DESOTEC

Avoided Emissions Methodology

2026

V0 Oct 2026 D. Reichert

1. DESOTEC

We're committed to building a cleaner, greener world for all. With our unique, sustainable, mobile filtration solutions, purifying liquids and gases, we are committed to helping protect the planet by driving positive ecological change across all industries. DESOTEC's closed-loop, full-service model is as unique as our customers' needs. We'll define the right filtration setup and safely recycle filtration waste, making it easy to go green for every industry: www.desotec.com.

In Europe and North America (see our footprint in Figure 1) we deliver activated carbon (AC) as molecular filtration medium, (preferably) in mobile filters, to the customer. We take into our service lifecycle assessment the primary activated carbon (fossil-based and renewable-based AC, to start the cycle). The customer purifies their gas or liquid stream through adsorption of the pollutants on the AC (stream Pollutants, given as CO2e). Chemicals are needed for our process. When the AC at the customer site (stage material use) can no longer take up the pollutant, we take back the majority of that spent AC into the waste treatment stage. A small part of spent AC is treated by our customers directly and leaves our mass balance boundaries. The vast majority of accepted spent AC waste is subjected to our recycling process (high temperature steam atmosphere) in which the pollutants (of our customers) desorb and are fully oxidized (in an afterburner). The exhaust gas is further cleaned to only emit CO2 and H2O to the air. Solid streams are fly ash and gypsum (by-product). Some spent AC we are not allowed to recycle (operation permit) which then is sent to external treatment (incineration or landfill). Some AC waste is sent to waste stock for later processing.

2. Organisational Boundaries

DESOTEC offer their circular filtration services across the European continent and across North America, through strategically located thermal plants and hubs, see below schematic, Figure 1. DESOTEC care for delivery and pick-up of the filtration medium, ideally in a mobile filter, to and from the customer. This downstream transport is offered via heavy duty trucks, typically operated by diesel fuel. DESOTEC operates own tractors and trailers but also uses third party haulage services.

The calculation of the project carbon footprint of a customer's application includes this return transport, as well as, manufacturing of recycled or virgin activated carbon, cleaning of the according flue gases, manufacturing of the mobile filters, relevant chemicals and upstream transport.



Figure 1: Organisational boundaries (markets serviced)

Temporal boundary: Target setting is forward-looking and includes assumptions on market and regulations development and is based on activated carbon sales volumes per region and application. Reporting of achieved avoided emissions of historic years is based on ERP and OT data.

3. Data Sources and calculation method

3.1 Corporate Carbon Footprint

Historic consumptions and (via emission factors) emissions are tracked monthly since 2016 for all our furnaces. Consumptions of our material handling sites and mobile fuels are reported annually. In 2025, our total Greenhouse Gas emissions Inventory was 177 000 tonnes CO2e (Greenhouse Gas Protocol (GHGP) aligned inventory), with a Scope 3 share of 81%, see below figure 2. Our inventory does not include Scope 3.11 Use of sold products because our study revealed that, typically, the pollutant filter is a part of a highly integrated exhaust or water cleaning train and allocation of consumptions is challenging. A detailed study on the impact has been undertaken in Product Carbon Footprint Document, which is available upon request (legitimate interest).

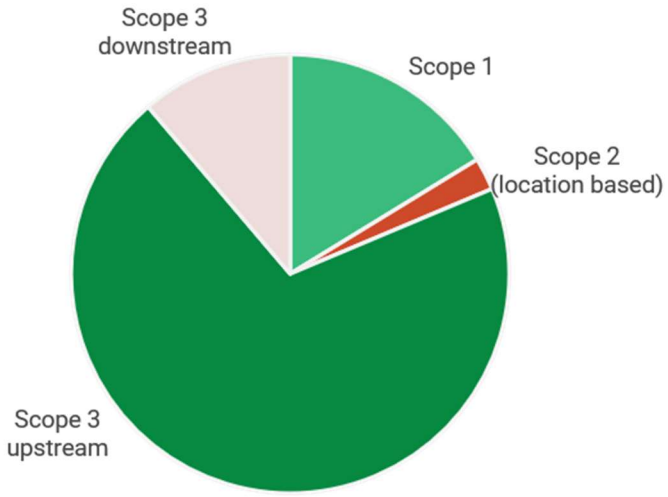


Figure 2: Distribution of DESOTEC's 2025 GHG Inventory over GHGP scopes.

3.2 Product Carbon Footprints (PCF)

PCF according to GHGP and with reference to ISO14067:2018 were calculated with Ademe Institute Bilan Carbon v9.1 (IPCC AR6) Nov 2025 based on primary consumption data of our suppliers. Primary data share of our PCFs range between 48 and 84%, details, uncertainties, sensitivities can be found in our PCF document which is available on request (legitimate interest). The PCF covers the complete lifecycle according to Figure 3.

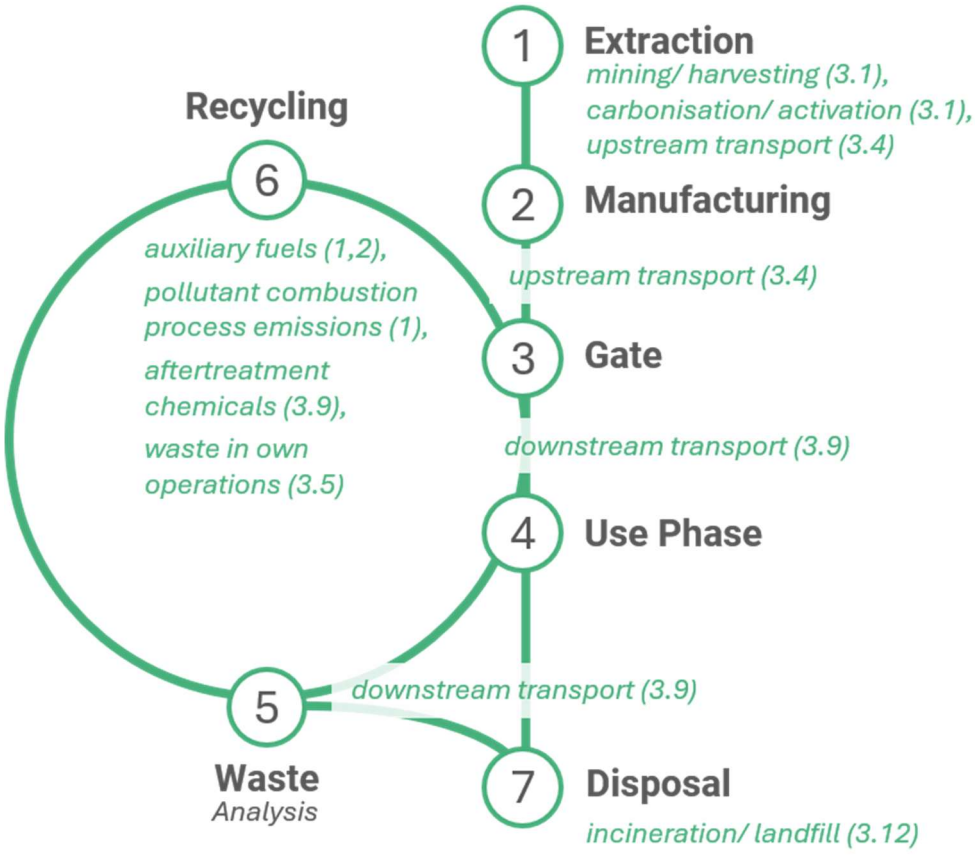


Figure 3: Lifecycle steps considered in DESOTEC's Product Carbon Footprint calculation.

DESOTEC offer non-impregnated activated carbon (AC) products for adsorption of organic molecules (VOC, volatile organic compounds, in air and COD, chemical oxygen demand, in water). The impregnated AC types are used for adsorption of acids in gas, mainly sulfur in the form of H_2S. The recycled products can usually substitute 1:1 the primary AC. The loss of waste AC in the recycling stage is very low, but is accounted for in the recycled product PCF according to ISO14067:2018. The PCF has been prepared by a third party and checked by DESOTEC experts. It has not yet undergone external assurance.

PCFs of coal-based activated carbon are usually around 10 metric tonnes CO2e emission per tonne of virgin activated carbon (excl. upstream transport) (T(CO2e)/T(AC)) while renewable-based AC is around 2 T(CO2e)/T(AC). Upstream transport to EU or US is typically around 0.2 T(CO2e)/T(AC). Recycled AC only has between 1-2 T(CO2e)/T(AC), hence, has a much lower GHG impact.

3.3 Calculation of Avoided Emissions

When a customer uses recycled AC rather than fossil virgin AC with subsequent disposal like incineration (for necessary destruction of the adsorbed pollutants), the climate impact of the linear solution (reference scenario) is much higher than for DESOTEC's circular filtration solution based on recycled AC (climate solution).

Through system expansion (ISO14067:2018), the lifecycle emissions (incl. transport, pollutant destruction etc.) of the complete pollutant removal project are considered, cf. Figure 3 (not only the cradle-to-gate impact of the AC). Then, the lifecycle emissions of the climate solution are subtracted from the lifecycle emissions of the reference scenario. AC is used as filtration medium in all our customer projects, hence, we calculate the linear use (cradle-to-grave) of coal-based (fossil) AC of our total AC volume sold in the year as reference scenario. From this we subtract our CCF. Because we assume the same electricity/ mechanical energy consumption at the customer to overcome the filter resistance (back pressure), in the reference scenario – climate solution, Scope 3.11 Use of sold products is not explicitly calculated.

To account conservatively for uncertainty in the reference scenario and associated assumptions, we recognise 80% of the calculated difference between reference-scenario emissions and climate-solution emissions as avoided emissions. Details on the methodology with reference to WBCSD standards are given in the Annex [1,2].

Based on this calculation approach, in 2025, we achieved 440 000 tonnes CO2e avoided. Assuming an average annual milage of 14500 km per year and passenger car at an average GHG emission of 120 g(CO2e)/km the annual GHG emission of a passenger car in Europe is 1740 kg(CO2e). For tangible communication, we have been using on our website the narrative: "Our business cuts as much CO2 emissions as those produced by almost 250 000 passenger cars per year", relating to aforementioned avoided emissions (Our sustainability commitments | Desotec). These avoided emissions are reported separately and are not used to offset our corporate carbon footprint. For now, the methodology to calculate Avoided Emissions is not yet externally assured.

4. Our Avoided Emissions Target

Increasing our recycling capacity, mobile filter fleet and regional footprint, we are confident to be able to increase our Avoided Emissions by 2030 to 640 000 tonnes CO2e and by 2033 to 900 000 tonnes CO2e.

5. References

[1] WBCSD Guidance on Avoided Emissions v2, 2025

[2] WBCSD Avoided Emissions & Climate Investing: A Guide for Investors and Businesses, 2025

6. Annex: Avoided Emissions Methodology Details

Assessment goal: external use of AE data, especially CO2e emissions saved in our customers' projects

Type of solution: end-use solution (pollutant removal)

Function and functional unit (FU): The function of the activated carbon (AC) is the removal of pollutants from gaseous and liquid streams through adsorption and subsequent destruction of these pollutants into less harmful molecules. A typical FU is x m³ fluid stream or y kg pollutant removed until saturation of a fixed volume filter system (end of the AC's loading capacity), which can translate into the according reference flow of activated carbon, see Table A1.

Table A1: General loading capacities of pollutants (in weight percent, top) and relating reference flows for this study (in kilograms, bottom)

loading capacities / wt.%	VOC (gas)	COD (liquid)	Sulfur (gas)
coal-based AC	0-20%	10-40%	10%
renewable-based AC	0-20%	10-40%	10%
coal-based impregnated AC	0-10%	n/a	25-40%
renewable-based impregnated AC	0-10%	n/a	40-50%
recycled AC	0-20%	10-40%	10%
recycled impregnated AC	0-10%	n/a	25-50%

AC reference flows / kg	VOC (gas)	COD (liquid)	Sulfur (gas)
coal-based AC	10	4	10

renewable-based AC	10	4	10
coal-based impregnated AC	20	n/a	3
renewable-based impregnated AC	20	n/a	2
recycled AC	10	4	10
recycled impregnated AC	20	n/a	3

Filter lifetimes (time they are in operation at the customer site) are typically shorter than one year, hence, the turnover of activated carbon per site is, on average, lower than one year reducing data carry-over (data accuracy) year-on-year. AC volumes incoming and outgoing are tracked in the ERP system, auxiliary fuels consumptions (gas, electricity) are tracked in our OT system, both leading to good primary data accuracy.

System boundary: To provide the purification of x m³ fluid stream or removal of y kg pollutants per time step and to-be-cleaned volume flow at a specific site, activated carbon and the filter vessel need to be produced (cradle-to-gate). Both need to be brought to site of filtration. The AC needs to be filled in the vessel (before gate or at end-user site). In the use phase, the to-be-cleaned stream needs to be pumped through the filter against the backpressure of the filter, AC and piping. Once the activated carbon is saturated and can no longer take up pollutants, the spent AC needs to be transported to a site for end-of-life treatment (eol). This can be either disposal through incineration, energy recovery in e.g. cement kilns or landfill. Alternatively, the AC can be recovered and thermally recycled to the same activity as before use (and fully substitute primary material). In both eol scenarios, aftertreatment is needed to destroy the harmful pollutants into less harmful ones. In incineration, energy recovery and thermal recycling, the pollutants are combusted to CO2, H2O, SO2, mineral acids, elemental/ charged heavy metals which have to be removed from the flue gas with chemicals. In landfilling, the pollutants may or may not decompose into other species and be transferred into landfill gas (channeled or diffuse emission) and liquid leachate, both of which require treatment to remove those pollutants.

Activated carbon removes pollutants based on adsorption which means the pollutants weakly bind the surface of the AC. In reactive adsorption, a chemical reaction may occur through which the pollutants are converted into other species and then stored in the AC pores.

In our calculation of avoided emissions, we include all activated carbon grades we offer which, in principle, may achieve the same pollutant removal result as coal-based primary activated carbon (reference scenario): coal- and renewable-based primary activated carbon, impregnated activated carbon, recycled activated carbon and spent activated carbon waste which had to be sent to disposal because

DESOTEC was not allowed (operation permit restrictions) to recycle these specific waste streams. We considered all activities to operate the solution business including, for example, fuels for company cars, office electricity etc. When new sites are onboarded, they are treated in the same way as existing sites in that they report their consumptions into our corporate inventory (Corporate Carbon Footprint).

Reference scenario: Pollutants can be removed from liquid and gaseous streams through different physical processes like adsorption, absorption, direct conversion/ oxidation/ combustion. In the narrower reference scenario 1 (1a & 1b, Table A2), which only considers pollutant removal via adsorption on activated carbon, the state-of-the-art approach is the linear use of fossil-based activated carbon: make, use, dispose for exhaust and wastewater cleaning. Because the adsorption activity of our recycled product is generally the same as for the primary material, a one-to-one exchange between the two products is possible.

Another reference scenario could be the linear use of other adsorbens media like ion exchange resins, minerals, not-activated carbon. The widest reference scenario which could be considered is the use of all currently available pollutant removal techniques, see table A2. However, in the environmental filtration market the technique to be used for a specific depollution task is mainly defined by regulation (BAT, Best Available Technique) – which limits the uses again per filtration task. DESOTEC mostly operates filters in application in which activated carbon filtration is seen as BAT, hence, we do not consider other technologies than linear fossil AC use as reference scenario. BAT legal revision cycles are usually between seven and ten years. Hence, it is assumed, that a review of the reference scenario every other year is sufficient.

Table A2: Technologies for pollutant removal

	stream	*Physical method*	*Cleaning technique*	*State-of-the-art lifecycle*
1a	gas	adsorption	Activated carbon	Mining, production, transport, use, disposal, reuse of filter
1b		adsorption	biofilter	Production of organic filtration media, generation of active biofilm, use, disposal of spent, reuse of filter
1c		absorption	Scrubbing (wet or dry)	Production of scrubbing chemical, transport, use, disposal, reuse of scrubber
1d		direct oxidation	Thermal (RTO, TO, CTO) or electric (plasma, UV)	Production of reaction chamber, fuel (natural gas) or electricity, exhaust cleaning chemicals, disposal of ash, reuse of reaction chamber
1e		ultrafiltration	Mechanical separation based on molecule/ aggregate size with mambranes (HEPA)	Production of membranes and membrane chamber, electricity, reuse of reaction chamber, end-of-life treatment of dust, end-of-life treatment of membrane
2a	liquid	adsorption	Activated carbon	Mining, production, transport, use, disposal, reuse of filter
2b			Mixture of media (AC, exchange resins, minerals)	Production of media (mining, fossil oil), transport, use, disposal, reuse of filter
2c		absorption	foams	Production of chemicals, use, disposal of spent foam, reuse of filter
2d		direct oxidation	Chemicals only (O3, H2O2) or electricity-assisted (plasma, UV)	Production of reaction chamber, electricity, oxidative chemicals, reuse of reaction chamber
2e		ultrafiltration	Mechanical separation based on molecule/ aggregate size with membranes	Production of membranes and membrane chamber, electricity, reuse of reaction chamber, end-of-life treatment of retentate, end-of-life treatment of membrane

Avoided Emissions Calculation procedure:

Solution Emission: For the year of calculation (in general forward-looking, based on activated carbon sales volumes budgets per market and per application), we calculate our corporate carbon footprint as total GHG emission from sales of the activated carbon volume considered for that year as emission of our climate solution. This includes emissions from the complete lifecycle (see Figure 3, all steps).

Reference Scenario Emission: We take the same total activated carbon sales volume for that year and calculate the lifecycle emissions of using coal-based primary activated carbon with subsequent disposal (incineration in EU, landfill in US) and their corresponding GHG emissions, see Figure 3, steps 1,2,3,4,7).

Avoided Emissions (AE) are then calculated as Reference Scenario Emission ($E_{reference}$) minus Solution Emission ($E_{solution}$) times eighty percent:

$$AE = 0.80 \times (E_{reference} - E_{solution})$$

The 80% factor is a 20% conservativeness adjustment, which is applied to the calculated avoided emissions to reflect uncertainty regarding the counterfactual technology (cf. table A2), activated-carbon type (see PCFs), product performance in specific gas/ liquid matrices, variabilities in use-phase emissions (e.g. pump/ fan efficiencies), geographic conditions and end-of-life route that would have occurred in the absence of DESOTEC's circular solution. It also includes uncertainties in projected vs. achieved sales volumes.

In general, use phase emissions i.e. from electricity or mechanical energy provision are not explicitly calculated here because they are very similar between Solution and Reference and would equal out. Small, project-related differences are included in above 20% conservativeness adjustment.

We will continuously revise methodology and calculation and work towards WBCSD Guidance on Avoided Emissions v2.0 alignment [1].

Eligibility Statement: DESOTEC considers its circular activated-carbon solution eligible for avoided-emissions assessment because it provides an equivalent pollutant-removal function at lower lifecycle GHG emissions, supports reduced demand for virgin fossil-based activated carbon, and is deployed alongside DESOTEC's own corporate emissions-reduction activities. No avoided emissions are used to compensate for or subtract from DESOTEC's Scope 1, 2 or 3 emissions.

Contribution and double-counting statement: The reported avoided emissions represent the estimated system-level difference between the climate solution and the reference scenario. They are not an exclusive attribution of the full impact to DESOTEC. Other value-chain actors like our customers may report the same or

related avoided emissions; consequently, the result should not be aggregated across organisations without assessing possible double counting.

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