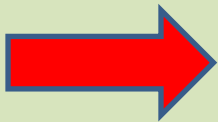


## IMPACT VAN LAGERE N- GEBRUIKSNORMEN OP HET KLIMAAT

### KUNSTMEST VEROORZAAKT EEN FORSE CO<sub>2</sub> –VOETAFDRIUK

in de aardappelteelt bijvoorbeeld :

ca 20-30 % bij productie van kunstmest + ca 20- 30 % bij de toediening



Carbon, one of the potato footprints

CFT-Potato output of 4 NL systems

Factor	Table		Organic		Seed		Starch	
	kg	%	kg	%	kg	%	kg	%
Seed	3.9	5.1	6.5	7.9	14.8	12.8	3.4	4.9
Fertilizer	24.6	32.0	0	0	39.6	34.2	12.2	17.2
Emission	25.1	32.6	26.3	31.7	18.2	15.7	31.8	24.9
Biocides	5.1	6.7	0	0	16.2	14.0	9.8	13.9
Operations	7.1	9.2	25.8	31.3	10.8	9.4	11.1	15.6
Irrigation	1.1	1.4	2.0	2.4	0	0	0.4	0.6
Storage	10.1	13.1	22.3	26.9	16.2	14.0	2.2	3.0
Sprout inhibition	0.2	0.3	0	0	0	0	0	0
Total	77.1	100	82.4	100	115.8	100	70.8	100

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Bron: A. Haverkort, 12-10-2011 WPC

Voor KAS is de CO<sub>2</sub> voetafdruk per kg N bij YARA's beste fabriek:

3,6 kg CO<sub>2</sub> bij de productie 0,1 kg CO<sub>2</sub> bij transport 5,6kg bij toediening



Knowledge grows

## A FERTILIZER PRODUCTION

When operating with 'Best Available Technique' (BAT) ammonia and nitric acid plants, the total carbon footprint of AN is 3.6 kg CO<sub>2</sub>-eqv per kg N.

### Ammonia production

Binding nitrogen from the air requires energy. Natural gas is the most efficient energy source. Yara plants are among the best performers in terms of energy efficiency worldwide.

- European average energy consumption: 35.2 GJ per ton ammonia
- EU BAT energy consumption: 31.8 GJ per ton ammonia (= 2.2 kg CO<sub>2</sub> per kg N in AN)

### Nitric acid production

Nitric acid is used for making AN-based fertilizers. Its production releases N<sub>2</sub>O. Catalytic cleansing developed by Yara reduces N<sub>2</sub>O emissions below BAT level.

- N<sub>2</sub>O emission without cleansing: 7.5 kg N<sub>2</sub>O per ton nitric acid
- EU BAT emission with cleansing: 1.85 kg N<sub>2</sub>O per ton nitric acid (= 1.3 kg CO<sub>2</sub>-eqv per kg N in AN)

### Solidification

AN solutions made from ammonia and nitric acid are granulated or prilled to form high-quality solid fertilizer. Solidification needs energy.

- European average energy consumption: 0.5 GJ per ton of product (= 0.1 kg CO<sub>2</sub> per kg N in AN)

### MITIGATION POTENTIAL:

- Improve the energy efficiency of ammonia production and other production systems
- Install and further optimize catalytic cleansing of N<sub>2</sub>O

## B TRANSPORTATION

Ammonium nitrate is transported by ship, barge, road or rail.

- European average: 0.1 kg CO<sub>2</sub> per kg N

### MITIGATION POTENTIAL:

- Optimize logistics chain from production sites to farmers

## C FERTILIZER USE

Nitrogen, whether from organic or inorganic sources, is subject to natural microbial conversion in the soil. During this process N<sub>2</sub>O can be lost to the air. In addition, CO<sub>2</sub> is also released by liming and farming machinery.

- Average footprint for AN: 5.6 kg CO<sub>2</sub>-eqv per kg N

### MITIGATION POTENTIAL:

- Assure balanced nutrition
- Tailor N-application according to actual crop needs
- Use placement fertilization when appropriate
- Just-in-time application to ensure rapid uptake
- Use of precision farming tools (N-Sensor, N-Tester, online applications)
- Maintain good soil structure (draining, avoid packing)
- Select appropriate fertilizer (AN or CAN based rather than ammonium or urea)
- Efficient manure management

## IMPACT van lagere N- gebruiksnormen op het klimaat

	CO2/kg N	
	PRODUCTIE	TOEDIENING
<b>N uit luchtwasser vloeibaar (reststromen zijn 0)</b>	<b>0</b>	<b>0 in wortelzone</b>
<b>Urine en dunne fractie</b>	<b>0</b>	<b>0</b>
<b>Ureum vloeibaar</b>	<b>1,62</b>	<b>0</b>
<b>Zwavelzure ammoniak uit fabriek vloeibaar</b>	<b>2,14</b>	<b>, 0</b>
<b>Urean</b>	<b>2,74</b>	<b>0</b>
<b>KAS ( ca 50 % van het verbruik )</b>	<b>&gt; 3,6</b>	<b>5,6 oppervlakkig</b>
<b>Mineralenconcentraat zonder groene energie geproduceerd</b>	<b>14</b>	<b>0 in wortelzone</b>

# IMPACT van lagere N-gebruiksnormen op het klimaat

