

Carbon Footprint in Chemical Industry – Organic Chemical Products

PEP Review 2025-05

Jamie Lacson, Research and Analysis Associate Director, Process Economics Program

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Table of contents

1	Introduction	7
2	Summary	8
3	Methodology	16
	Technical basis	16
	Carbon dioxide	16
	Methane	16
	Nitrous oxide	16
	CFCs	16
	PFCs	17
	Other fluorinated gases	17
	Our convention for accounting for emissions	17
	Process emissions	17
	Emissions from on-site combustion	17
	Emissions from off-site electrical generation	18
	How we arrived at these emissions estimates	18
	Process description	23
	Calculating process emissions	24
	Calculating emissions from on-site combustion	25
	Calculating emissions from off-site electrical generation	26
	Appendix A — Design and cost basis	27
	Design conditions	28
	Cost basis	28
	Capital investment	28
	Project construction timing	29
	Available utilities	29
	Production costs	30
	Effect of operating level on production costs	30
	Appendix B — Cited references	31
	Appendix C — Process flow diagrams	33
	Appendix D — Carbon footprint data	35

Tables

Table 2.1 List of products	8
Table 3.1 EVAs by a tubular reactor process — Major equipment	19
Table 3.2 EVAs by a tubular reactor process — Stream flows	22

Table 3.3 EVAs by a tubular reactor process — Production costs	23
Table 3.4 Scope 1 and 2 CO ₂ e emissions details	23
Table 3.5 Streams exiting process of Figure C1 — Stream flows	24
Table 3.6 Carbon content of streams exiting process of Figure 1 — Stream flows	25
Table 3.7 CO ₂ uncontrolled emissions factors from combustion	25

Figures

Figure 2.1 CO ₂ emissions from organic chemicals (ton CO ₂ /ton products)	10
Figure 2.2 CO ₂ emissions from organic acids (ton CO ₂ /ton product)	10
Figure 2.3 CO ₂ emissions from acrylic monomer processes (percent)	11
Figure 2.4 CO ₂ emissions from alcohol processes (ton CO ₂ /ton product)	11
Figure 2.5 CO ₂ emissions from glycols and polyols processes (ton CO ₂ /ton product)	12
Figure 2.6 CO ₂ emissions from aldehydes processes (ton CO ₂ /ton product)	12
Figure 2.7 CO ₂ emissions from anhydrides processes (ton CO ₂ /ton product)	13
Figure 2.8 CO ₂ emissions from epoxides processes (ton CO ₂ /ton product)	13
Figure 2.9 CO ₂ emissions from phenolics processes (ton CO ₂ /ton product)	14
Figure 2.10 CO ₂ emissions from vinyls processes (ton CO ₂ /ton product)	14

Appendix C Figures

Figure C1 Ethylene vinyl acetate copolymers by a tubular reactor process	34
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Appendix D Carbon footprint data

Table D1 Carbon dioxide emissions from organic chemical products (ton CO ₂ /ton product)	36
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Glossary

¢/kWh	Cents per kilowatt hour
¢/lb	Cents per pound
¢/Mgal	Cents per thousand gallons
¢/Mlb	Cents per thousand pounds
¢/t-h	Cents per ton hour
°C	Degree Celsius
ADN	Adiponitrile
bhp	Brake horsepower
Btu	British thermal units
CDM	Clean Development Mechanism
CFCs	Chlorofluorocarbons
CO ₂ e/GJ	Carbon dioxide equivalent per gigajoule
CO ₂ e/MWh	Carbon dioxide equivalent per megawatt-hour
DEG	Diethylene glycol
EIA	Energy Information Administration
EPDM	Ethylene propylene diene monomer
EU-ETS	European Union European Trading Scheme
EVA	Ethylene vinyl acetate
EVA _s	Ethylene-vinyl acetate copolymers
ft	Feet
ft dia	Feet diameter
g	Gram
gal	Gallon
GHG	Greenhouse gas
GJ/ton	Gigajoules per ton
GWP	Global warming potential
h	Hour
HFCS	High-fructose corn syrup
HMDA	Hexamethylenediamine
HPA	Hydroxypropionic acid
HPPO	Hydrogen peroxide to propylene oxide
IPCC	Intergovernmental Panel on Climate Change
kg	Kilogram
kg/cm ²	Kilograms per square centimeter
kg/h	Kilograms per hour
lb	Pounds
lb/h	Pounds per hour
lb/y	Pounds per year
MDI	Methylene diphenyl diisocyanate
mgal	Thousand gallons
mlb	Thousand pounds
MMBtu/h	Million British thermal units per hour
MMt	Million metric tons
MMt/y	Million metric tons per year
Mol wt	Molecular weight
MWh	Megawatt-hour
MWh/ton	Megawatt-hour per ton
PEP	Process Economics Program
PET	Polyethylene terephthalate
PFCs	Perfluorinated compounds
PTA	Purified terephthalic acid
psig	Pounds per square inch gauge
sq ft	square feet
SS	Stainless steel
t	Metric tons

t/y	Metric tons per year
TFC	Total fixed capital
USGC	United States Gulf Coast
VCM	Vinyl chloride monomer
wt%	weight percent

Abstract

There has been a growing urgency to curb greenhouse gas (GHG) emissions. While viable solutions to reduce GHG emissions are being explored, the chemical industry has been a primary focus of many international environmental organizations. Numerous opportunities exist for emissions reductions in the chemical industry. It is necessary to quantify the carbon emissions for chemical processes to understand potential reductions. However, carbon emissions estimates for many chemical processes have not been established.

To help determine potential emissions reductions, the Process Economics Program has prepared an estimate of the carbon footprint of major organic chemical products. This review presents carbon dioxide emissions factors for 364 processes. Estimates have been broken down into Scope 1 (direct emissions) and Scope 2 (indirect emissions). Direct emissions occur at the plant site, while indirect emissions arise due to remotely located electrical generators. GHG emissions factors calculations are presented on a US Gulf Coast basis.

Contacts

Rajiv Narang

Executive Director, Process Economics Program
rajiv.narang@spglobal.com

Jamie Lacson

Research and Analysis Associate Director, Process Economics Program
jamie.lacson@spglobal.com

CONTACTS

Europe, Middle East, Africa: +44 (0) 203 367 0681

Americas: +1 800 332 6077

Asia-Pacific: +60 4 296 1125

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