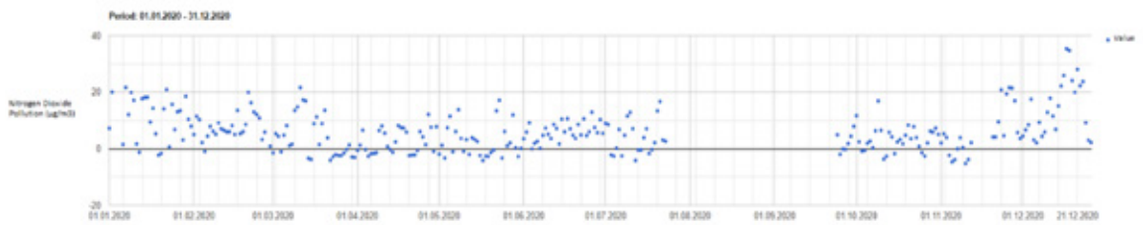
Figure 13.: H_2S – Hydrogen Sulphide Pollution (µg/m^3) – Daily Values



Source: Croatian Agency for Environment and Nature, 2020

The average annual hydrogen sulphide concentration amounts to 1,7 µg/m^3 No exceedance of the threshold value of 5 µg/m^3 was recorded. According to the obtained results, air quality is in the 1st category with regard to the concentration of hydrogen sulphide.

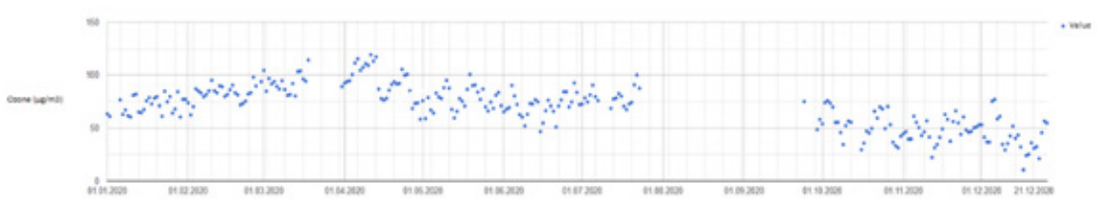
Figure 14.: NO_2 – Nitrogen Dioxide Pollution (µg/m^3) – Daily Values



Source: Croatian Agency for Environment and Nature, 2020

All the values of nitrogen dioxide during the year are below the annual threshold value of 40 µg/m^3, and the area is classified into the 1st category of air quality, i.e. clean or slightly polluted air. No exceedance of the threshold value in 2020 were recorded.

Figure 15.: O_3 – Ozone Pollution (µg/m^3) – Daily Values



Source: Croatian Agency for Environment and Nature, 2020

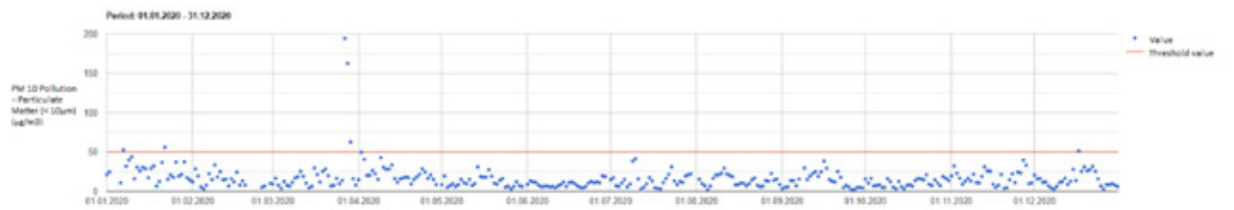
The figure shows the ozone concentration trend during 2018. The threshold value which must not be exceeded for more than 25 days in the calendar year is 120 µg/m^3. The average annual concentration in Rijeka is 75 µg/m^3; however, exceedances from the threshold value were not recorded during the year.

Slika 16.: SO_2 – Sulphur Dioxide Pollution (µg/m^3) – Daily Values

Source: Croatian Agency for Environment and Nature, 2020

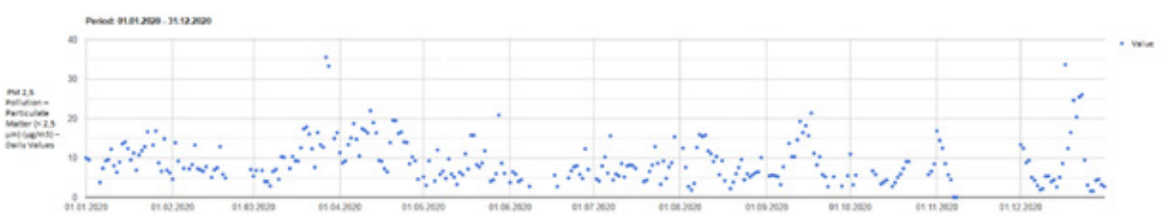
The figure shows daily measurements of sulphur dioxide. The daily threshold value is 125 μg/m^3. There were no recorded exceedances in the observed period, and the average emission was 12 μg/m^3.

Figure 17.: PM 10 Pollution – Particulate Matter (< 10μm) (μg/m^3) – Daily Values



Source: Croatian Agency for Environment and Nature, 2020

Figure 18.: PM 2,5 Pollution – Particulate Matter (< 2,5μm) (μg/m^3) – Daily Values



Source: Croatian Agency for Environment and Nature, 2020

Particulate matter is emitted from various sources. In the process of monitoring air quality, anthropogenic sources are observed: thermal power plants, industrial processes, transport, and households. Particulate matter is a complex mixture of organic and inorganic substances of different dimensions whose composition significantly depends on local air pollution sources. Particulate matter PM10 are a fraction of total particulate matter of aerodynamic diameter smaller than 10 μm and can as such enter the human respiratory system. The average concentration is 25 μg/m^3 and in March 2020 there were exceedances from the threshold value recorded. Average concentration of particulate matter PM2,5 is 10 μg/m^3. There were no exceedances from the threshold level recorded in 2020. The threshold level is below 35 during calendar year, which is allowed under the Decree.

It was established by air quality analysis that the air in the Rijeka area can be classified into the 1st quality group, i.e. the air is clean or slightly polluted.

FUTURE GOALS

High greenhouse gas emissions have become an immense global challenge since they have an impact on climate change. Extreme temperature changes and disappearance of seasons have a negative impact on human health and living environment. In order to improve the situation, individuals need to start from their everyday activities and reduce greenhouse gas emissions.

At the Faculty of Economics and Business University of Rijeka, we believe that the future is based on sustainable growth and development and operate in accordance with the interests of the society and the environment. After the completion of the LIFE Clim'Foot project we will monitor the activities of the Faculty and calculate the carbon footprint since EFRI is member of PRME and thus a member of the UN Global Compact initiative for sustainable business

In 2020 there has been a decrease in intensity of CO_2 per employee for 74% compared to the previous year. This means that EFRI per capita employee have continued to increase its energy efficiency despite significant investment that will produce savings in the future. Intensity of CO_2 per student, after the drop of 2,8% in 2017, decreased further in 2018 and 2019. During 2020, CO_2 intensity per student fell by 73%. Even when excluding the effect of the COVID 19 pandemic, there is a clear trend that EFRI has continued to increase its energy efficiency in relation to the number of students, despite significant investments from which savings results are expected only in the future.

The overall carbon footprint of the Faculty in 2020 was 273 tCO_2e, which represents a decrease of 73,7% in relation to 2019. The largest part of the carbon footprint refers to indirect emissions (49%) generated from the daily migrations, business trips, and students' visits on student exchange. The second most important source are energy sources, i.e. electricity consumption and natural gas consumption, with a share of 38%. The smallest share is comprised of input materials, capital goods and waste with total of 13% in EFRI's carbon footprint. The highest rate of change was recorded in category input materials – decrease of 87,4%. The reason for this rate of change is energy efficiency project that was performed in previous period. The highest increase was recorded in category capital goods. Due to transition toward online classes the Faculty invested into new and modern IT equipment so the classes could be performed without interruptions and problems.

Although in the City of Rijeka and in the territory of the Republic of Croatia the air is almost free of pollution, i.e. mildly polluted, and is classified into the first category, it is not a static category. In today's dynamic environment, it is necessary to find a strategy and a way to maintain the current state and improve it. Individuals and educational institutions, such as the Faculty of Economics and Business of the University of Rijeka, must start from themselves and be a positive example to the rest of the Republic of Croatia and the European Union.

References

1. **Greenhouse Gas Protocol,** URL: http://ghgprotocol.org/ (10/03/2021)

2. **Croatian Agency for Environment and Nature,** URL: http://iszz.azo.hr/iskzl/index.html (13/03/2021)

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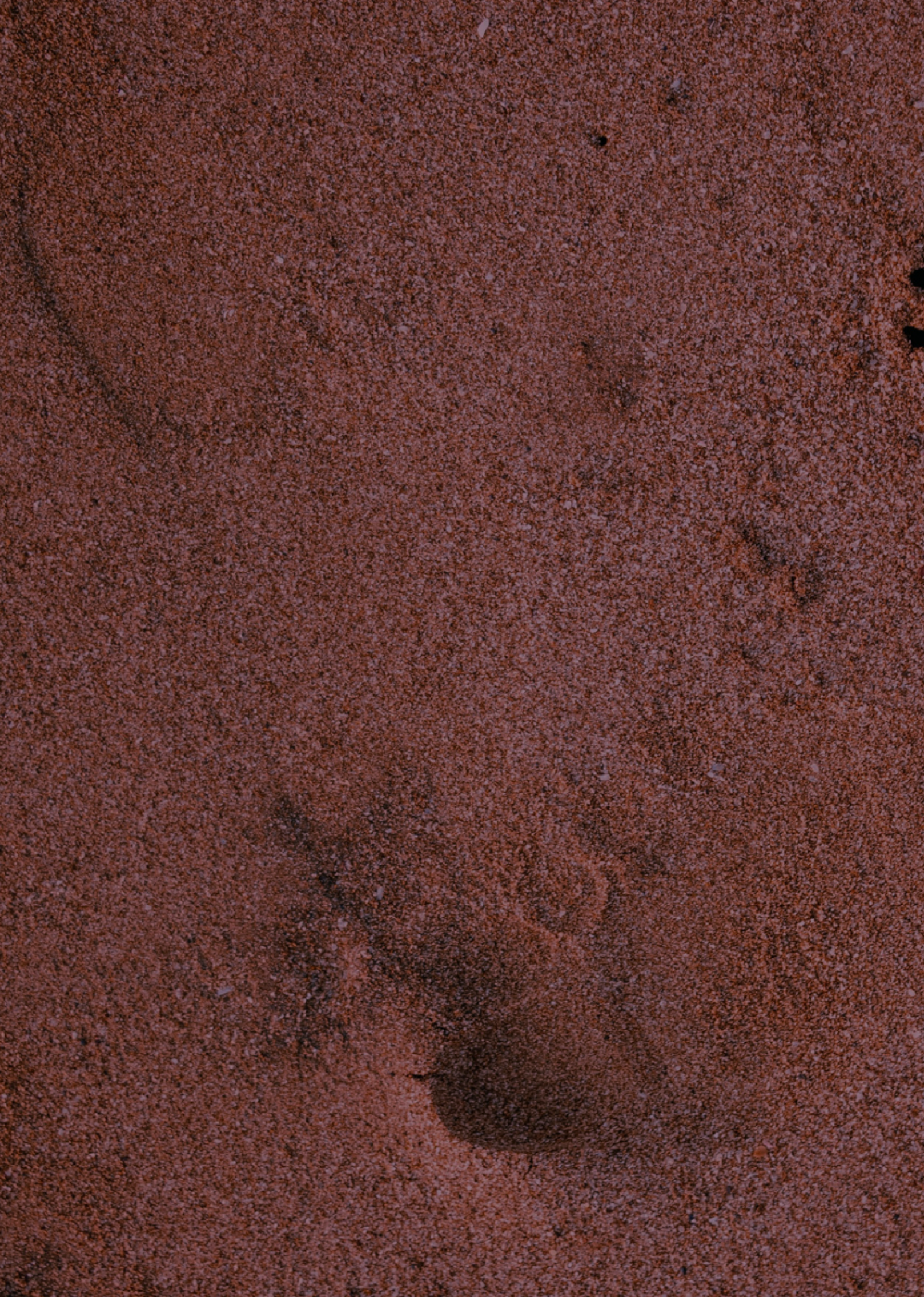

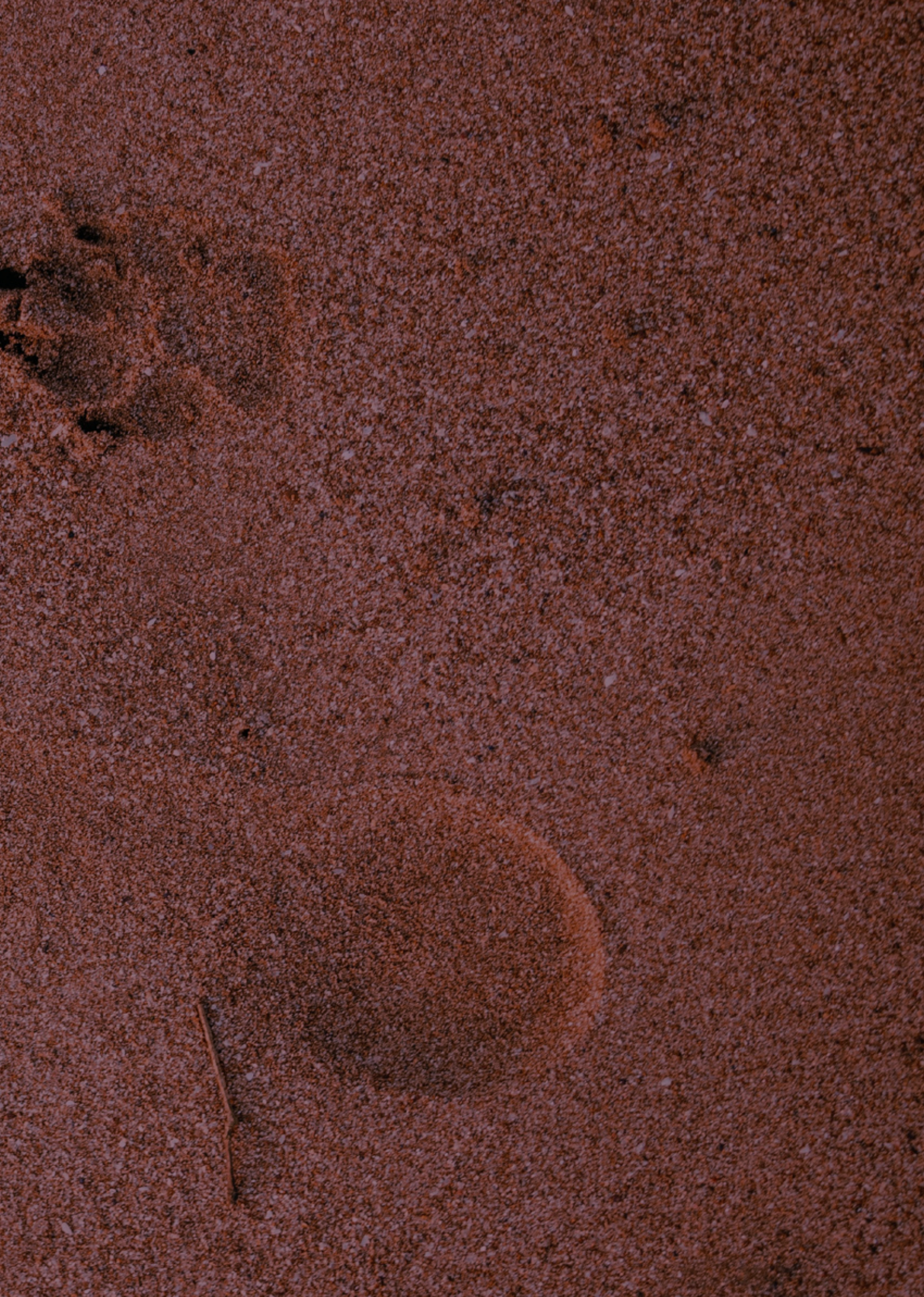

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