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International Fertiliser Society

THE CARBON FOOTPRINT OF FERTILISER PRODUCTION: REGIONAL REFERENCE VALUES

by

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SUMMARY.

Fertilizers Europe as the representative of the EU fertiliser industry has commissioned a calculator for assessing the greenhouse gas emissions of the production of fertilisers. The Carbon Footprint Calculator is a cradle to plant gate calculator for fertiliser products. It is freely available on-line and can be used to evaluate the footprint of a given fertiliser produced in a specific plant. For comparison purposes, it also contains reference values for the main regions in the world.

The paper provides tables with regional reference values for the main fertilisers (urea, AN, CAN, UAN).

RELATED PROCEEDINGS OF THE SOCIETY.

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191, (1980), *New Concept Ammonia Process with Higher Efficiency,* W F van Weenen, J Tielrooy.

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CONTENTS

Keywords: greenhouse gases, carbon footprint, fertilisers, Carbon Footprint Calculator.

1. INTRODUCTION.

Fertilizers Europe has commissioned a tool for estimating the carbon footprint related to the production of selected fertiliser products.

The calculator estimates the emission factor (tonnes CO_2 equivalent [CO_2eq] per tonne product) related to the production of fertilisers. All emissions with GWP (Global Warming Potential) are included. The calculator includes direct and indirect emissions from all materials related to the production of the particular final product delivered in the final product storage at the production site.

The Calculator also includes the estimated emissions related to exploitation and transport of energy from the source to the user.

The online Carbon Footprint Calculator (web-CFC) is freely available through the Fertilizers Europe web-site[1].

The Calculator provides options for selecting and inserting the basic assumptions related to raw materials, transportation, energy and production specific data.

The tool has been developed to

- calculate and provide reference values for carbon emissions for selected fertilisers based on EU average (ammonia and nitric acid), EU BAT (ammonia and nitric acid) as well as other defined references.
- calculate emission factors required in the LCA (Life Cycle Assessment) calculator for agriculture, such as the CoolFarmTool or other similar tools for calculating the LCA for food products and from agriculture.
- provide regional data (North America, Latin America, Africa, Middle East, CIS, South East Asia, South Asia, Oceania, China) for ammonia and nitric acid for inclusion in the Calculator for reference calculation of emission factors. The goal is to obtain carbon emission averages for the selected fertilisers in the above regions, to be used as reference points for global comparisons. The regional averages can also be used as an input for LCA calculators (such as Cool Farm Tool).

The tool is also intended to be used by fertiliser manufacturers to calculate their own emission factors for internal company reference purposes. Provided that the data are verified by an external auditor (The Carbon Trust has been appointed by Fertilizers Europe as such auditor) fertiliser producers can use the calculator for:

- the purpose of legal reporting and/or sustainability and CSR reports.
- the purpose of communicating with local or national authorities concerning energy and environmental issues.

[1] https://www.fertilizerseurope.com

2. CALCULATION OF CARBON FOOTPRINT.

The Calculator is divided into four main parts:

- Defining the fertilisers to be calculated.
- Energy sources using either built-in average data or own specified data.
- Components part for specifying imported materials and own produced intermediates.
- Summary part showing the calculated CO_2eq for the selected fertilisers.
- A detailed pdf report containing all the details can be generated and down-loaded.

The main structure in the calculations is based on the principles described by Kongshaug, (1998), as shown in Figure 1.

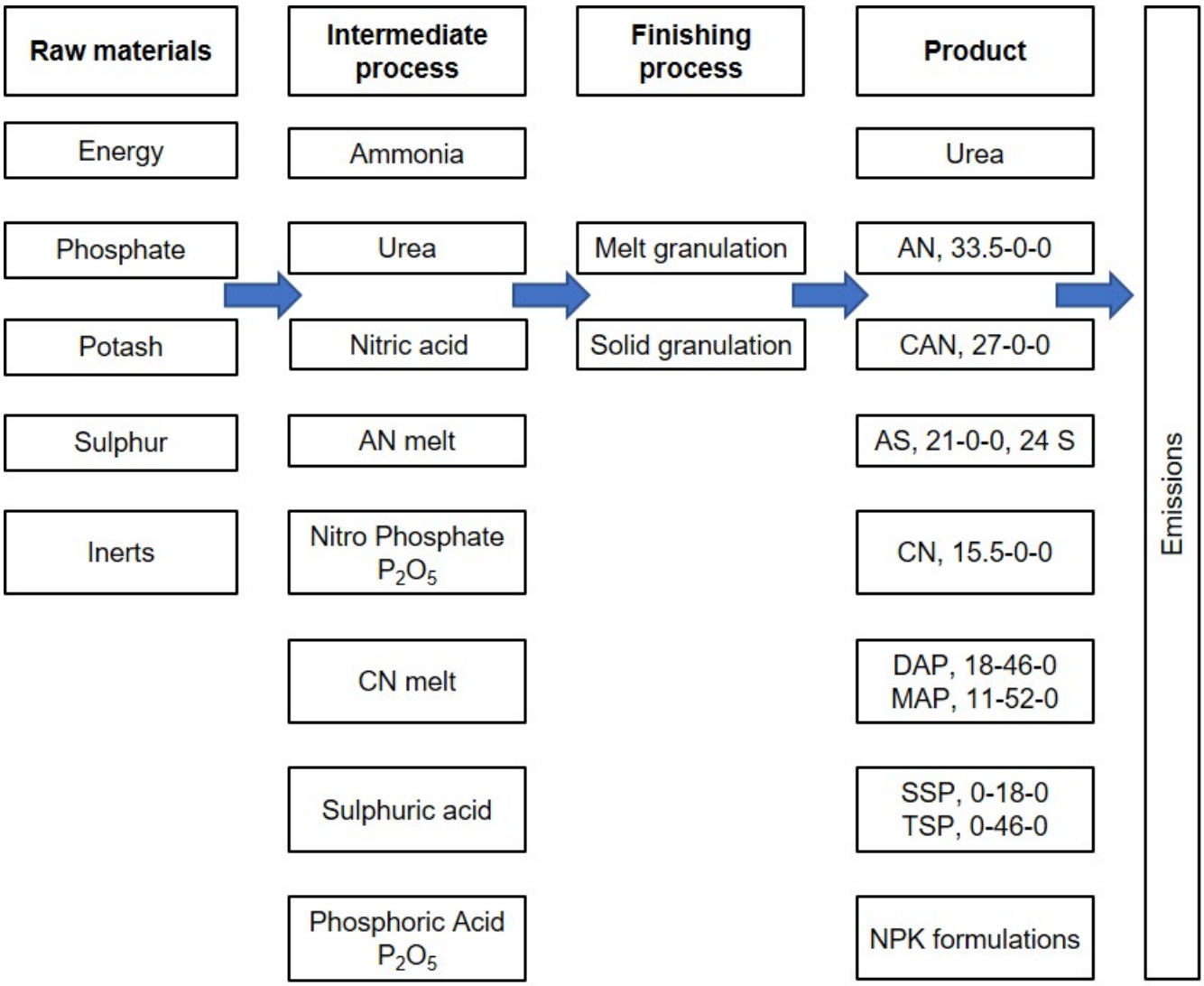

Figure 1: *Principles of carbon footprint calculator for fertiliser products.*

3. DATA BUILT INTO THE FERTILIZERS EUROPE CALCULATOR.

To improve the ease of use of the calculator a large amount of data has been built into it. This enables products produced in different regions to be compared.

3.1. Energy sources.

In this section this regional data on energy sources is shown. Table 1 covers fossil sources of fuel and feedstock carbon.

Table 1: *Fossil fuels. Source: IPCC guidelines 2006 (Fuel carbon factor). Thinkstep, GaBi database (energy supply). CF supply is the additional Carbon Factor of the exploration and transport of the energy source to the end user.*

	Carbon factor	**GaBi: CF supply**
	kg CO_2eq/GJ	kg CO_2eq/GJ
Natural Gas, EU-27	56.1	11.4
LPG, Liq. Petroleum Gas	63.1	16.9
Heavy Fuel Oil (HFO)	77.4	11.2
High Viscosity Residue (HVR)	80.7	0.0
Coal (Bituminous), EU-27	94.6	10.9
Natural Gas, North America	56.1	15.3
Natural Gas, Latin America	56.1	5.7
Natural Gas, Africa	56.1	8.7
Natural Gas, Middle East	56.1	5.3
Natural Gas, CIS (Russia Commonwealth)	56.1	11.6
Natural Gas, South East Asia	56.1	7.4
Natural Gas, South Asia	56.1	12.2
Natural Gas, Oceania	56.1	7.9
Natural Gas, China	56.1	13.5
Coal (Bituminous), China	94.6	11.2
Own data	optional	optional

Table 2 shows the regional model data for electricity.

Table 2: *Electricity. Source: IEA, Carbon factors for electricity generation, 2011. CF supply is the additional Carbon Factor of the exploration and transport of the energy source to the end user.*

	Carbon factor	**GaBi: CF supply**
	kg CO_2eq/GJ	kg CO_2eq/GJ
EU-27 average[1]	97.8	31.5
Conventional coal (EU-27)	238.9	27.3
North America[1]	113.4	25.4
Latin America[1]	113.2	68.1
Africa[1]	149.7	48.3
Middle East[1]	176.2	49.6
CIS (Russian Commonwealth)[1]	128.0	57.3
South East Asia[1]	192.1	64.9
South Asia[1]	212.7	101.9
Oceania[1]	212.2	41.4
China[1]	212.2	58.9
Own data	optional	optional

[1] These data are from the International Energy Agency (IEA), 2011.

Table 3 shows the emission factors from boiler steam, based on a variety of fuels.

Table 3: *Emission factors from steam boiler using selected fuels. The figures are based on 93% fuel efficiency except for coal at 90% efficiency. CF supply is the additional Carbon Factor of the exploration and transport of the energy source to the end user.*

	Carbon factor	**GaBi: CF supply**
	kg CO_2eq/GJ	kg CO_2eq/GJ
Steam boiler (gas-EU)	60.3	12.2
Steam boiler (LPG-EU)	67.8	18.2
Steam boiler (oil-EU)	83.2	12.0
Steam boiler (coal-EU)	105.1	12.1
Steam boiler (gas-North America)	60.3	16.4
Steam boiler (gas-Latin America)	60.3	6.1
Steam boiler (gas-Africa)	60.3	9.4
Steam boiler (gas-Middle East)	60.3	5.7
Steam boiler (gas-CIS Russian Commonwealth)	60.3	12.5
Steam boiler (gas-South East Asia)	60.3	8.0
Steam boiler (gas-South Asia)	60.3	13.1
Steam boiler (gas-Oceania)	60.3	8.5
Steam boiler (gas-China)	60.3	14.6
Own data for steam emission factor	optional	
Eff: gas, LPG, oil 93%, coal 90%, own data*	optional	

* Eff: gas, LPG, oil 93%, coal 90% shows default efficiency factors for steam boilers using different fuels.

The direct emission factors are related to the fuel composition, while the emission factors for the supply are related to the fuel mining and transportation to the plant site. The online tool enables the user to enter their own data for the efficiency of the steam boiler.

3.2. Plant specific energy and emission data.

Typical energy consumption for the fertiliser processes are built-in, and companies' own data can also be inserted. Ammonia and nitric acid production have the most significant impact on the carbon foot print and the data for these processes has been included on a regional basis, as shown in Tables 4 and 5.

Table 4: *Energy consumption data in fertiliser processes for ammonia.*

Product	Energy input, GJ per tonne product			Emissions kg/t product[3]	
	Feedstock and fuel	Steam	Electricity	N_2O	CH_4
EU average 2013/14[1]	34.03	-1.49	0.84		0
EU ETS benchmark	30.23	-3.6	1.2		0
EU BAT	31.6	-1.8	2.0		0
North America[2]	34.891	0	0		0
Latin America[2]	41.379	0	0		0
Africa[2]	36.705	0	0		0
Middle East[2]	35.745	0	0		0
CIS (Russian Commonwealth)[2]	39.491	0	0		0
South East Asia[2]	37.454	0	0		0
South Asia[2]	42.814	0	0		0
Oceania[2]	32.105	0	0		0
China, Coal based[2]	44.255	0	0		0
China, Gas based[2]	39.491	0	0		0
Own data	insert	insert	insert		0

[1] EU average 2013/14 is based on the PTAI Benchmarking of Fertilizers Europe ammonia plant 2013/14.

[2] The energy data (feed and fuel) for this regions include steam and electricity based on PSI methodology. These data are from Integer Research, March 2016.

[3] The online tool has options to include emissions of N_2O and CH_4, but these are seldom reported.

Table 5: *Energy consumption data in fertiliser processes for nitric acid (100%).*

Product	Energy input, GJ per tonne product			Emissions kg/tonne product	
	Feedstock and fuel	Steam	Electricity	N_2O	CH_4
EU average 2014[1]		-1.75	0.03	0.7	0
EU ETS benchmark[2]		-1.75	0.03	0.974	0
EU BAT, existing plants[3]		-1.75	0.03	1.85	0
North America[4]		-1.75	0.03	5.4	0
Latin America[4]		-1.75	0.03	4.7	0
Africa[4]		-1.75	0.03	4.7	0
Middle East[4]		-1.75	0.03	6.5	0
CIS (Russian Commonwealth)[4]		-1.75	0.03	5.6	0
South East Asia[4]		-1.75	0.03	5.9	0
South Asia[4]		-1.75	0.03	4.5	0
Oceania[4]		-1.75	0.03	5.2	0
China[4]		-1.75	0.03	7.4	0
Own data		insert	insert	insert	insert

[1] The EU average 2014 is based on a survey done by Fertilizers Europe.

[2] The EU ETS benchmark for nitric acid is set to 0.974 kg N_2O/t 100% acid.

[3] The EU BAT for existing plants is given as 0.12 – 1.85 kg N_2O/t 100% acid. In the calculator 1.85 kg N_2O/t 100% acid is used. The energy balance is given as typical and accepted by Fertilizers Europe Technical Committee.

[4] These data are from Integer Research, March 2016.

4. CARBON FOOTPRINT COMPARISON OF REGIONAL NITROGEN FERTILISERS.

Fertilizers Europe commissioned Integer Research to estimate the emission factors from ammonia and nitric acid plant in various global regions (North America, Latin America, Africa, Middle East, CIS (Russia Commonwealth), South East Asia, South Asia, Oceania and China). The emission factors are shown in the tables in the previous section.

The regional emission data and regional energy supply data have been used to calculate the carbon footprint of the following four nitrogen fertilisers: ammonium nitrate, calcium ammonium nitrate, urea and the liquid fertiliser UAN-30.

The results are given below. The graphs are given in CO_2eq. per tonne N in the product. The tables are given in both per tonne N and per tonne product and also provide information about the elements in the carbon footprint.

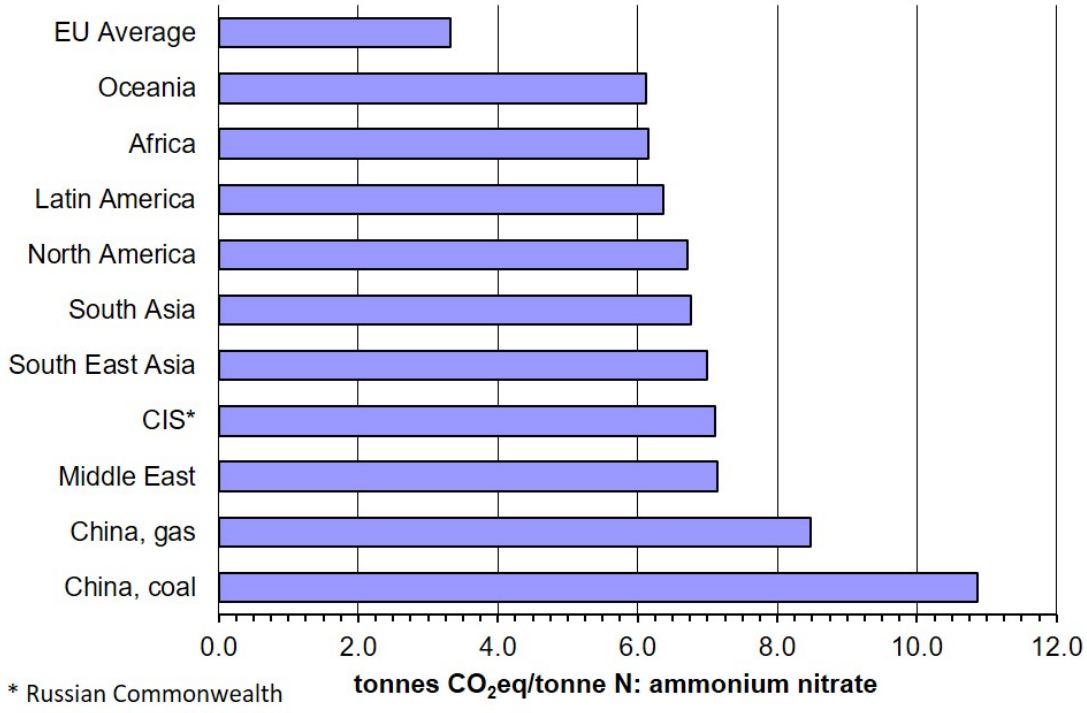

Figure 2: *Variations in the carbon footprint of ammonium nitrate (33.5-0-0) prilled fertiliser products between selected regions of the world.*

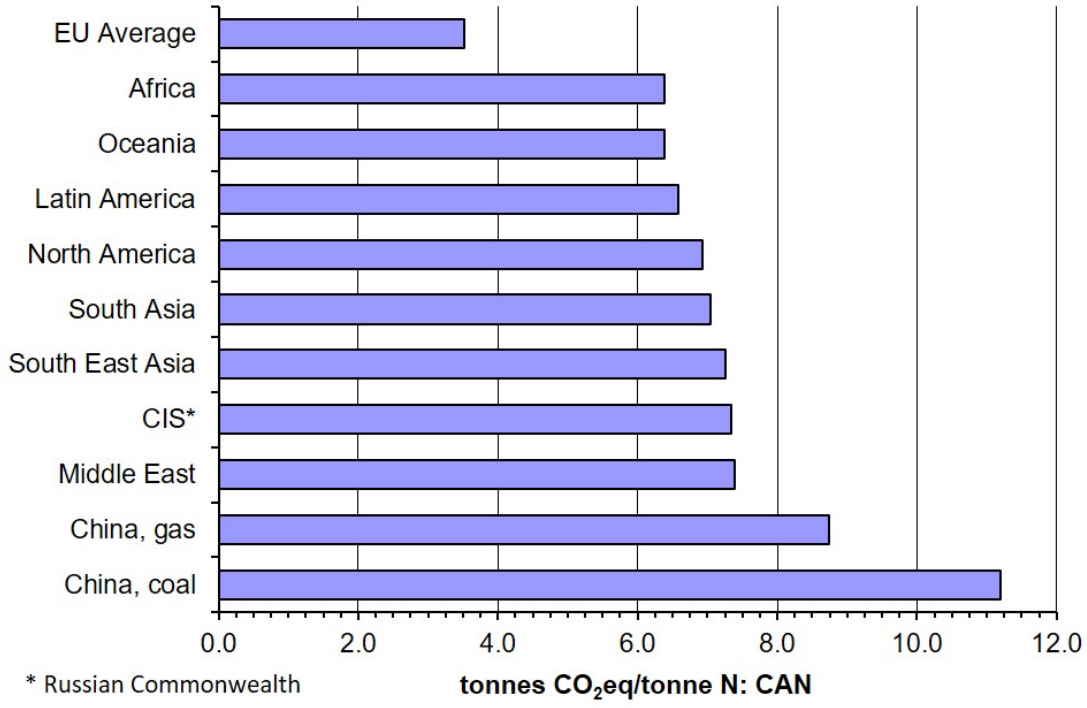

Figure 3: *Variations in the carbon footprint of calcium ammonium nitrate (CAN) (27-0-0) fertiliser products between selected regions of the world.*

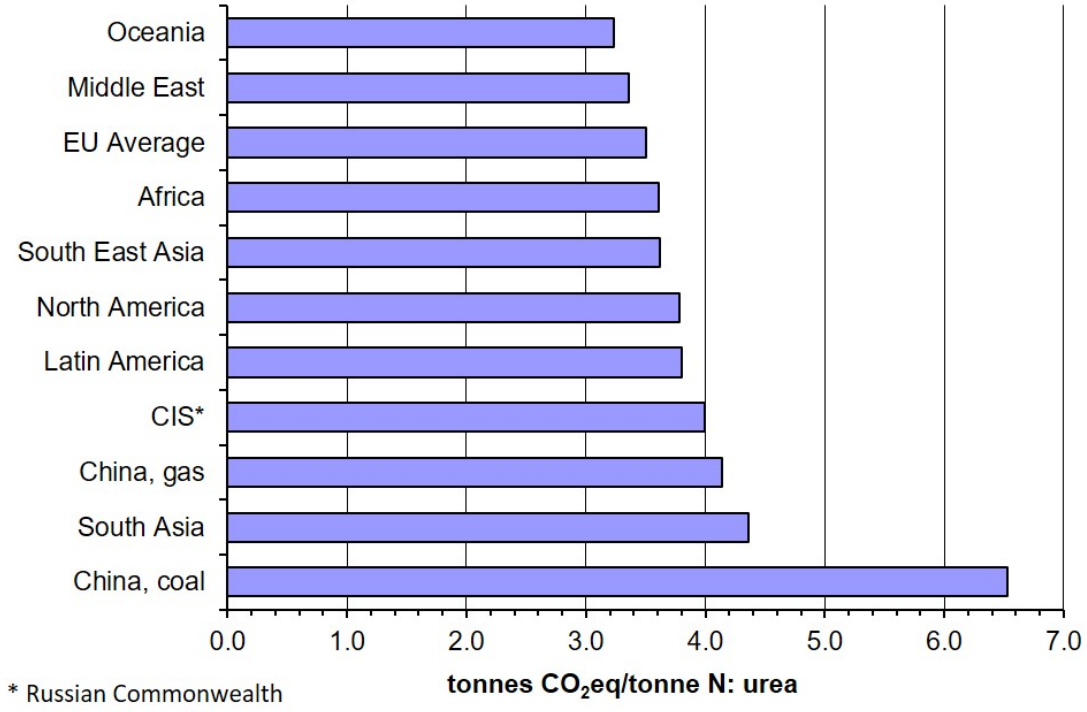

Figure 4: *Variations in the carbon footprint of urea (46-0-0) fertiliser products between selected regions of the world.*

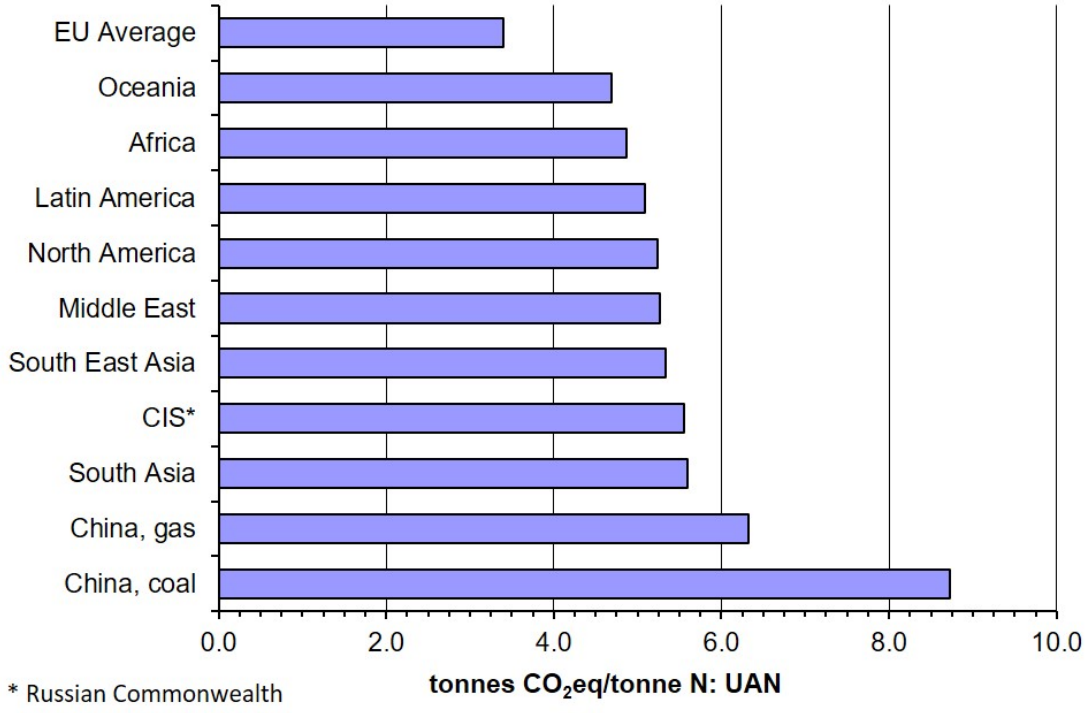

Figure 5: *Variations in the carbon footprint of urea ammonium nitrate (UAN) (30-0-0) fertiliser products between selected regions of the world.*

Table 6: *Variations in the carbon footprint of ammonium nitrate (33.5-0-0), prilled fertiliser products, per tonne of product, between selected regions of the world.*
Sources: Regional references (sources of data are validated by DNV GL.)

Fertiliser, AN (33.5-0-0) prilled	**CO_2 from raw materials (excl. natural gas)**	**CO_2 from energy supply**	**N_2O and CH_4 from production**	**CO_2 from production**		**Total Carbon Footprint**	
				CO_2 released during production	CO_2 captured in product*	(incl. CO_2 captured in product)	(excl. CO_2 captured in product)
	kg CO_2eq/kg product			kg CO_2eq/kg product		kg CO_2eq/kg product	
EU average	0.000	0.166	0.157	0.788	0.000	1.112	1.112
North America	0.000	0.221	1.213	0.815	0.000	2.249	2.249
Latin America	0.000	0.111	1.056	0.967	0.000	2.134	2.134
Africa	0.000	0.140	1.056	0.865	0.000	2.061	2.061
Middle East	0.000	0.087	1.460	0.849	0.000	2.396	2.396
CIS (Russian Commonwealth)	0.000	0.199	1.258	0.926	0.000	2.383	2.383
South East Asia	0.000	0.127	1.325	0.892	0.000	2.344	2.344
South Asia	0.000	0.234	1.011	1.022	0.000	2.267	2.267
Oceania	0.000	0.111	1.168	0.771	0.000	2.051	2.051
China, coal	0.000	0.214	1.662	1.767	0.000	3.643	3.643
China, gas	0.000	0.229	1.662	0.944	0.000	2.836	2.836

* Captured CO_2 will be released when applied in agriculture.

Table 7: *Variations in the carbon footprint of ammonium nitrate (33.5-0-0), prilled fertiliser products, per tonne of nitrogen (N), between selected regions of the world.*
Sources: Regional references (sources of data are validated by DNV GL.)

Fertiliser, AN (33.5-0-0) prilled	**CO_2 from raw materials (excl. natural gas)**	**CO_2 from energy supply**	**N_2O and CH_4 from production**	**CO_2 from production**		**Total Carbon Footprint**	
				CO_2 released during production	CO_2 captured in product*	(incl. CO_2 captured in product)	(excl. CO_2 captured in product)
	kg CO_2eq/kg nitrogen			kg CO_2eq/kg nitrogen		kg CO_2eq/kg nitrogen	
EU average	0.000	0.497	0.469	2.353	0.000	3.319	3.319
North America	0.000	0.659	3.621	2.433	0.000	6.712	6.712
Latin America	0.000	0.331	3.151	2.886	0.000	6.369	6.369
Africa	0.000	0.418	3.151	2.583	0.000	6.153	6.153
Middle East	0.000	0.261	4.358	2.534	0.000	7.153	7.153
CIS (Russia Commonwealth)	0.000	0.593	3.755	2.764	0.000	7.112	7.112
South East Asia	0.000	0.378	3.956	2.664	0.000	6.997	6.997
South Asia	0.000	0.698	3.017	3.052	0.000	6.767	6.767
Oceania	0.000	0.332	3.487	2.303	0.000	6.121	6.121
China, coal	0.000	0.638	4.962	5.275	0.000	10.875	10.875
China, gas	0.000	0.685	4.962	2.819	0.000	8.466	8.466

* Captured CO_2 will be released when applied in agriculture.

Table 8: *Variations in the carbon footprint of calcium ammonium nitrate(CAN) (27-0-0) fertiliser products, per tonne of product, between selected regions of the world.*
Sources: Regional references (sources of data are validated by DNV GL.)

Fertiliser, CAN (27-0-0)	**CO_2 from raw materials (excl. natural gas)**	**CO_2 from energy supply**	**N_2O and CH_4 from production**	**CO_2 from production**		**Total Carbon Footprint**	
				CO_2 released during production	CO_2 captured in product*	(incl. CO_2 captured in product)	(excl. CO_2 captured in product)
	kg CO_2eq/kg product			kg CO_2eq/kg product		kg CO_2eq/kg product	
EU average	0.016	0.142	0.127	0.667	0.000	0.951	0.951
North America	0.016	0.186	0.978	0.690	0.000	1.870	1.870
Latin America	0.016	0.100	0.851	0.813	0.000	1.779	1.779
Africa	0.016	0.122	0.851	0.735	0.000	1.724	1.724
Middle East	0.016	0.078	1.177	0.725	0.000	1.996	1.996
CIS (Russia Commonwealth)	0.016	0.171	1.014	0.781	0.000	1.982	1.982
South East Asia	0.016	0.112	1.068	0.762	0.000	1.958	1.958
South Asia	0.016	0.205	0.815	0.869	0.000	1.905	1.905
Oceania	0.016	0.097	0.941	0.667	0.000	1.721	1.721
China, coal	0.016	0.183	1.340	1.485	0.000	3.023	3.023
China, gas	0.016	0.197	1.340	0.806	0.000	2.358	2.358

* Captured CO_2 will be released when applied in agriculture.

Table 9: *Variations in the carbon footprint of calcium ammonium nitrate(CAN) (27-0-0) fertiliser products, per tonne of nitrogen (N), between selected regions of the world.*
Sources: Regional references (sources of data are validated by DNV GL.)

Fertiliser, CAN (27-0-0)	**CO_2 from raw materials (excl. natural gas)**	**CO_2 from energy supply**	**N_2O and CH_4 from production**	**CO_2 from production**		**Total Carbon Footprint**	
				CO_2 released during production	CO_2 captured in product*	(incl. CO_2 captured in product)	(excl. CO_2 captured in product)
	kg CO_2eq/kg nitrogen			kg CO_2eq/kg nitrogen		kg CO_2eq/kg nitrogen	
EU average	0.058	0.526	0.469	2.470	0.000	3.523	3.523
North America	0.058	0.690	3.621	2.557	0.000	6.926	6.926
Latin America	0.058	0.369	3.151	3.010	0.000	6.588	6.588
Africa	0.058	0.451	3.151	2.723	0.000	6.384	6.384
Middle East	0.058	0.290	4.358	2.685	0.000	7.391	7.391
CIS (Russian Commonwealth)	0.058	0.634	3.755	2.894	0.000	7.341	7.341
South East Asia	0.058	0.416	3.956	2.822	0.000	7.252	7.252
South Asia	0.058	0.759	3.017	3.219	0.000	7.054	7.054
Oceania	0.058	0.360	3.487	2.470	0.000	6.375	6.375
China, coal	0.058	0.678	4.962	5.500	0.000	11.198	11.198
China, gas	0.058	0.729	4.962	2.987	0.000	8.735	8.735

* Captured CO_2 will be released when applied in agriculture.

Table 10: *Variations in the carbon footprint of urea (46-0-0) fertiliser products, per tonne of product, between selected regions of the world.*
Sources: Regional references (sources of data are validated by DNV GL.)

Fertiliser, Urea (46-0-0)	**CO_2 from raw materials (excl. natural gas)**	**CO_2 from energy supply**	**N_2O and CH_4 from production**	**CO_2 from production**		**Total Carbon Footprint**	
				CO_2 released during production	CO_2 captured in product*	(incl. CO_2 captured in product)	(excl. CO_2 captured in product)
	kg CO_2eq/kg product			kg CO_2eq/kg product		kg CO_2eq/kg product	
EU average	0.000	0.278	0.000	0.600	0.733	1.611	0.878
North America	0.000	0.371	0.000	0.635	0.733	1.739	1.006
Latin America	0.000	0.172	0.000	0.841	0.733	1.746	1.013
Africa	0.000	0.228	0.000	0.700	0.733	1.661	0.928
Middle East	0.000	0.139	0.000	0.675	0.733	1.547	0.814
CIS (Russia Commonwealth)	0.000	0.321	0.000	0.784	0.733	1.838	1.105
South East Asia	0.000	0.201	0.000	0.732	0.733	1.667	0.934
South Asia	0.000	0.367	0.000	0.907	0.733	2.007	1.274
Oceania	0.000	0.185	0.000	0.566	0.733	1.484	0.751
China, coal	0.000	0.350	0.000	1.918	0.733	3.002	2.269
China, gas	0.000	0.372	0.000	0.801	0.733	1.905	1.172

* Captured CO_2 will be released when applied in agriculture.

Table 11: *Variations in the carbon footprint of urea (46-0-0) fertiliser products, per tonne of nitrogen (N), between selected regions of the world.*
Sources: Regional references (sources of data are validated by DNV GL.)

Fertiliser, Urea (46-0-0)	**CO_2 from raw materials (excl. natural gas)**	**CO_2 from energy supply**	**N_2O and CH_4 from production**	**CO_2 from production**		**Total Carbon Footprint**	
				CO_2 released during production	CO_2 captured in product*	(incl. CO_2 captured in product)	(excl. CO_2 captured in product)
	kg CO_2eq/kg nitrogen			kg CO_2eq/kg nitrogen		kg CO_2eq/kg nitrogen	
EU average	0.000	0.605	0.000	1.304	1.593	3.502	1.909
North America	0.000	0.807	0.000	1.380	1.593	3.781	2.187
Latin America	0.000	0.373	0.000	1.829	1.593	3.795	2.202
Africa	0.000	0.495	0.000	1.521	1.593	3.610	2.016
Middle East	0.000	0.303	0.000	1.466	1.593	3.363	1.770
CIS (Russia Commonwealth)	0.000	0.697	0.000	1.704	1.593	3.995	2.401
South East Asia	0.000	0.438	0.000	1.591	1.593	3.623	2.029
South Asia	0.000	0.798	0.000	1.971	1.593	4.362	2.769
Oceania	0.000	0.403	0.000	1.230	1.593	3.226	1.633
China, coal	0.000	0.761	0.000	4.171	1.593	6.525	4.932
China, gas	0.000	0.808	0.000	1.741	1.593	4.142	2.549

* Captured CO_2 will be released when applied in agriculture.

Table 12: *Variations in the carbon footprint of urea ammonium nitrate (UAN) (30-0-0) fertiliser products, per tonne of product, between selected regions of the world.*
Sources: Regional references (sources of data are validated by DNV GL.)

Fertiliser, UAN (30-0-0)	**CO_2 from raw materials (excl. natural gas)**	**CO_2 from energy supply**	**N_2O and CH_4 from production**	**CO_2 from production**		**Total Carbon Footprint**	
				CO_2 released during production	CO_2 captured in product*	(incl. CO_2 captured in product)	(excl. CO_2 captured in product)
	kg CO_2eq/kg product			kg CO_2eq/kg product		kg CO_2eq/kg product	
EU average	0.000	0.165	0.070	0.546	0.239	1.021	0.782
North America	0.000	0.219	0.543	0.570	0.239	1.571	1.332
Latin America	0.000	0.109	0.473	0.705	0.239	1.526	1.287
Africa	0.000	0.138	0.473	0.616	0.239	1.466	1.227
Middle East	0.000	0.087	0.654	0.602	0.239	1.581	1.342
CIS (Russian Commonwealth)	0.000	0.195	0.563	0.669	0.239	1.666	1.427
South East Asia	0.000	0.125	0.593	0.641	0.239	1.598	1.359
South Asia	0.000	0.228	0.453	0.757	0.239	1.677	1.438
Oceania	0.000	0.111	0.523	0.534	0.239	1.407	1.168
China, coal	0.000	0.211	0.744	1.420	0.239	2.615	2.376
China, gas	0.000	0.225	0.744	0.688	0.239	1.896	1.657

* Captured CO_2 will be released when applied in agriculture.

Table 13: *Variations in the carbon footprint of urea ammonium nitrate (UAN) (30-0-0) fertiliser products, per tonne of nitrogen (N), between selected regions of the world.*
Sources: Regional references (sources of data are validated by DNV GL.)

Fertiliser, UAN (30-0-0)	CO_2 from raw materials (excl. natural gas)	CO_2 from energy supply	N_2O and CH_4 from production	CO_2 from production		Total Carbon Footprint	
				CO_2 released during production	CO_2 captured in product*	(incl. CO_2 captured in product)	(excl. CO_2 captured in product)
	kg CO_2eq/kg nitrogen			kg CO_2eq/kg nitrogen		kg CO_2eq/kg nitrogen	
EU average	0.000	0.551	0.235	1.820	0.797	3.402	2.605
North America	0.000	0.730	1.810	1.900	0.797	5.238	4.441
Latin America	0.000	0.362	1.576	2.351	0.797	5.086	4.289
Africa	0.000	0.461	1.576	2.053	0.797	4.887	4.090
Middle East	0.000	0.289	2.179	2.005	0.797	5.270	4.473
CIS (Russian Commonwealth)	0.000	0.650	1.877	2.231	0.797	5.555	4.758
South East Asia	0.000	0.416	1.978	2.136	0.797	5.327	4.530
South Asia	0.000	0.761	1.509	2.523	0.797	5.590	4.793
Oceania	0.000	0.371	1.743	1.779	0.797	4.690	3.893
China, coal	0.000	0.704	2.481	4.735	0.797	8.716	7.920
China, gas	0.000	0.751	2.481	2.292	0.797	6.320	5.524

* Captured CO_2 will be released when applied in agriculture.

5. REFERENCE.

Kongshaug, G. (1998). Hydro Agri (Yara), Energy Consumption and Greenhouse Gas Emissions in Fertilizer Production, IFA.

International Fertiliser Society

The International Fertiliser Society is a scientific Society founded in 1947, with members in approximately 50 countries worldwide. Its main objectives are:

To provide an international forum for discussion and dissemination of knowledge of scientific, technical, environmental, economic and safety aspects of the production, marketing, use and application of fertilisers.

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