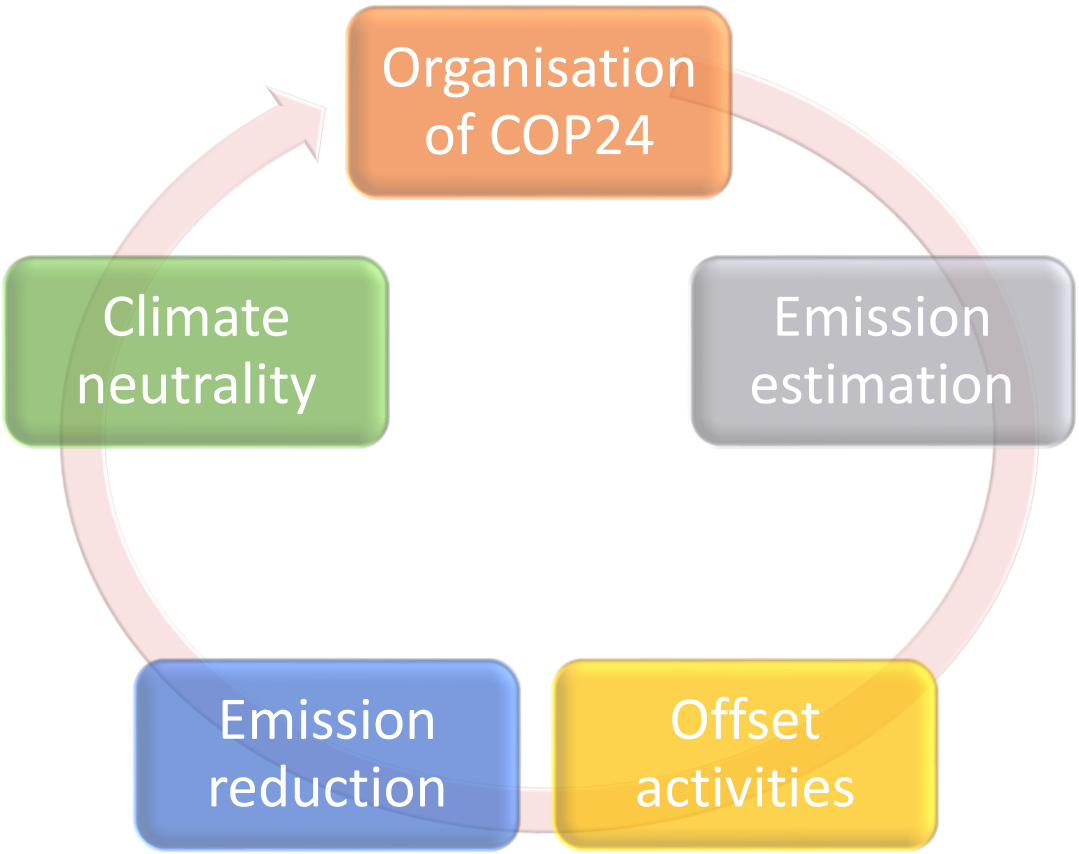
CO_2 EMISSIONS RELATED TO COP24 CONFERENCE IN KATOWICE

[1]

[1] https://www.flickr.com/photos/cop24official/

1. Introduction

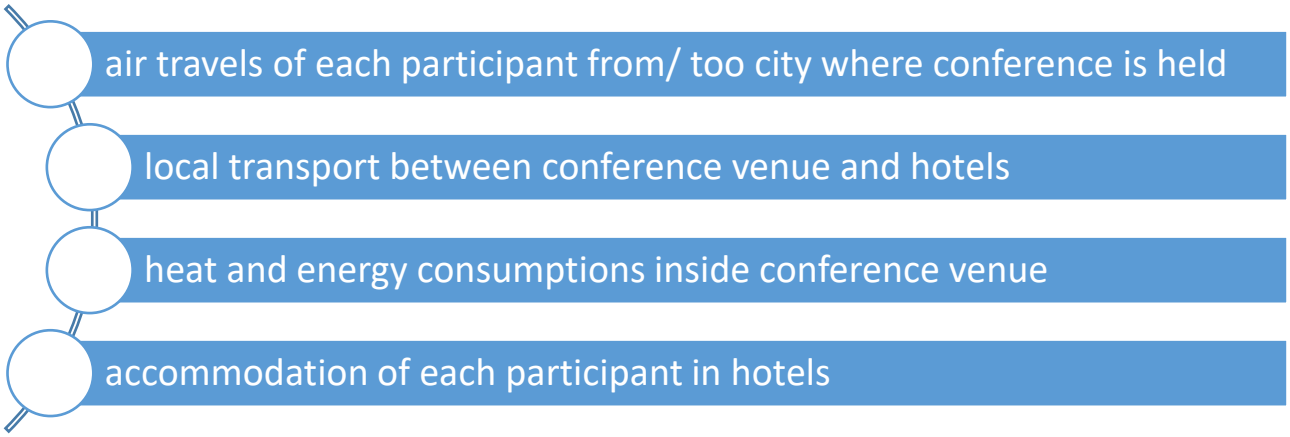
Between 2nd and 14th of December 2019 24th session of Conference of Parties to the United Nation Framework Convention on Climate Change was held in Katowice. During those two weeks almost 23 000 participants, including representatives of Parties, non-governmental organizations and media participated in negotiation process to prepare package of decisions with set of rules needed to implement the Paris Agreement. Organisation of such an event is always linked with increased impact on environment due to increased emission of carbon dioxide a key greenhouse gas. As a part of host country agreement between UNFCCC secretariat and Poland, host country committed to limit environmental impact of this conference and to prepare report containing estimation of greenhouse gases emissions related to preparation of COP24. This estimation will be a basis to implement set of actions by Poland to offset emission related to COP24 and to keep climate neutrality of whole conference.



2. Calculation Methodology

Currently there are no international recognised methodology or standard to calculate greenhouse gas emission related to large international conferences or events like Conference of Parties. There are no common rules or best practices that would indicate what kind of emissions should be included in overall calculations or how they should be conducted. Due to different circumstances of each event like whether condition, climate zone or conference length calculation of GHG emissions for each event or conference needs individual tailor made approach. Estimation of COP24 GHG emission will be based on source data provided by number of institutions involved in logistics of COP24, on previous experiences related to calculation of emission from COP14 and on assumptions, reference values and best practices in case of lack of source data.

In most cases whenever there is a need to calculate greenhouse gases emission related to events like COP following elements are included:



Calculation of emissions from events like COP can be done only after event is finished because number of data like total number of participants, origin of each participant that are significant for calculation of emission coming from air travel will be available then.

3. Initial GHG estimation before COP24

To prepare some of the offset activities already before COP24 initial GHG estimation were needed in 2018. Source data related to number of COP23 participants and GHG emission from air travel where analysed. Based on previous experience air travel emission might be responsible for up to 95% of total emission from whole event.

There were 23 259 COP23 participants (Party delegates, NGO representatives, media, UN secretariat stuff). Estimated GHG emission from air travel of same amount of delegates to Katowice would be around 54 858 CO_2 eq. This estimation was based on official air travel emission calculator[2] prepared by International Civil Aviation Organization (ICAO) that takes into account length of each flight, type of carrier and cabin class. In addition this estimation includes application of level 3 factor related to radiative forcing index (RFI)[3]. Application of this factor is needed to take into account different climate change effects related to emissions in different layers of atmosphere.

Following formula was used:

$$18\ 286\ \mathrm{CO2\ eq}\ x\ 3\ (RFI) = \mathbf{54\ 858\ CO2\ eq}$$

Where:

18 286 CO_2 eq – *emission calculated through ICAO carbon calculator*

3 – precautionary correction factor taking into account RFI;

Before beginning of COP24 questionnaire related to source date was circulated to all organizations involved in preparation of conference (conference venue, hotel operator, transport services) to gather necessary information needed to calculate emissions from elements other that air travel of participants.

4. Calculation of GHG emissions from COP24

Number of participants:

Based on the information received form UNFCCC secretariat after the end of COP24 there were 22 933 participants. Those are participants that received badge after the online registration process. This includes: official Party delegates (11 318), UN and other international organization staff (1 688), non-governmental representative and media (6 785) and technical service support (3 142).

During the COP24 conference UN informed about more then 30 000 participants but those were numbers related to online registration. Some of the participants registered online before COP24 but where not present in Katowice during conference. For the calculation purposes value 22 944 where used.

Conference lenght:

According to COP preliminary agenda conference should begin on 2nd December and should last until 14th December 2018. In fact negotiation processes where continued until the late night hours between 15th and 16th December.

[2] https://www.icao.int/environmental-protection/Carbonoffset/Pages/default.aspx
[3] Aviation and Climate Change: Best practice for calculation of the global warming potential (Niels Jungblutha)

Also number of additional pre sessional meeting where organized to allow internal coordination inside different negotiating groups. Those meeting were mainly organised between 26th November and 1st of December.

For simplification purposes value of 14 working days were used whenever it was needed for calculation.

4.1. Emissions from air travel:

After the end of COP24 conference UNFCCC secretariat calculated emission coming from air travel of all participants using ICAO carbon calculator. Official capital of each participant was treated as an origin of travel. Katowice airport was a reference destination in case of direct connections. In specific cases airports in Cracow or Warsaw were used. In case of Krakow airport additional correction factor + 10 kg CO_2 were used to represent emission coming from train travel from Cracow to Katowice and in case of Warsaw additional correction factor +46 kg CO_2 were used to represent direct air travel connection between Warsaw and Katowice. In addition for OECD representatives and a long haul flights of UN and other international agencies experts emission factors representative for bossiness cabin class were used. In any other case emission factors for economy cabin class were used. Overall calculation also includes emissions coming from non-commercial flights of Heads of States or governmental representatives (165 participants) that participated in High Level Segment during COP24.

Calculation does not include local technical support.

From further calculations 560 CO_2 eq was deducted as those are emission corresponding to air travel of UNFCCC secretariat staff. Those emissions are directly offset by UNFCCC secretariat by cancelation of appropriate amount of CER units.

Similar like in case of initial estimation for further calculation precautionary correction factor 3 were used to reflect radiative forcing index.

Following formula was used:

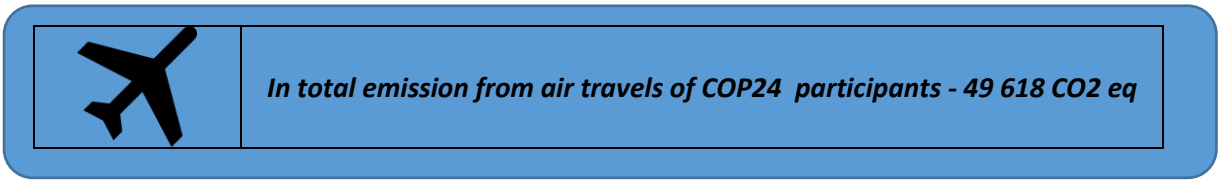
$$(17\ 099\ \mathrm{CO2\ eq} - 560\ \mathrm{CO2\ eq})\ x\ 3\ (RFI) = \mathbf{49\ 618\ CO2\ eq}$$

Where:

17 099 CO_2 eq – *total emission calculated through ICAO carbon calculator*

560 CO_2 eq – *emission corresponding to UNFCCC Secretariat travels;*

3 – precautionary correction factor taking into account RFI;



4.2. Emissions from local transport

COP24 organisers arranged different types of local transportation services to facilitate travel form hotels to conference venue:

- shuttle buses;
- free city transport service (buses and trams);
- local train connections;
- buses for UN staff;
- electric cars fleet;

Due to a large number of local service providers and different type of vehicles involved it was not possible to gather complete and detailed information about fuel used and length of each route. In some cases assumptions or reference values was taken into account during calculation processes.

- Emissions from shuttle buses:

During COP24 shuttle bus network was established between conference venue groups of hotels in Katowice and Cracow. Network operator was able to gather information about length of all routes for all buses. All shuttle buses used diesel as a fuel.

Following formula was used:

$$162\,583\ km\ x\ 0{,}3\ \frac{l}{km}\ x\ 0{,}84\ \frac{kg}{l}\ x\ \frac{43\ MJ}{Kg}\ x\ 74{,}1\ \frac{\mathrm{CO2\ eq}}{TJ} = \mathbf{130\ CO2\ eq}$$

Where:

162 583 km – total number of kilometres

0,3 l/km – average fuel consumption of shuttle bus (diesel)

0,84 kg/l – density of fuel

43 MJ/kg – net caloric value of diesel fuel (IPCC 2006)

74,1 CO_2 eq /TJ – emission factor of diesel fuel (IPCC 2006)

- free city transport service (buses and trams):

In addition to standard city transport services City of Katowice introduced dedicated buses and trams for COP24 participants between conference venue and main hotels area in Katowice.

Following formula was used:

$$16\,260\ km\ x\ 1\ \frac{kWh}{km}\ x\ 0{,}778\ Mg/MWh = \mathbf{12\ CO2\ eq}$$

Where:

16 260 km - total number of kilometres

1 kWh/km – average energy consumption for km[4]

0,778 Mg/MWh – emission factor for energy production[5]

- Local train connections:

COP24 participants that stayed outside Katowice in Krakow or Chorzow were able to used free local train connections. Due to lack of detailed information some assumptions were made in following calculation:

Estimated number of train raids – 1 000
Emission from singular train ride (distance 20 km) – 10 kg CO[6]

Following formula was used:

$$1\,000\ x\ 10kg\ CO2 = \mathbf{10\ CO2\ eq}$$

- Buses for UN staff:

Conference venue operator organised dedicated bus shuttle services for UNFCCC secretariat staff. Operator was able to gather information about total fuel usage. All bus used diesel as a fuel.

Following formula was used:

$$3\,728\ l\ x\ 0{,}84\frac{kg}{l}\ x\ 43\frac{MJ}{kg}\ x\ 74{,}1\ \mathrm{CO2\ eq}\ /TJ = \mathbf{10\ CO2\ eq}$$

Where:

3 728l – total fuel usage

0,84 kg/l – density of fuel

43 MJ/kg – net caloric value of diesel fuel (IPCC 2006)

74,1 CO_2 eq /TJ – emission factor of diesel fuel (IPCC 2006)

[4] http://m.infotram.pl/tramwaj-zuzywa-najmniej-energii-_more_94940.html

[5] http://www.kobize.pl/uploads/materialy/materialy_do_pobrania/wskazniki_emisyjnosci/Wskazniki_emisyjnosci_2018.pdf

[6] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwiG2P_koLbgAhXQlYsKHVsaAHIQFjAAegQICRAC&url=http%3A%2F%2Fyadda.icm.edu.pl%2Fyadda%2Felement%2Fbwmeta1.element.baztech-article-BGPK-0638-3025%2Fc%2FEickman.pdf&usg=AOvVaw1HuP5vFn4y29hZwJg8NNY6

- Electric cars fleet:

Ministry of Environment organised small fleet of electric cars for internal purposes. Operator was able to gather information about total distance covered and average energy consumed.

Following formula was used:

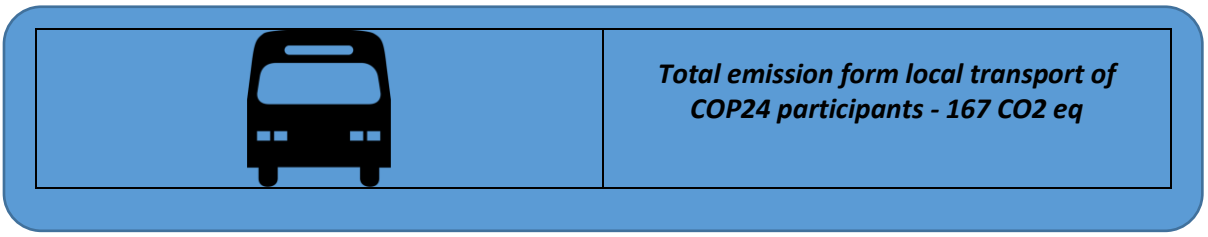
$$35\ 057\ km\ x\ 0{,}18\frac{kWh}{km}x\ 0{,}778\ Mg/MWh = \mathbf{5\ CO2\ eq}$$

Where:

35 057 km – total distance covered

0,18 kWh/km – Energy consumed per km (data supplied by car supplier)

0,778 Mg/MWh – emission factor for energy production [7]



4.3. Emission related to conference venue

During COP24 heat and electric energy where provided for conference venue and for temporary structure. In addition to heat up temporary structures number of fuel oil heaters were used. Conference venue operator was able to provide detailed information about amount of energy consumed, heat provided and fuel oil usage. Calculation also includes pre sessional period and construction processes related to building of temporary structures.

- Electric energy consumption:

Following formula was used:

$$552MWh\ x\ \ 0{,}778\frac{\mathrm{CO2\ eq}}{MWh} = \mathbf{429\ CO2\ eq}$$

Where:

[7] http://www.kobize.pl/uploads/materialy/materialy_do_pobrania/wskazniki_emisyjnosci/Wskazniki_emisyjnosci_2018.pdf

552 MWh – electric energy used (data from conference venue operator)

0,778 Mg/MWh – emission factor for energy production [8]

- Zużycie energii cieplnej:

Following formula was used:

$$12\,832{,}7\ GJ\ x\ \ 0{,}11\frac{\mathrm{CO2\ eq}}{GJ} = \mathbf{1\,411\ CO2\ eq}$$

Where:

12 833 GJ – total heat consumption (data from conference venue operator)

0,11 Mg/GJ – emission factor for heat energy production (internal data)

- Temporary structures heating:

Following formula was used:

$$355\,500\ l\ x\ 0{,}86\frac{kg}{l}\ x\ 43\frac{MJ}{kg}\ x\ 74{,}1\frac{\mathrm{CO2\ eq}}{TJ} = \mathbf{974\ CO2\ eq}$$

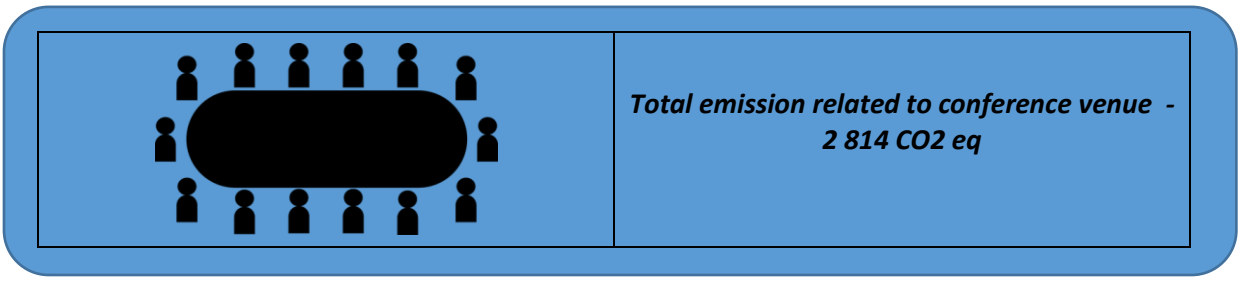
Where:

355 500 l – total amount of oil fuel

0,86 kg/l – fuel density (suppliers data)

43 MJ/kg – fuel net caloric values (IPCC 2006)

74,1 CO_2 eq /TJ – fuel emission factor (IPCC 2006)



[8] http://www.kobize.pl/uploads/materialy/materialy_do_pobrania/wskazniki_emisyjnosci/Wskazniki_emisyjnosci_2018.pdf

4.4. Emission related to accommodation:

Due to the fact that number of COP24 participants booked their hotel by themselves and not by official COP24 hotel operator it was impossible to gather full and detailed information about accommodation of each participant. In following calculations assumption was made that each participant stayed in Katowice for 14 days.

Following formula was used:

$$22\,933\ participants\ x\ 14\ days\ x\ 20\ kg\frac{CO2}{day} = \mathbf{6\ 421\ CO2\ eq}$$

Where:

22 933 – number of COP 24 participants;

14 – estimated number of days in Katowice;

20 kg CO_2/day – estimated emission factor for night stay in hotel.

	***Total emission related to accommodation - 6 421 CO2 eq***

4.5. Total COP24 emissions:

Total sum of emissions from elements identified above:

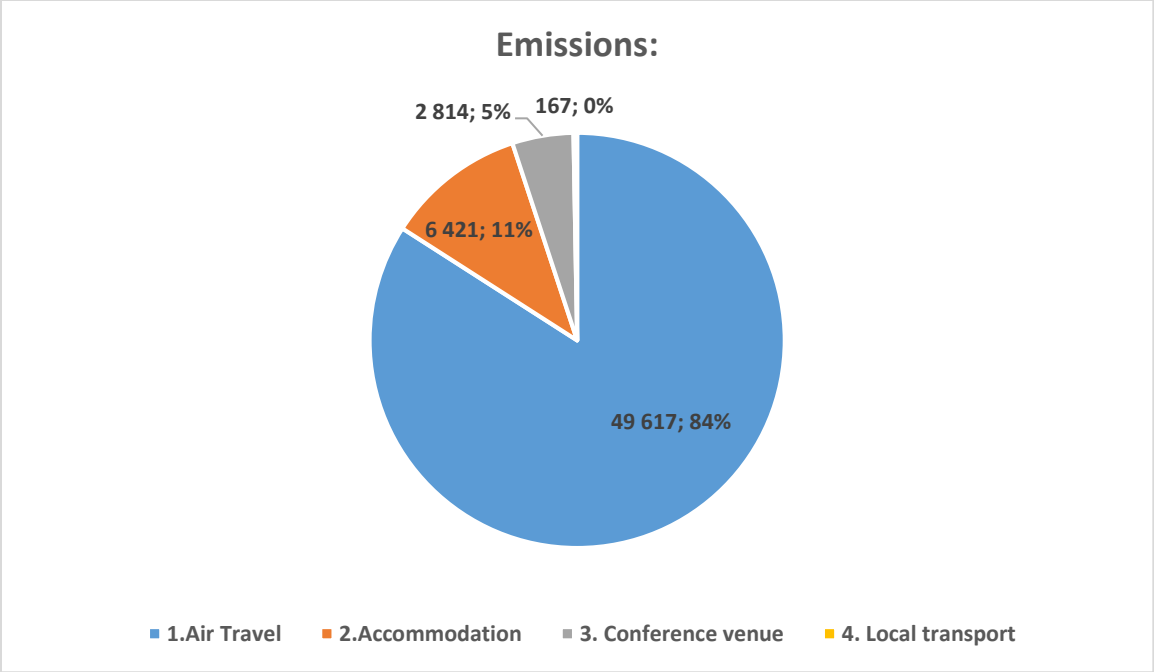
$$49\,618 + 167{,}6 + 2\,814 + 6\,421 = \mathbf{59\ 020\ CO2\ eq}$$

COP24·KATOWICE 2018 KONFERENCJA NARODÓW ZJEDNOCZONYCH W SPRAWIE ZMIAN KLIMATU	***Total emissions related to COP24 - 59 020 CO2 eq***

4.6. Summary

Organisation of any kind of large international conference always leads to additional GHG emission, that could not be prevented during logistic planning before such an event. Average emission per participant during COP24 was around 2,6 CO_2 eq. This value is very close to values from previous COP conferences: during COP14 and COP22 average values were around 2 CO_2 eq and during COP18 around 4 CO_2 eq.

In case of all COP conferences the biggest share in total emission was linked with air travel. Also emission related to accommodation played important role.

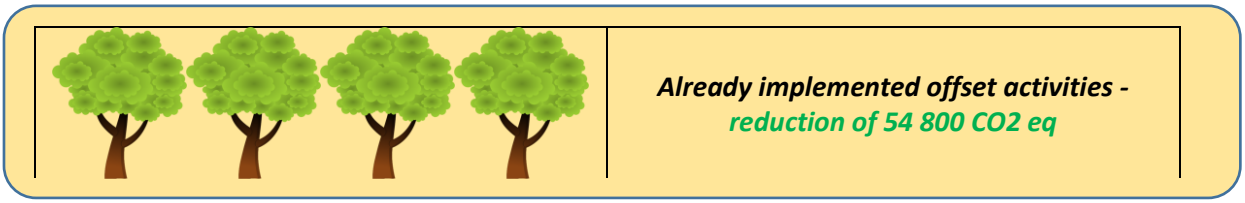


5. Offset activities

To compensate emissions related to organisation of COP24 Ministry of Environment together with State Forests will undertake number of activities related to forestation. Forestation is one of the most important mechanism to fulfil climate neutrality in line with the Paris Agreements principles. To determine area needed for forestation following assumptions were made:

- 4 CO_2 eq /h – average CO_2 absorption per hectare of forest (IPCC2006)
- 20 years – minimal life cycle of forest

Based on initial COP24 GHG estimation State Forests already in 2018 started forestation program by identifying proper areas and planting first trees. In 2018 trees were planted on almost 375 hectares leading to reduction of **30 000 CO2 eq** emission during 20 years forest life cycle. In 2019 additional planting processes are already set up on area around 310 hectares and this activity will reduce emissions related to COP24 conference by **24 800 CO2 eq.**



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