

The effects of global warming and climate change are becoming ever more apparent. More frequent storms and flooding in northern and central Europe have been matched by higher summer temperatures, lack of water and increasing dust levels in countries in the south. This growth in climate volatility and extreme weather not only impacts human activity but also natural processes such as crop and livestock production.

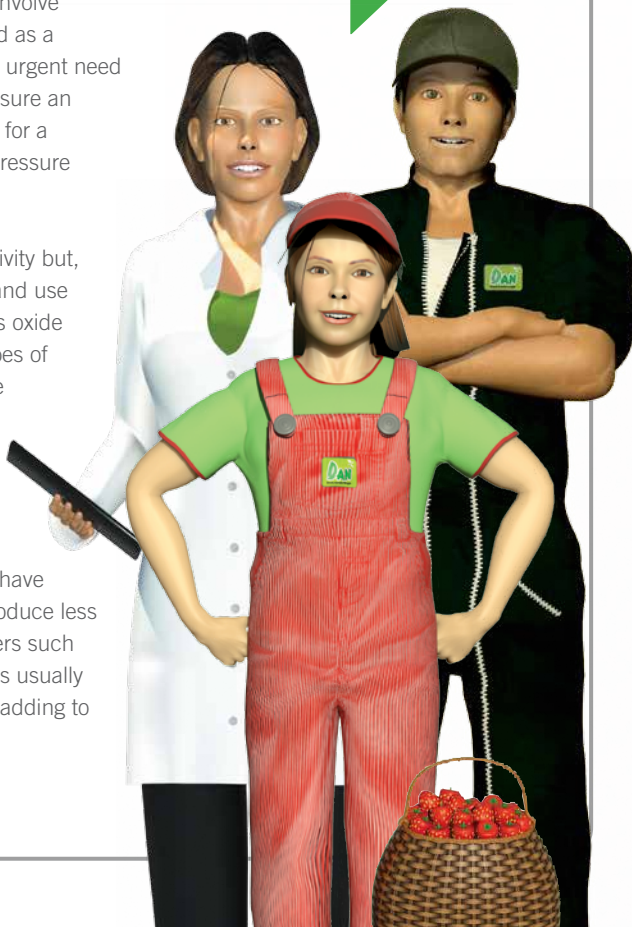
It is no longer possible to believe these phenomena are not connected to global warming and the increase in greenhouse gases (GHGs) such as carbon dioxide (CO<sub>2</sub>).

Although most forms of human activity involve GHG emissions, agriculture is often cited as a significant contributor. Furthermore, the urgent need to increase agricultural production to ensure an adequate supply of food and bio-energy for a growing global population puts further pressure on the sector.

Fertilizers greatly enhance crop productivity but, like many products, their manufacture and use creates GHGs, including CO<sub>2</sub> and nitrous oxide (N<sub>2</sub>O). Life-cycle analysis of different types of fertilizer, however, demonstrates that the carbon footprint of some are better than others.

For example, DAN directly available nitrate fertilizers, such as ammonium nitrate and calcium ammonium nitrate, have been shown to be more efficient and produce less GHGs than other nitrogen-based fertilizers such as urea. The lower N-efficiency of urea is usually compensated by a 15% higher dosage, adding to its carbon footprint.

“DAN fertilizers offer better crop yields with less environmental impact than other nitrogen fertilizers.”



[www.danfertilizers.com](http://www.danfertilizers.com)



This brochure is published under Fertilizers Europe's Infinite Nutrient Stewardship initiative within "Infinite fertilizers" to increase the efficient use of nutrients and reduce the carbon footprint of food production.

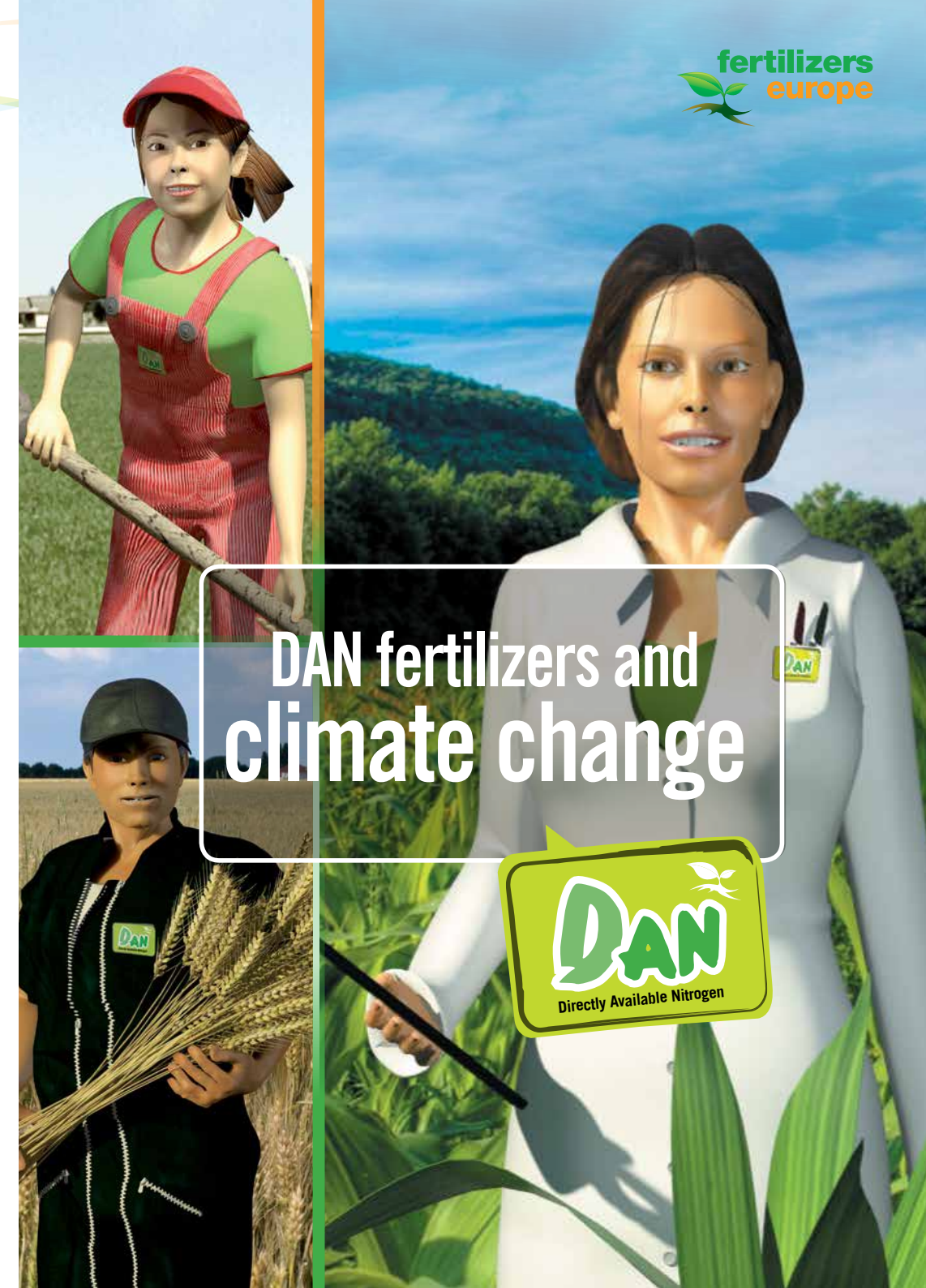


Fertilizers Europe represents the majority of fertilizer producers in Europe and is recognized as the dedicated industry source of information on mineral fertilizers. The association communicates with a wide variety of institutions, legislators, stakeholders and members of the public who seek information on fertilizer technology and topics relating to today's agricultural, environmental and economic challenges. The Fertilizers Europe website provides information on subjects of relevance to all those interested in fertilizers contribution to global food security.

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DAN fertilizers and  
climate change





“DAN fertilizers can help us with climate change,”

Dani.



I got caught up in a sudden, really violent rainstorm the other day and got totally soaked. I've noticed that our weather seems to be changing more recently and seen reports on TV of high winds and flooding as well as heat waves and drought in other parts of Europe. They say it's due to global warming and is likely to get worse as I get older.

My dad says he hates unpredictable changes in the weather as he wants his crops develop steadily throughout the growing season and not be damaged by storms, flooding or even too much heat.

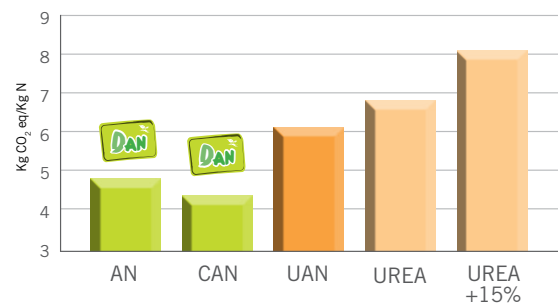
We had a science project on climate change and agriculture at my school the other day and afterwards I had an interesting discussion with him about greenhouse gases. He told me that the soil naturally releases greenhouse gases (GHGs) but that he is trying to limit any from his own activities. He said that by using DAN fertilizers, he can reduce his emissions. He added that other nitrogen fertilizers actually increase the GHGs coming from his fields!

I admire my dad for helping to protect the environment for me and reckon he should be rewarded for his efforts. If others follow his example, we will be still able to enjoy our summer holidays without being too hot, or too wet, for many years to come.

The need to increase food production, while preserving natural forests, grassland and wetlands, means we have to improve the productivity of our existing agricultural area. Although fertilizers enhance crop productivity, their production, transport and use emit GHGs, adding to agriculture's overall carbon footprint. Life-cycle assessment studies on different fertilizers reveal three core areas for reducing this footprint:

- 1. PRESERVING NATURAL AREAS** - Fertilizers stimulate the uptake of CO<sub>2</sub> by crops. By increasing crop yields, they reduce the need to convert new land for agriculture, avoiding roughly 12% of annual global GHG emissions.
- 2. IMPROVING FERTILIZER PRODUCTION** - DAN fertilizers are the most commonly used nitrogen fertilizers in Europe. The European fertilizer industry's development of new catalysts and emissions reduction technology has reduced N<sub>2</sub>O emissions from their production by on average 50%.
- 3. OPTIMIZING NITROGEN FERTILIZER USE** - GHG emissions from the soil, especially of N<sub>2</sub>O, result from natural biological processes. They are influenced by soil conditions and the climate, as well as by agricultural practices. The use of precision farming tools and application of the right type of fertilizer, at the right rate, at the right time enhances crop nitrogen uptake and reduces GHG emissions.

COMPARATIVE N<sub>2</sub>O EMISSIONS FROM THE APPLICATION OF DIFFERENT NITROGEN FERTILIZERS



DAN nitrate-based fertilizers provide the optimal form of nitrogen for ready assimilation by crops, minimizing nitrogen losses.



“The most efficient way for me to reduce my GHGs was to change my fertilizer,”

Danny.

Like farmers everywhere, I'm concerned about climate change. My yields depend on appropriate temperatures and rainfall. Erratic weather conditions can harm my crops or, in extreme cases, even destroy them, greatly affecting my revenue.

Until now, I just accepted that our weather was changeable. But I understand that global warming

and climate change is likely to significantly aggravate the situation. Coping with more extreme weather will increasingly become part of my daily routine.

Agriculture is often singled out as being a major significant contributor to the GHGs that cause climate change, so I'm eager to do what I can to reduce them on my farm. My agronomist told me that several things can be done, including growing cover crops, recycling my organic waste and improving my fertilization practices.

The fertilizer I use to feed my crops can also help me fight climate change. In this respect, I know that DAN nitrate-based fertilizers significantly reduce potential losses of nitrogen to the atmosphere which means that the maximum amount is available to meet the crop's need. I also know that DAN fertilizer emit fewer GHGs over their life cycle, from production right the way through to their use on my fields.

After measuring the results of adopting DAN fertilizers on my farm, the agronomist told me that I have managed to reduce my overall carbon footprint emissions considerably.

“DAN fertilizers offer the lowest carbon footprint per unit of crop production,”

Daniella.

