A conversation about

your share of global food and land

Imprint

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DING DONG

Hello!

We would like to introduce you to your personal source of daily food.

My name is Carla Giardini, and this is my colleague Ben Wissler. We work at Campo Mio 2000, an EU-wide agri-food innovation project. We would like you to join us for a little experiment. Here's the story:

Seven billion people are now sharing this planet. While that number continues to grow, the size of the Earth remains the same. This raises many questions for our future, including whether or not there will be enough food. Dividing the total global surface area of arable land (around 1.4 billion hectares[1]) by the number of people currently on the planet[2] gives us this figure: **2000 square metres per person**. It is on this piece of land that everything Mother Earth supplies you with must grow: wheat, rice, potatoes, fruit, vegetables, oil, sugar… not to mention all the animal feed that does not stem from meadows and pastures. On top of that we also need to grow cotton for our clothes, tobacco for smokers, biogas or diesel, and other so-called renewables on our field.

We've laid out an example of a 2000m² field in the park outside. To start off with, we've planted it with the global average; next season we can adapt it to fit your wishes and personal consumption patterns.

The amount of arable land available per person worldwide has dramatically declined since 1961, and will be smaller still by 2050

Arable land per person: Past, present & future

Source: FAOSTAT[1]

Size Ratios

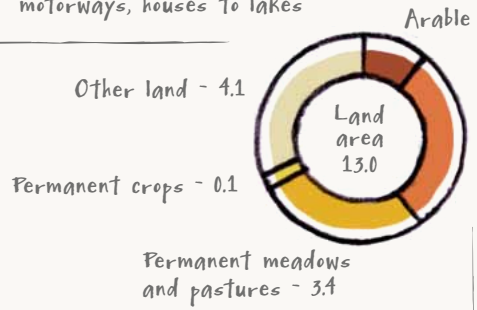
So just how much is 2000m²?

It's a fifth of a hectare: not that small a plot. A garden this size would keep you really busy. A 2000m² field could host about 200 cars, 33 flats (of 60m²) or one supermarket.

Back in the days before tractors, 2000m² was only a little less than what one person could till in one morning with a horse-plough. A pond that size could also host quite a bit of activity - it's around twice the size of a standard 50 metre pool with eight swimming lanes.

Coming back to our topic of arable land, it represents about 11 percent of the total land surface on the planet. Another 26 percent is grassland (meadows and pastures). These would provide another 5000m² per person. Forests represent 31 percent. All other areas, mainly deserts, as well as urban areas and roads, represent a total of 31 percent.[3]

Only 11% of the world's total land area is arable, 31% is forest and 26% grassland. "Other land" comprises of everything from desert to motorways, houses to lakes



Global land use by category (billion hectares in 2011)

Source: FAOSTAT[3]

The Big Bustle

Who lives on your 2000m²?

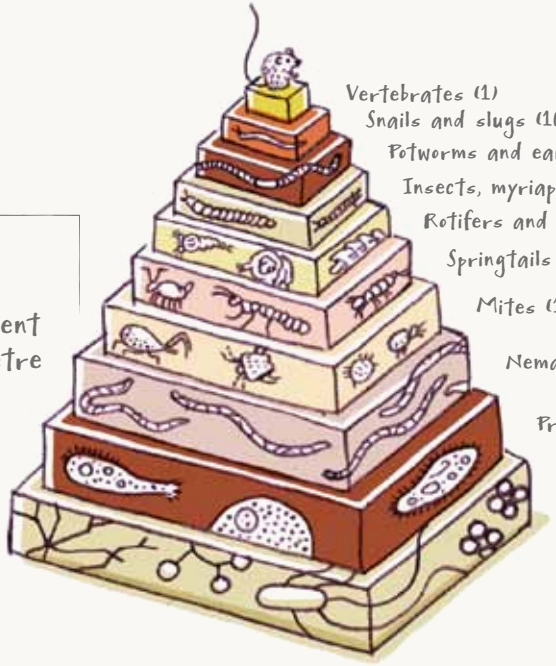
If well-maintained, your 2000m² could be bursting with life: Trillions of microorganisms would live together with billions of fungi, algae and protozoa, as well as millions of thread and bristle worms, springtails and mites.[4]

It could become home to nearly a million centipedes and beetles, as well as tens of thousands of ants, woodlice, spiders and of course – the kings of soil – earthworms. Moles, mice and birds would feed on them; while bees, bumblebees, butterflies and other insects would be interested in the flowering plants. In total, your 2000m² could host no less than 20 quadrillion organisms, weighing about two tonnes in total.

We don't want to lose any of them: Only where it bustles and hums is the earth healthy and fertile.

The bigger the fewer,
the smaller the greater:
Average number of different organisms per square metre of fertile soil

Source: James B. Nardi[5]



More Than You Can Eat

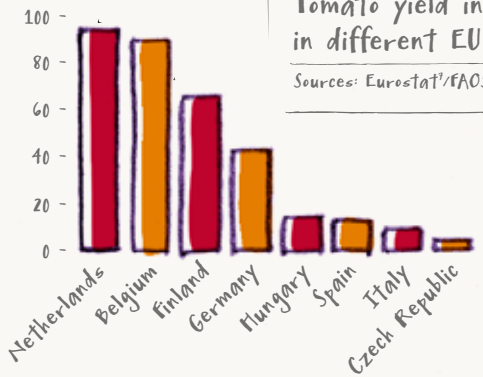
How much can be grown on 2000m²?

It's unbelievable just how much can be grown on 2000m²!
Tonnes of avocados, tomatoes, cabbages, carrots, wheat and potatoes can be harvested.[6] But who is supposed to eat all of that? The answer to this lies in a mixture of things. In addition, crop yields vary considerably, regionally and from year to year.

When it comes to vegetables, there is a difference between whether they are grown on a field or in a greenhouse. For example, Belgium and Holland hold the record for the most tomatoes per square metre, with almost everything grown in greenhouses all year round, and a correspondingly high use of energy and fertilisers. In other regions, harvest only takes place during the appropriate season, or more is grown in fields.

Maximum yield per unit area is frequently associated with a high use of artificial fertilisers, and often pesticides too, so it may not be the most ecological way of growing our food.

There are huge differences in yield per hectare when it comes to vegetables. Are they grown in greenhouses all year round or only when in season?



Tomato yield in tonnes per 2000m² in different EU countries

Sources: Eurostat[7]/FAOSTAT[8]


4000 Kg
CAULIFLOWER
Poland
8200Kg
CARROTS
Finland
400Kg
OLIVES
Slovenia
1800 Kg
MAIZE
Italy
1100 KG
WHEAT
Sweden
DON'T GET ME WRONG - 2000 M² YIELD ONE OF THESE PILES - NOT ALL OF THEM!
2500Kg
GREEN
BEANS
France
8500Kg
POTATOES
Germany
556
Kg
SOY
BEANS
Austria
2200 Kg
AVOCADOS
Cyprus
7800 Kg
ONIONS
U.K.
15000 Kg
TOMATOES
Spain
EGG PLANTS
Greece

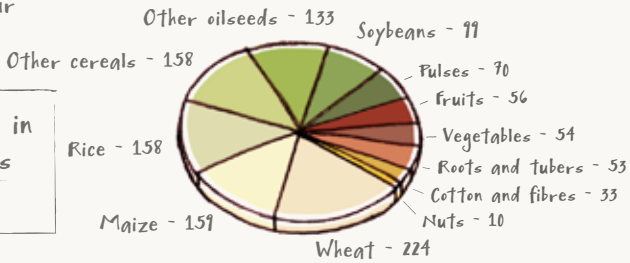
The Global Field

If one 2000m² field were to represent the global surface of arable land, what would be grown on it?

So, this is what your 2000m² would look like if it were to represent the global situation. More than half of the field would be cultivated for just four crops: wheat, maize, rice and soybeans.[9] Other cereals, tubers and oil crops would also be dominated by very few types and varieties of plants.

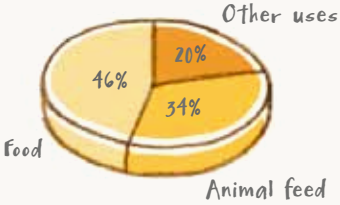
Of course, smaller gardens are full of hundreds of varieties, but the area they cover is only a small fraction of all arable land. With the exception of rice, the larger part of vast monocultures is dedicated to non-food uses, such as animal feed or fuel.

Monocultures: Almost half of the entire global area of arable land is planted with only four crops (wheat, rice, maize and soybeans)



Global area harvested in 2009 in million hectares

Source: FAOSTAT[7]



Less than half of the global cereal harvest is used for human consumption - industrial and energy uses are growing rapidly

Utilisation of the world cereal production (2.3 billion tonnes) in 2011

Source: FAO (2013)[10]

1) wheat 2) maize 3) rice 4) other cereals and grains
5) other oilseed 6) soybean 7) cotton 8) nuts 9) fruits
10) pulses 11) fibres 12) vegetables 13) tubers

Kitchen Inventory

How much do I consume per year?

Kitchens, canteens, restaurants and supermarkets – these are all places where we manage our 2000m² field: Every meal we eat and every food purchase we make can be seen as an indirect order to our agricultural producers. However, what each of us really consumes varies enormously.

Our eating habits differ according to age, income, culture, calorific requirement, preferences and many additional factors. However, nearly a tonne of food a year is available for each European.

Expressed in energy, this works out at around 3,500 kilocalories a day. This amount might see the kitchen slightly cramped, and you certainly don't want to eat that much every day! So isn't it a consolation that we throw away nearly half of our food on its journey from farm to plate?

All you can eat: Almost one tonne of food per year or nearly 3,500 kilocalories a day are available for every belly in the European Union

Food supply in the EU per person in 2009

Source: FAOSTAT[11]

Loss & Waste

What's lost along the food chain?

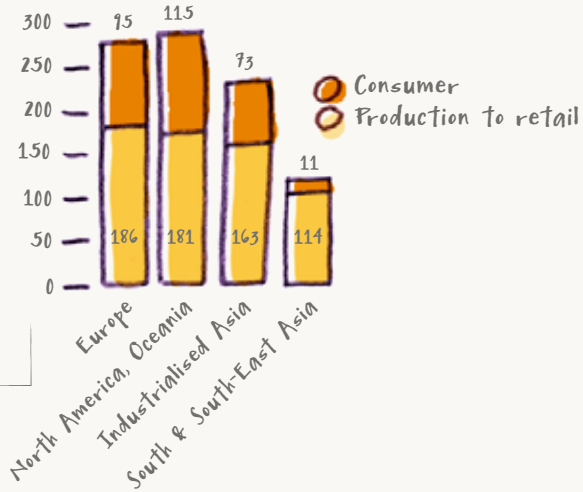
If we were to consume 3,500 kilocalories per day throughout our life, we might simply burst one day. Adults with a light level of physical activity require around 2,000 kilocalories per day. To put this amount on a plate, a global average of more than 4,600 kilocalories[12] must be harvested on the field – more than twice the amount!

Food ends up in the bin so that everything in the supermarket looks fresh and perfect, and is available at any time; but also because we buy more than we eat. Not all losses can be avoided, e.g. vegetable peel, but most of them. In Europe and other industrialised regions, most food waste occurs in processing, retail, restaurants, catering and private households. In tropical and less-industrialised regions of the world, the share of food that doesn't make it from the field to processing is the biggest: mouldy, spoiled, eaten by rats and insects, or simply not harvested. Such post-harvest losses also occur in the EU. Since carrots, potatoes and other vegetables often don't fit the norms of retail, tonnes of them are destroyed or left in the field.

Per capita food loss and waste in kilograms in different areas of the world at different stages in the food system

The more we have, the more we spoil!

Source: FAO (2011)[13]



Pig Meal?

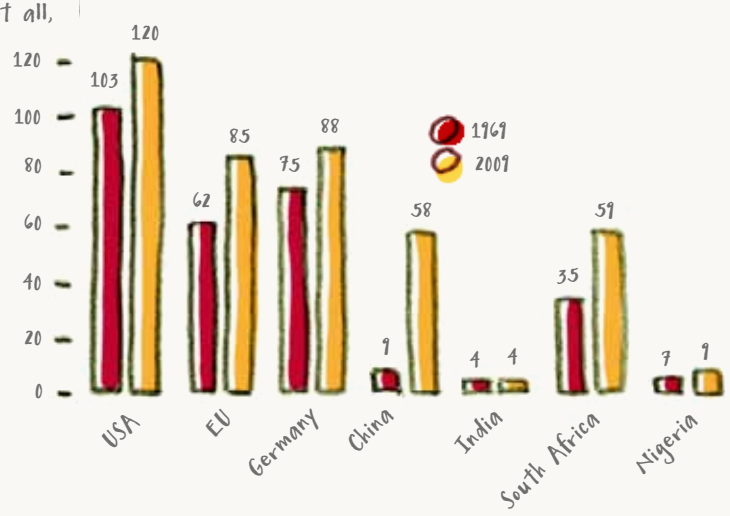
Two pigs would eat the entire contents of your field!

We don't know the names of these two pigs. They are just two of the 260 million pigs in Europe and 1.3 billion worldwide.[14] The often referred to average European consumes about 40 kilograms of pork a year.[15] The two guys here therefore only meet the needs of five Europeans, if slaughtered at a weight of around 115 kilograms.

To grow the wheat, soy, maize and other plants consumed by a pig until then, about nine square metres[16] per kilogram of meat is required. This means these two will have practically eaten an entire field. In addition, during their short lifetime they will be fed with antibiotics five times.[17]

By the way: European animal welfare provisions would permit 2000 pigs to be kept on our field: one square metre per adult animal.[18]

Enormous differences: On average, meat consumption has increased over the past 40 years in many, but not all, areas of the world



Meat supply in kilograms per person around the world in 1969 and 2009

Source: FAOSTAT[15]


GO VEGAN!
CONCRETE FEED

Land Grabbing

Why does rich and fertile Europe import one third of its arable land?

When looking at the EU alone, there are just over 2000m² for every citizen. In 2008, the total amount of arable land within the EU was 109 million[19] hectares. The distribution differs from country to country. However, the EU does not manage to get by with this area. Although our fields have better air and water quality, and higher soil fertility than most other fields in the world, not to mention access to extensive technical and financial resources, the EU still relies on huge areas of additional land. Compared in hectares, exports (14.1 million hectares) and imports (48.99 million ha) of our agricultural products in 2008 resulted in a deficit of 34.9 million hectares.[20] This is equivalent to one third of the EU's arable land and 700m² for every EU citizen.

Of these 700m², three-quarters are used for growing animal feed, particularly soybeans. They come primarily from Latin and North America.[21] Additional imports from arable land are also supposed to cover an increasing proportion of so-called renewable resources for our fuel.

Since the amount of arable land will not be significantly expanded, the question remains: Who is missing out on those square metres we are using in excess?

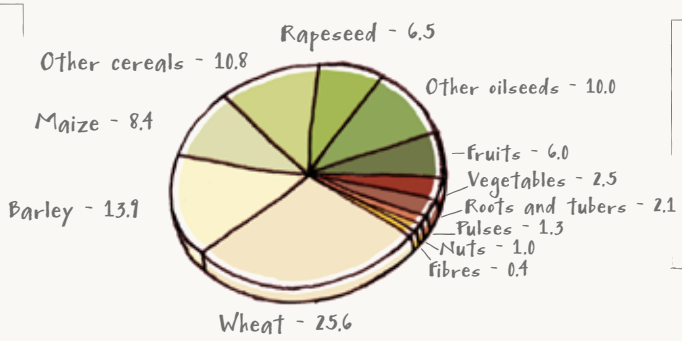
Can the EU not feed itself? Comparing the hectares required to produce EU exports (14.1 million ha) and imports (48.99 million ha) of agricultural goods reveals a big deficit

	Land imports	Land exports	Net land trade
Soybeans	1.71	11.24	-17.53
Coffee, cocoa, tea	0.44	6.72	-6.28
Other oilseeds	3.47	8.59	-5.12
Palm oil	0.05	2.61	-2.56
Fruits	0.75	3.31	-2.36
Vegetables	0.22	0.56	-0.35
Sugar crops	0.15	0.44	-0.29
Tobacco	0.31	0.54	-0.23
Wheat	3.28	2.57	0.71
Coarse grains	2.12	1.40	1.52
TOTAL	14.10	48.99	-34.90

Net land trade of the EU in 2007/2008 in million hectares

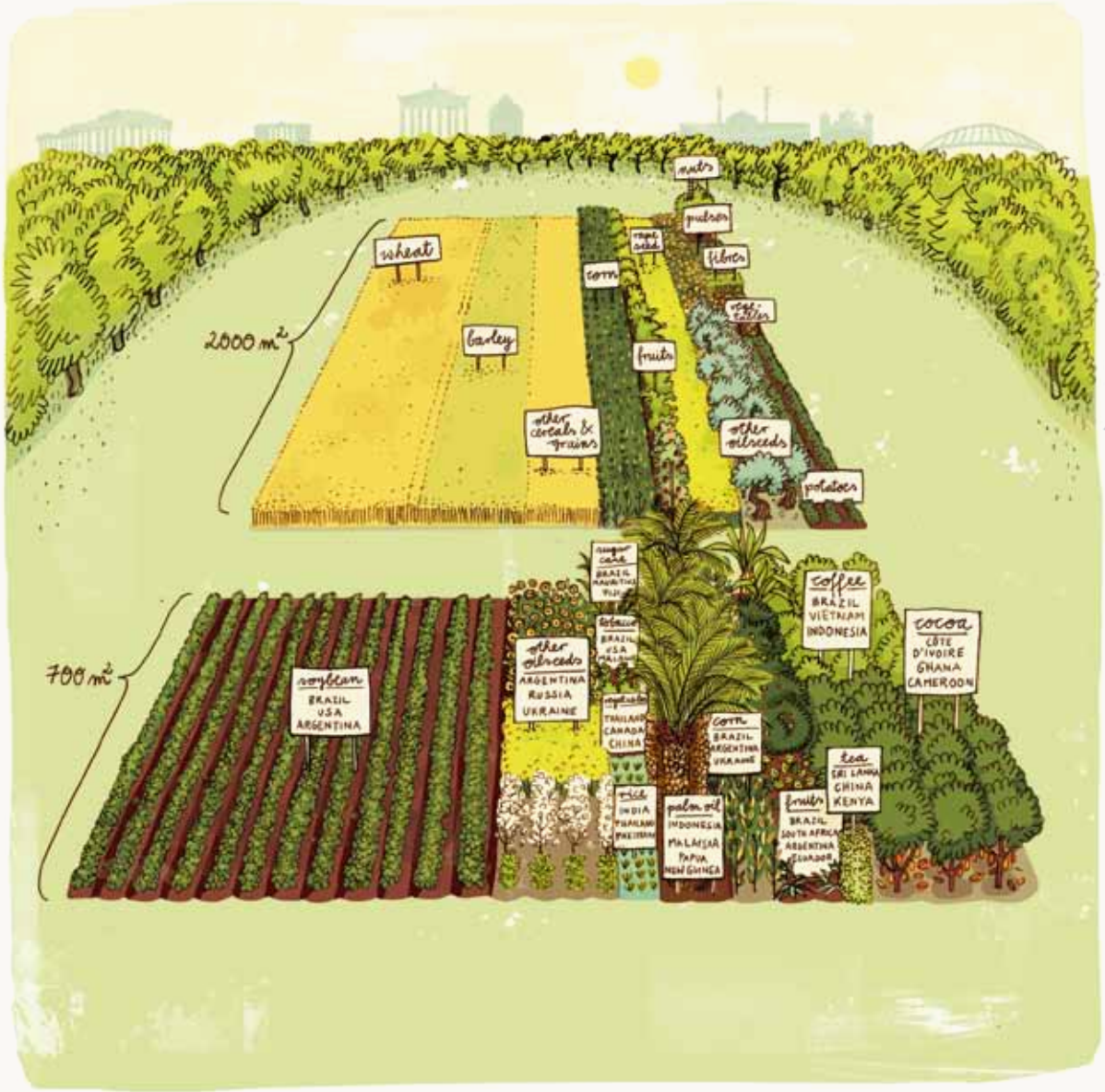
Source: von Witzke/Noleppa (2010)[20]

More than 80 percent of Europe's arable land is planted with cereals and oilseeds. Only a small fraction of that harvest is used for direct human consumption



EU area harvested in million hectares in 2009

Source: FAOSTAT[7]


2000 m²
wheat
barley
other cereals & grains
corn
fruits
nuts
pulses
sugar crops
fibres
oil crops
other oilseeds
potatoes
700 m²
soybean
BRAZIL
USA
ARGENTINA
other oilseeds
ARGENTINA
RUSSIA
UKRAINE
sugar cane
BRAZIL
tobacco
BRAZIL
USA
rapeseed
THAILAND
CANADA
CHINA
rice
INDIA
corn
BRAZIL
ARGENTINA
UKRAINE
palm oil
INDONESIA
MALAYSIA
PAPUA NEW GUINEA
coffee
BRAZIL
VIETNAM
INDONESIA
cocoa
CÔTE D'IVOIRE
GHANA
CAMEROON
tea
SRI LANKA
CHINA
KENYA
fruits
BRAZIL
SOUTH AFRICA
ARGENTINA
ECUADOR

Burning Out?

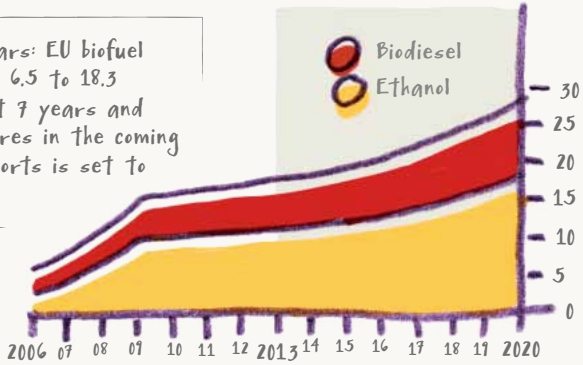
How far could you drive with the biodiesel produced on your 2000m²?

Is it really a good or "climate friendly" idea to burn the biomass from your 2000m² as fuel in cars or as energy for power generation? If the average EU rapeseed yield[22] for 2000m² (600kg) was converted into biodiesel, how far would this take us in an ordinary car? Well, with a diesel engine consuming the EU car fleet average of 7.1 litres[23], you could travel a distance of around 3,400 kilometres[24]. Just one return trip between Berlin and Bucharest, or Berlin and Naples, would use up your entire 2000m² for the whole year; although it would still be possible to yield some animal feed from the by-product of the oil production process.

The European Union has adopted legislation that requires 10 percent of energy in the transport sector to come from so-called "renewable sources" by 2020. To this end, an increasing part of arable land from within and outside the EU is being used to fuel our cars. Producing fuel from land uses a lot of energy and causes greenhouse gas emissions. In addition, the arable land used for biofuels is often gained by destroying valuable ecosystems, such as rainforests. The climate benefits of such fuel and energy generation may therefore be rather small, or even negative, compared to conventional fuels.[25] [26]

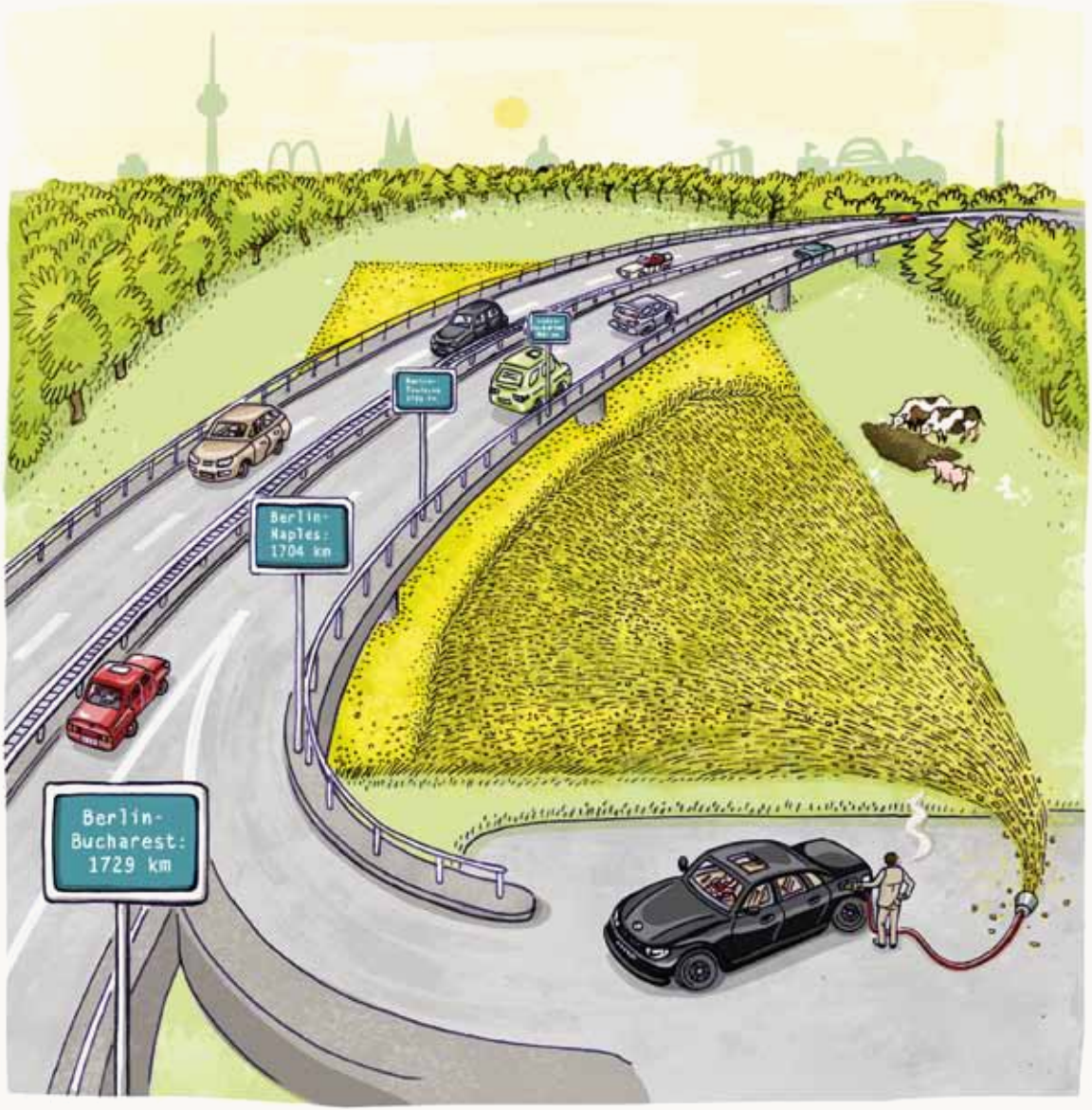
In Germany, one fifth[27] of all arable land is already used for fuel and energy production; fuel that would in fact not be needed if petrol consumption in Germany was reduced by just one litre per 100 kilometres!

Arable land for thirsty cars: EU biofuel production increased from 6.5 to 18.3 billion litres over the past 7 years and will climb to 28.5 billion litres in the coming 7 years. The share of imports is set to rise steeply



EU 27 biodiesel and ethanol production in billion litres

Source: OECD/FAO (2013)[28]

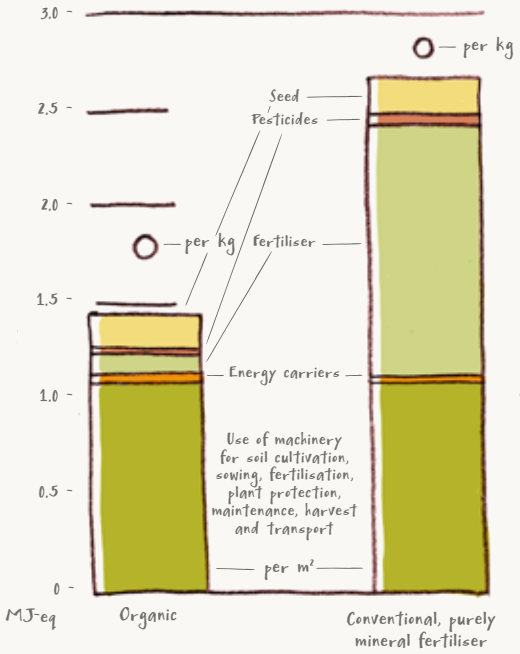

Berlin-
Naples:
1704 km
Berlin-
Bucharest:
1729 km

Input – Output

How much energy goes into your 2000m²?

About 40 percent of all greenhouse gases emitted are directly or indirectly connected to the way we eat, transport, throw away and produce our food, and the use of land for this purpose. In order to limit global warming to two degrees Celsius – considered to be the threshold to avert the most severe impacts of climate change – the European Union has committed to cutting its greenhouse gas emissions by at least 80 percent by 2050: A fabulous challenge! Still, it can be done. But we must reduce, and ultimately avoid, most of the energy input into our 2000m². The bulk of energy in food production is used for the production of mineral fertilisers, as well as some for pesticide production. This can be avoided by using organic and agro-ecological methods to enrich soil fertility and by controlling pests by non-chemical means. This will require better crop rotation. These methods are more knowledge-intensive, but greater and healthier biodiversity will be among the first rewards.[29 30]

Organic agriculture uses less energy per hectare and per kilogram of yield. However, reaching climate-safe levels of energy input still has a long way to go



Energy input in organic farming compared to conventional systems per square metre per year (columns) and per kilogram dry matter (dots) of 18 different crops

Source: Nemecek et al. (2005)[31]


pesticides
fertiliser

Join the 2000m² community!

We hope that looking at your food from a 2000m² perspective has provided you with some new insights and ideas and, most importantly, made you ask a lot of questions. If so, why not go online and post them on our website: **www.2000m2.eu**.

We would be happy to create an international community in search of answers to many important questions.

The 2000m² project was set up by the Agricultural and Rural Convention 2020 (ARC2020), a platform of more than 150 organisations and initiatives from across the European Union, and from different realms of life including farming, environmental protection, development and global justice, public health, cooking, gardening, animal welfare and rural development.

All of these aspects play an important role when evaluating how we can eat enough and healthily, with pleasure and with the certainty that we are not doing so at the expense of humans, including our children and generations to come, as well as animals and nature.

ARC2020 was founded to advise the European Union's institutions and legislators on the reform of the EU's Common Agricultural Policy (CAP). We welcome your participation in ARC2020, and are also looking for partners to take the 2000m² project further.

Do you have a special story to tell in this format? Would you like to use the concept and drawings we have, or suggest new pictures for your advocacy or food and farm related work, maybe in your own language, or in a different national or regional context? We would love to share our 2000m² with you. Feel free to call us or drop us a mail!

Let's work together!
Let's move this forward!

Carla & Ben
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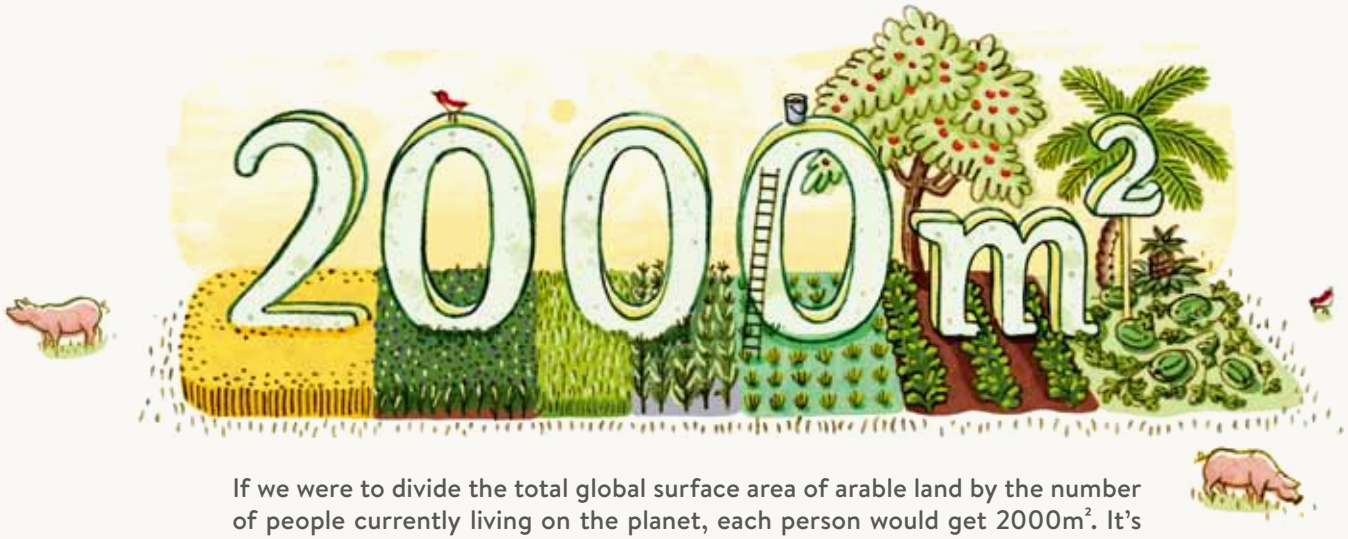

If we were to divide the total global surface area of arable land by the number of people currently living on the planet, each person would get 2000m². It's incredible just how much can be grown on a plot that size! Such a field could produce tonnes of vegetables, potatoes or grain… But who can eat all that?

What's even more incredible is that in Europe we are currently consuming and wasting more than can be produced on our individual share of land. Our field has gotten out of control. We urgently need to take action to stop this! Luckily we can all make changes. Some things we can do on our own once we understand the problems; others we can only achieve together.

For each 2000m² field, European taxpayers provide 50 € per year. The EU Common Agricultural Policy (CAP) determines how our field is managed and how this money is spent.

"Good Food – Good Farming" is the campaign slogan of the Agricultural and Rural Convention 2020 (ARC2020), a broad alliance of farmers and consumers, along with over a hundred environmental, animal welfare, public health and development organisations from across Europe. ARC2020 is calling for a fundamental shift in our European agricultural and rural development policy to foster sustainable production and consumption of food, and the recovery of rural areas.

Our proposals for innovation and change may well be heard in a not too distant future. First let's get started with our 2000m². There is still plenty to find out, to understand and to improve. Your participation is very welcome!

arc 2020
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