



Balancing Food Demand and Supply in Metropolitan Agri-food Systems (MAS)

Berlin vs London

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Structure of today's presentation

- Background, definitions, methods (**Ingo**)
- Berlin MAS (**Ingo**)
- London MAS (**Ulrich/Pete**)
- Discussion and next steps (**you**)



Background

Food demand area model

Food demand area model: Aim

Awareness-rising and **decision-support** for all stakeholders involved in urban food planning

A tool to assess:

- The spatial extent of the **regional food-shed**
- how to improve **regional self-sufficiency**
- Impacts of different **agricultural production systems** (conventional, organic)
- Impacts of different **diets** (healthy diet, vegetarian)
- Impacts of **food waste** and **food loss**
- Impacts of **change** in population, land use, and climate

Food area demand model

- **Output**

- Quantification and spatial analysis of regional **area demand for food production** (per person)

- **Input**

- Regional **food demand**: diets + population size
- Regional agricultural **production** conditions: yields, share of agricultural area
- Regional food waste and food loss

=> Analysis of necessary production area,
NOT area equivalents for energy, water, fertilisers, etc.

Food Demand

Food demand: Diets

- Differences between countries, but also regions (e.g. urban vs. rural)
- Changing diets over time (towards less meat consumption? Recommended healthy diets?)
- Social changes over time (migration, socio-economic and educational changes)
- Challenge to the relevance of seasonality, due to global transport (asparagus from Peru, green beans from Kenya)



Food demand: Diets

Per capita consumption in 1995 (kg per year) in 14 European countries, mean consumption and associated standard deviations

	Consumption category																			
	Beverages ^a				Fats ^b	Meat ^c				Dairy and eggs ^e					Cereals, potatoes, sugar, vegetables and fruits ^e					
	Beer	Wine	Coffee	Tea		Beef/veal	Pork	Other meat	Poultry	Eggs	Milk products	Condensed milk	Butter	Cheese	Cereals	Potatoes	Sugar	Vegetables	Fruits	Citrus fruits
Denmark	121.5	25.0	8.6	0.4	43.6	17.6	64.2	1.2	15.3	15.9	141.7	0.0	9.6	15.9	74.6	57.1	40.5	80.0 ^d	49.0 ^d	15.0 ^d
France	34.5	63.2	5.2	0.2	^e	28.1	35.9	5.3	22.6	16.0	101.6	0.7	8.3	23.3	76.2	58.5	33.3	124.0 ^d	58.0 ^d	24.0 ^d
Greece	36.0	14.9	2.2	0.0	^e	19.6	24.8	13.6	17.7	10.6	64.0	0.0	1.2	23.4	138.5	87.1	25.6	308.1	80.1	43.3
Italy	23.3	57.5	4.8	0.1	30.9	25.9	33.1	1.7	18.4	10.5	68.6	0.6	2.6	19.0	118.1	38.3	25.6	174.6	68.2	39.7
Austria	113.1	32.0	6.0	0.2	^e	19.6	56.9	1.2	15.3	13.8	98.9	2.4	5.0	14.2	67.8	60.5	39.7	79.8	77.9	17.2
Belgium/Luxembourg	109.1	21.0	2.0	0.1	32.5	21.2	46.6	2.1	23.1	14.5	83.1	2.1	5.9	14.2	72.7	94.1	42.4	99.5	68.7	32.3
Ireland	137.0	4.4	1.8	3.1	^e	14.5	37.9	7.2	30.9	9.2	176.3	0.3	3.6	5.3	80.7	173.8	43.0	90.7	33.8	15.2
Netherlands	86.5	11.9	9.0	1.0	24.9	19.8	46.3	1.3	20.1	15.3	129.6	7.1	4.0	14.1	58.4	87.6	32.7	93.8	64.1	45.4
Spain	58.3	36.5	3.8	0.1	30.2	12.7	55.3	6.6	25.5	15.3	133.7	1.0	0.6	7.1	72.1	86.3	31.7	153.9	64.6	46.3
Sweden	66.0	12.4	9.4	0.3	^e	18.2	36.1	0.7	7.9	12.0	150.7	1.2	5.5	15.6	65.6	57.7	40.3	98.9	41.6	1.2
Finland	88.3	5.6	7.8	0.2	^e	19.1	32.2	0.5	8.8	11.8	199.7	0.0	5.4	13.5	69.2	56.9	33.3	76.9	30.5	15.5
Germany	131.1	23.4	7.1	0.2	21.2	16.6	55.0	1.1	13.4	13.8	91.1	5.4	7.2	18.4	75.1	72.9	32.0	86.2	64.7	29.0
Great Britain	102.0	11.4	2.2	2.3	30.0	17.5	23.1	6.0	25.1	10.1	131.2	2.5	3.3	7.8	81.6	101.3	36.8	99.4	39.5	17.3
Portugal	67.4	58.4	3.3	0.0	^e	17.6	34.7	3.6	23.0	8.6	100.5	0.4	1.5	7.2	82.4	138.7	29.2	123.7	77.9	25.5

DE 55.0 kg

UK 23.1 kg

Pork

DE 13.4 kg

UK 25.1 kg

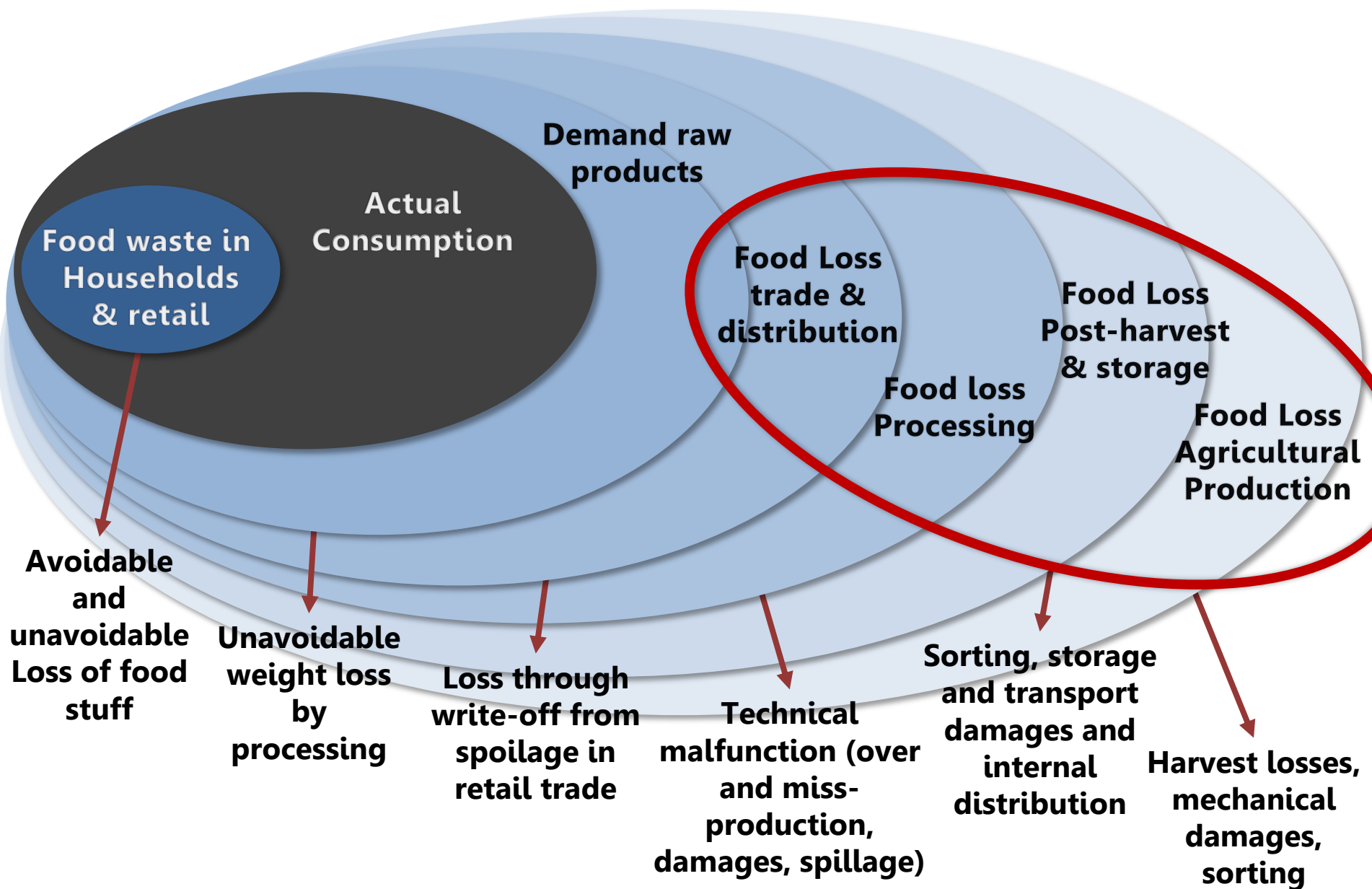
Poultry

DE 32.0 kg

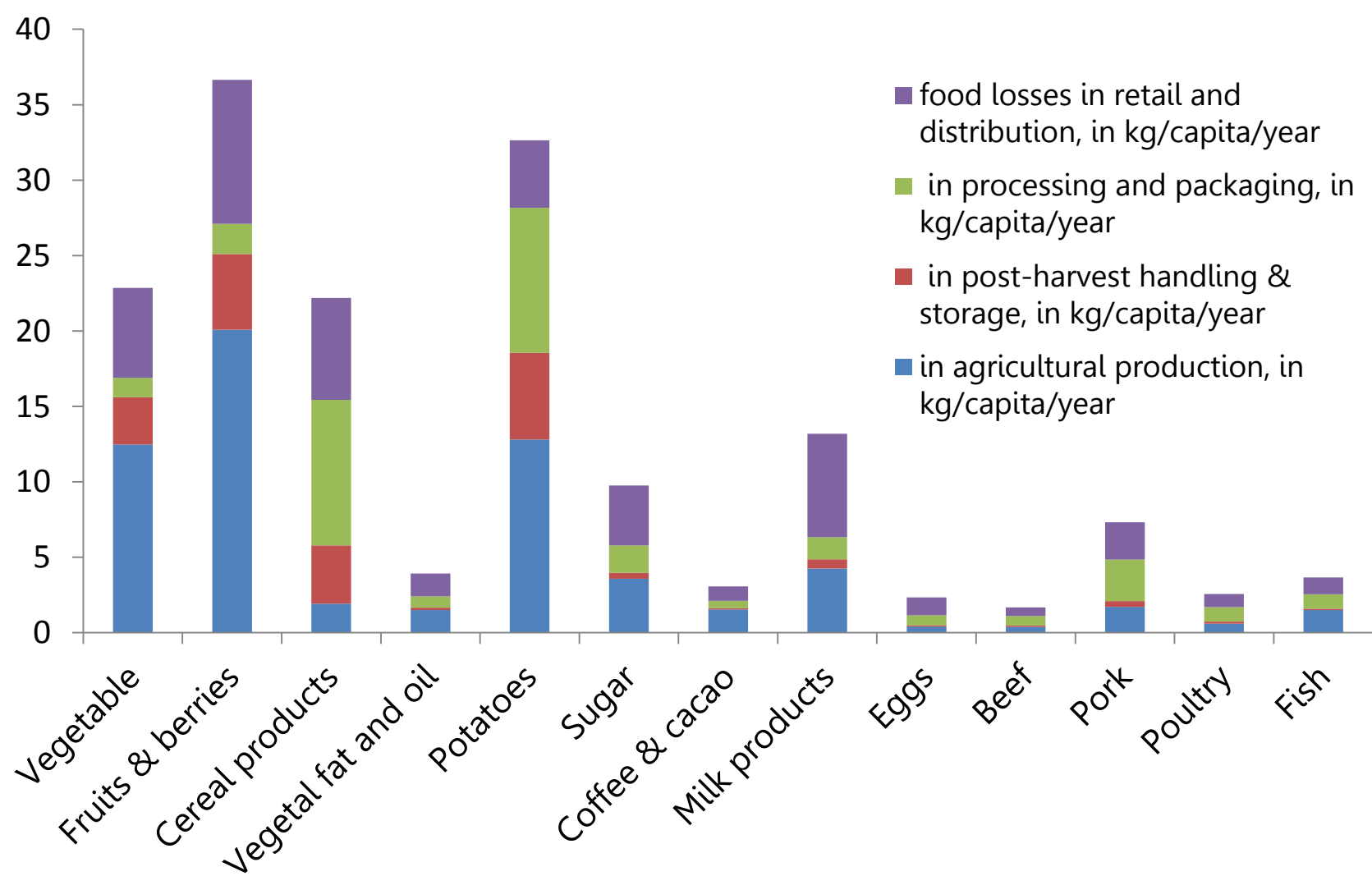
UK 36.8 kg

Sugar

Food demand: Food loss and waste



Food demand: Food loss and waste



(Sources: based on EC 2010, FAO 2011, Buzby et al. 2012)

Food Supply

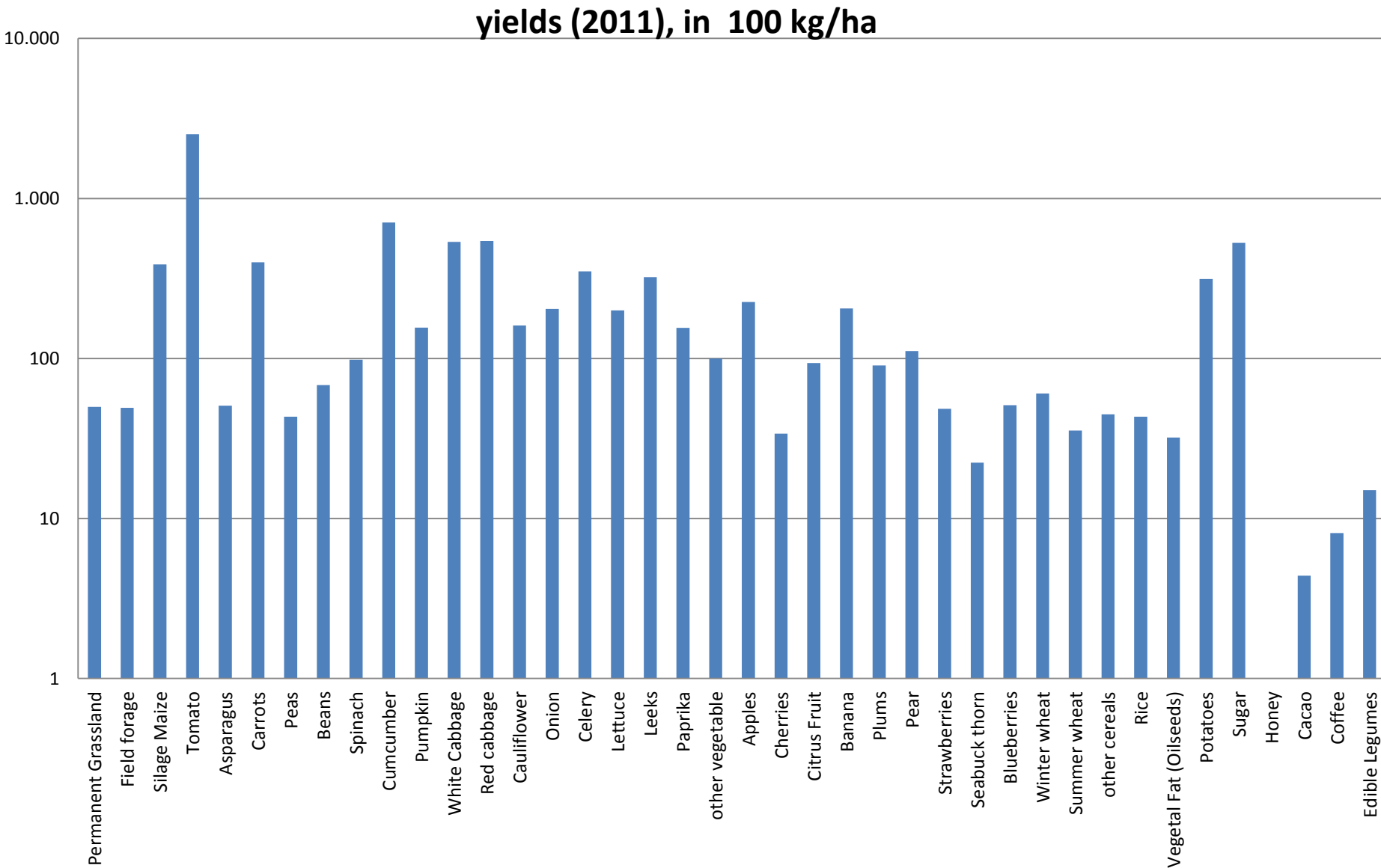
Food supply: Cultivation traditions



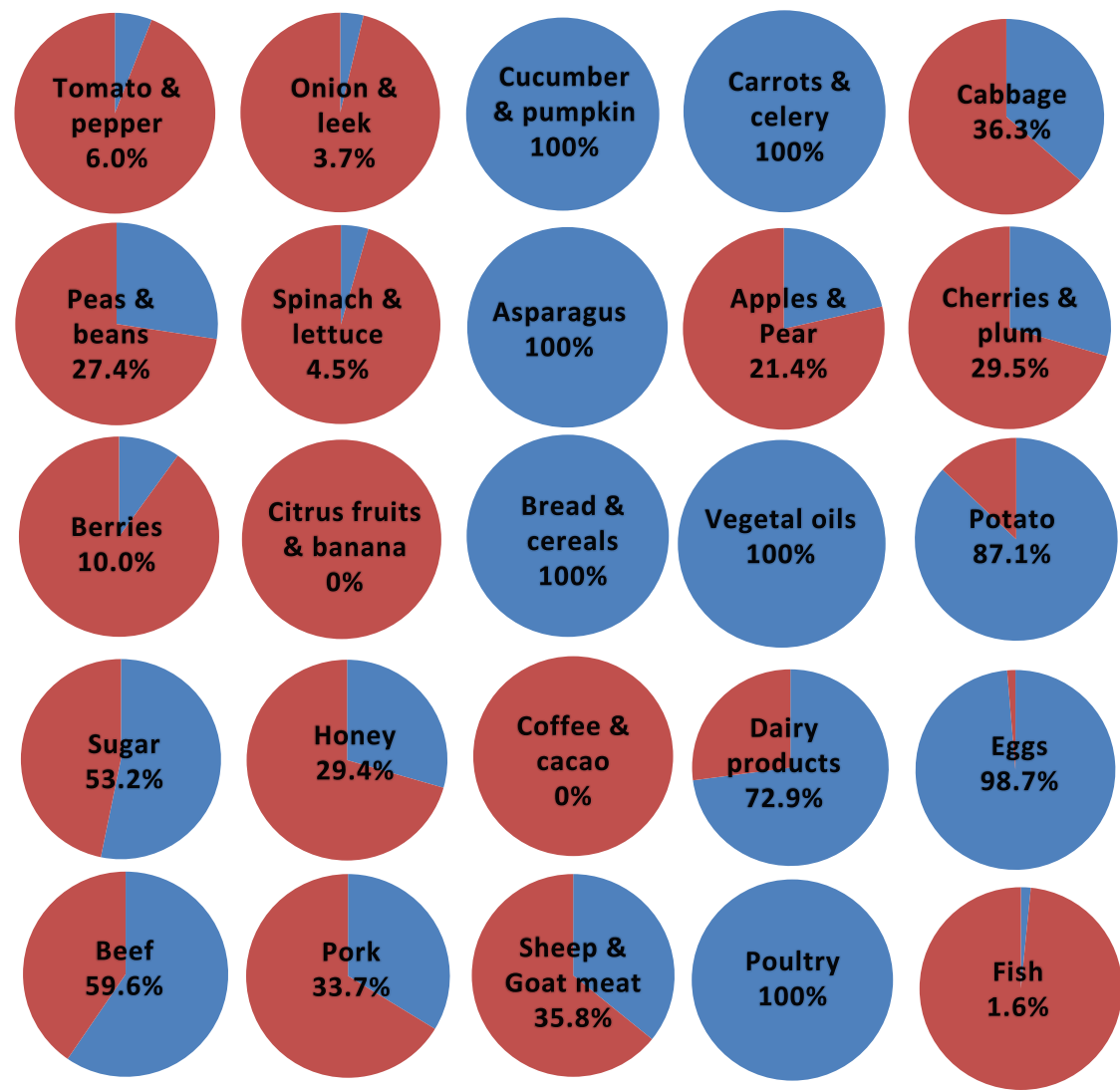
Food supply: Agricultural System / Intensity



Food supply: Regional yields

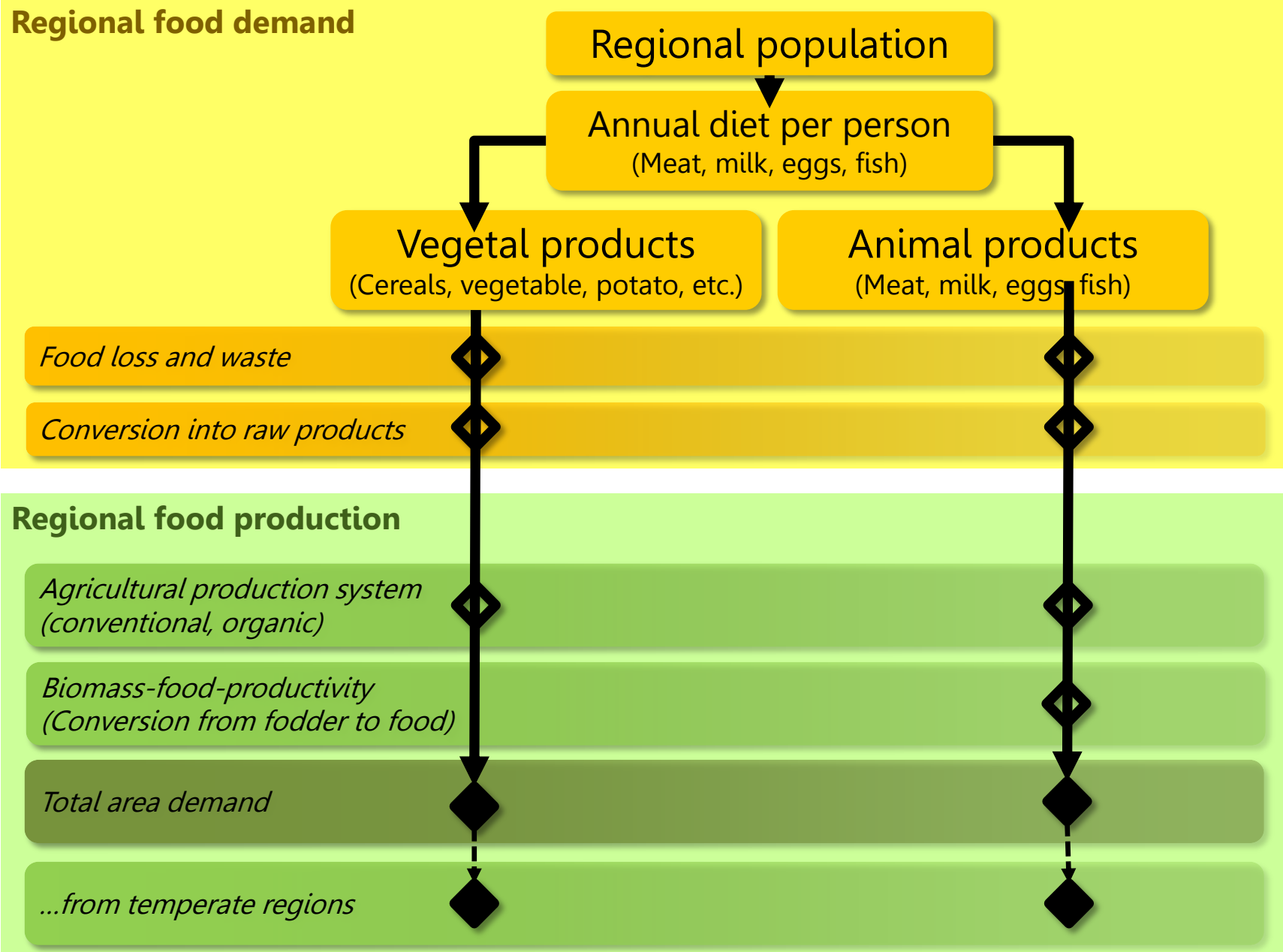


Food Production: Theoretical Regional Coverage B-B



Source: own calculation, based on: MIL 2012, BMELV 2011, Verzehrstudie II

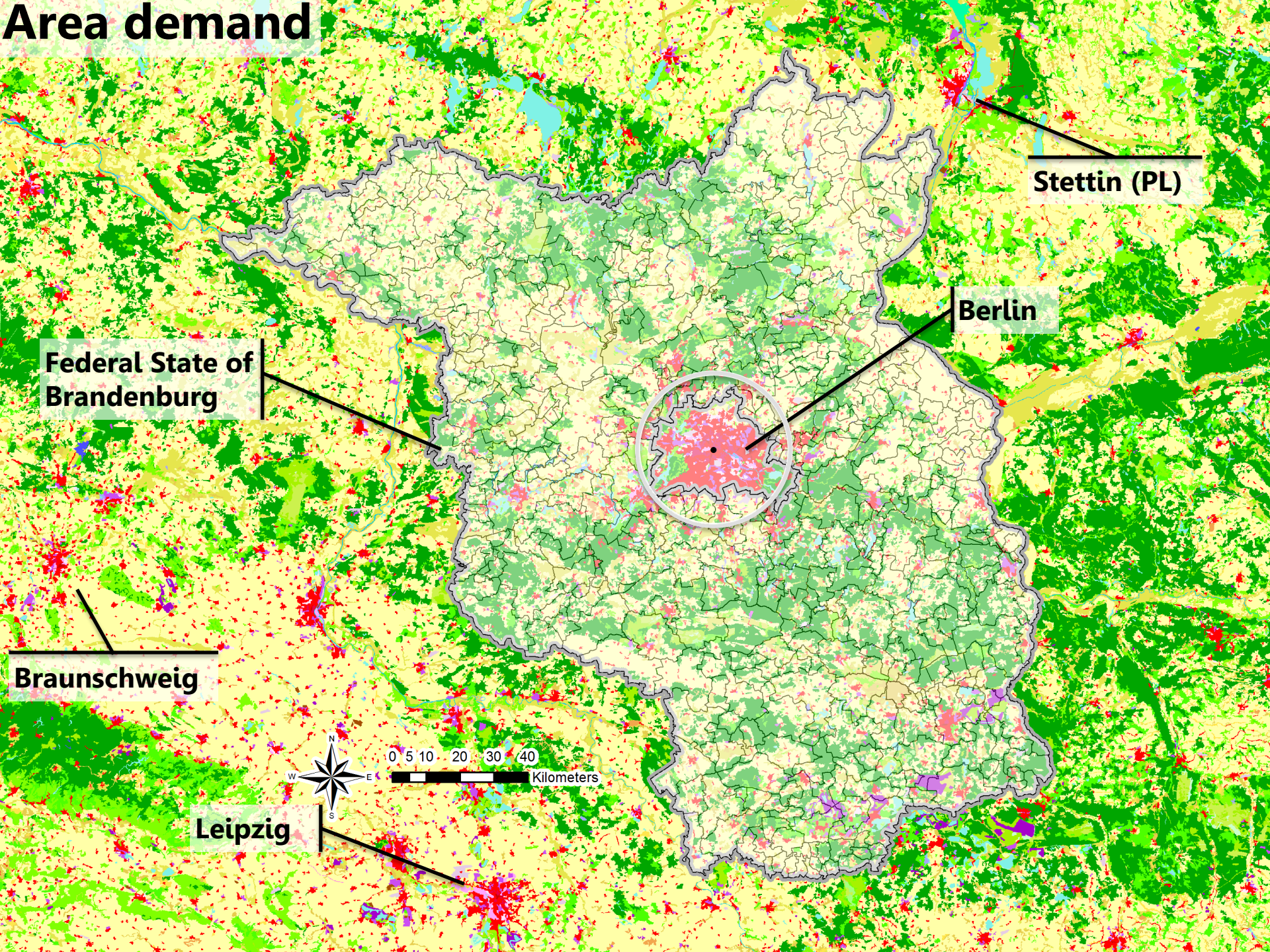
Food demand area model



Berlin

Metropolitan Agri-Food System

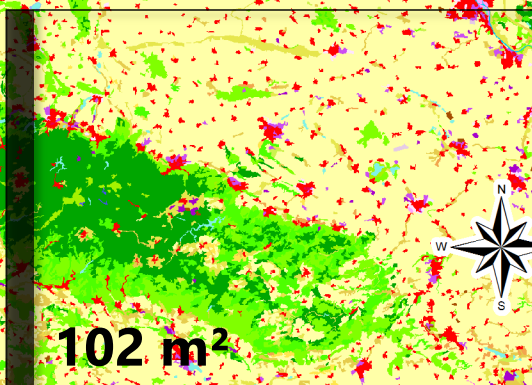
Area demand



Area demand: Conventional production

Fruits, vegetable, nuts & oilseeds

35,879 ha



0 5 10 20 30 40
Kilometers

Area demand per person

Area demand: Conventional production

Fruits, vegetable, nuts & oilseeds

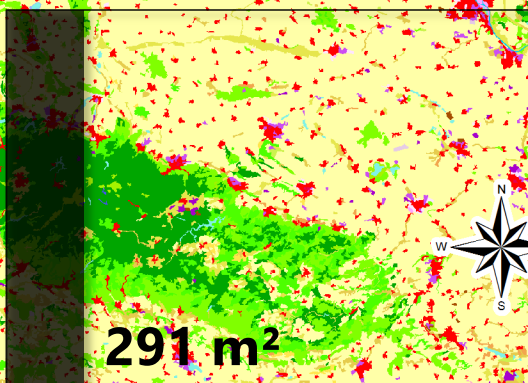
Tropical fruits, coffee & tea

Total

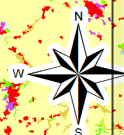
35,879 ha

66,341 ha

102,220 ha



Area demand per person



0 5 10 20 30 40
Kilometers

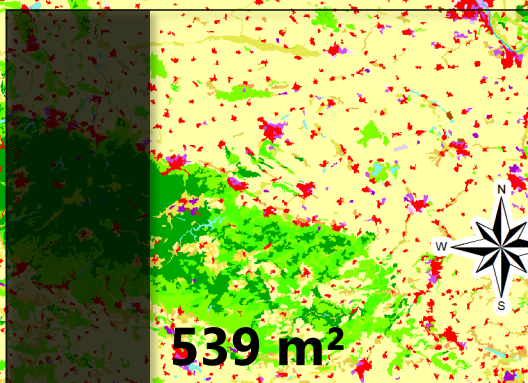
Area demand: Conventional production

Fruits, vegetable, nuts & oilseeds
Tropical fruits, coffee & tea
Cereals, potato, sugar

Total

35,879 ha
66,341 ha
86,401 ha

188,622 ha



Area demand per person

0 5 10 20 30 40
Kilometers

Area demand: Conventional production

Fruits, vegetable, nuts & oilseeds
Tropical fruits, coffee & tea
Cereals, potato, sugar
Dairy products

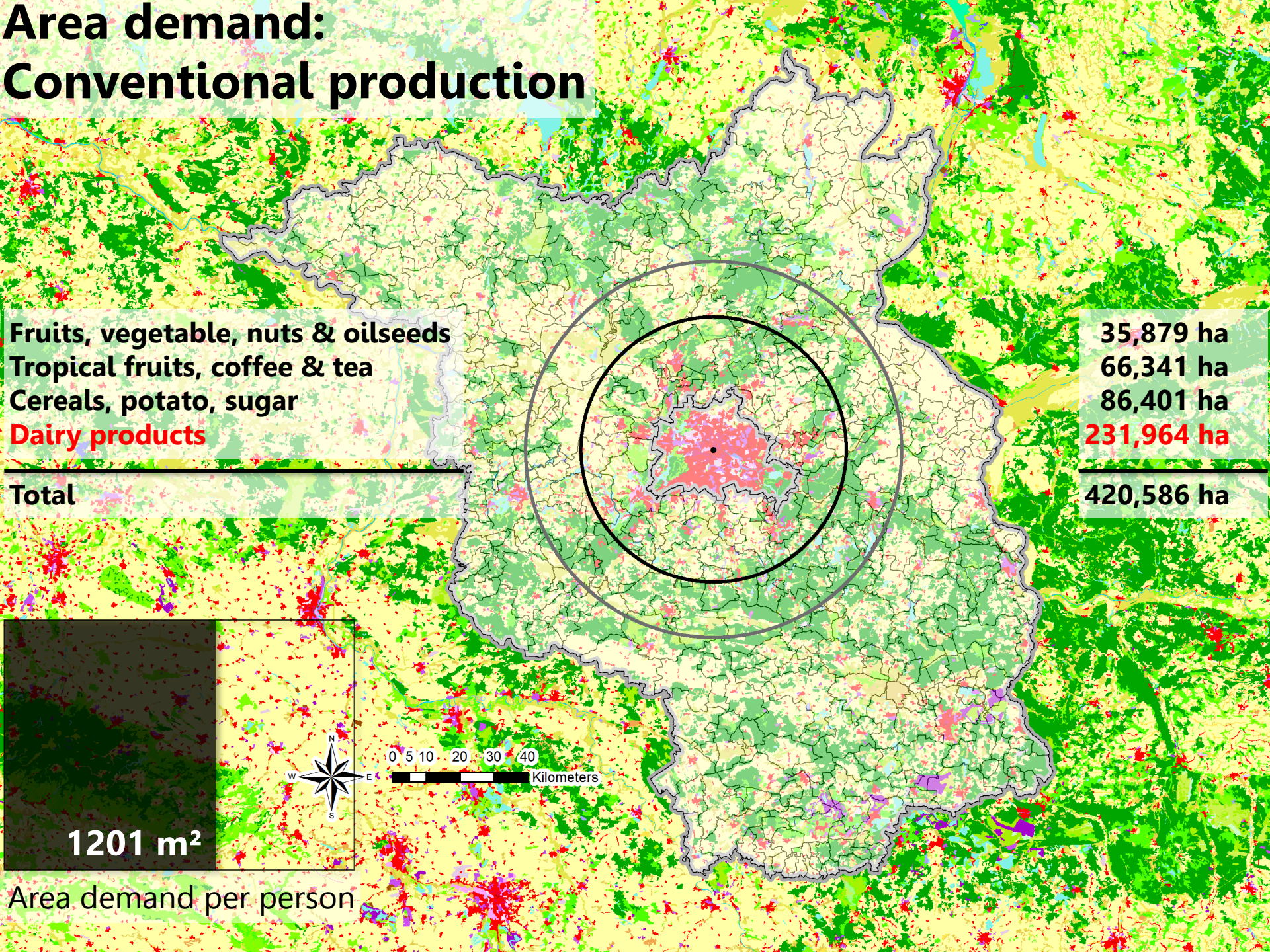
Total

35,879 ha
66,341 ha
86,401 ha
231,964 ha

420,586 ha

1201 m²

Area demand per person



Area demand: Conventional production

Fruits, vegetable, nuts & oilseeds
Tropical fruits, coffee & tea
Cereals, potato, sugar
Dairy products
Poultry & eggs

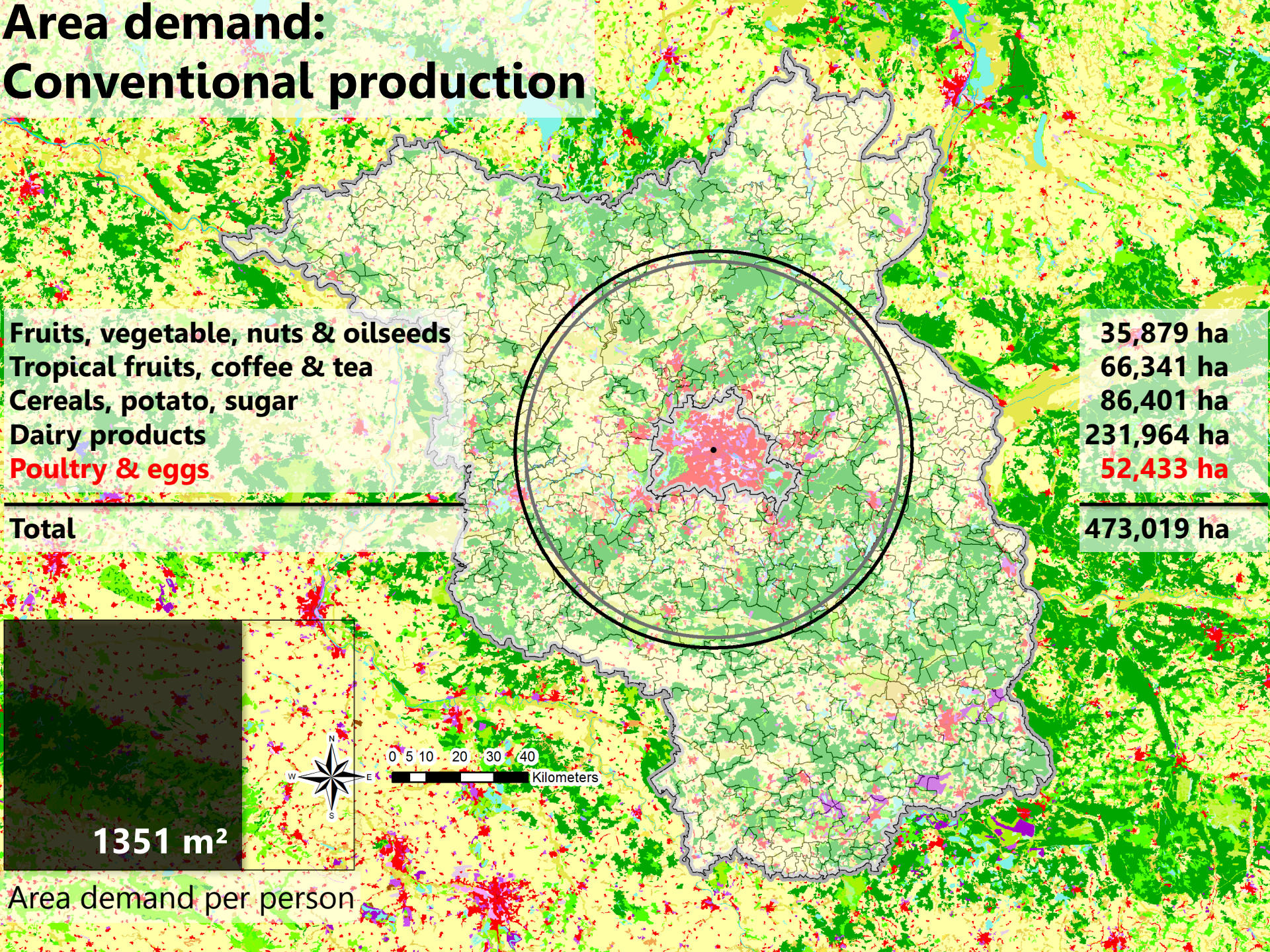
35,879 ha
66,341 ha
86,401 ha
231,964 ha
52,433 ha

Total

473,019 ha

1351 m²

Area demand per person



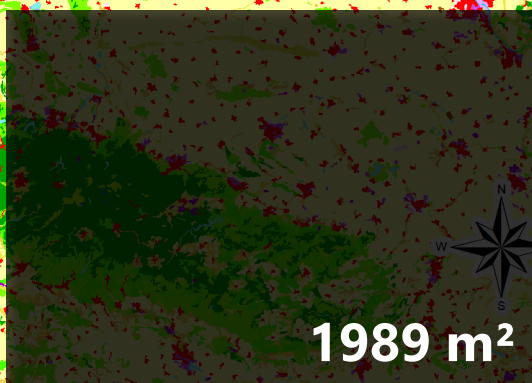
Area demand: Conventional production

Fruits, vegetable, nuts & oilseeds
Tropical fruits, coffee & tea
Cereals, potato, sugar
Dairy products
Poultry & eggs
Pork, beef, sheep, goat & fish

35,879 ha
66,341 ha
86,401 ha
231,964 ha
52,433 ha
223,443 ha

Total

696,463 ha

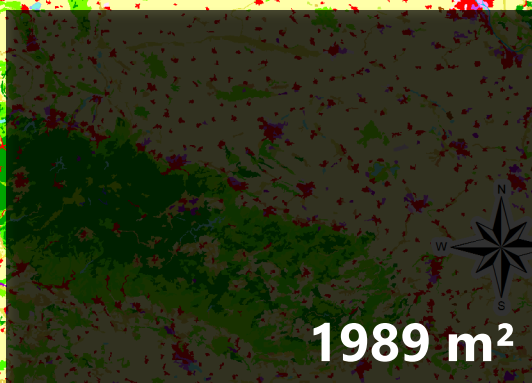


Area demand per person

Area demand: Conventional production

Total agricultural area
demand Berlin
(3.5 Mio. inh.), but...

696,463 ha

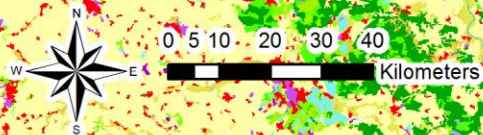


Area demand per person

0 5 10 20 30 40
Kilometers

Area demand: Conventional production

...we should not forget
the area demand from
settlements around



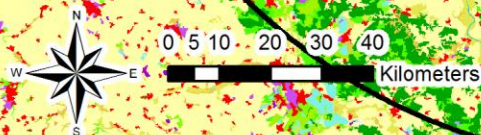
Area demand: Conventional production

Berlin
(Population 3.5 Mio)

**Berlin-Brandenburg
Metro region**
(Population 6.0 Mio)

696,463 ha

1,200,636 ha



Area demand: Conventional production (from temperate/domestic regions)

Berlin
(Population 3.5 Mio)

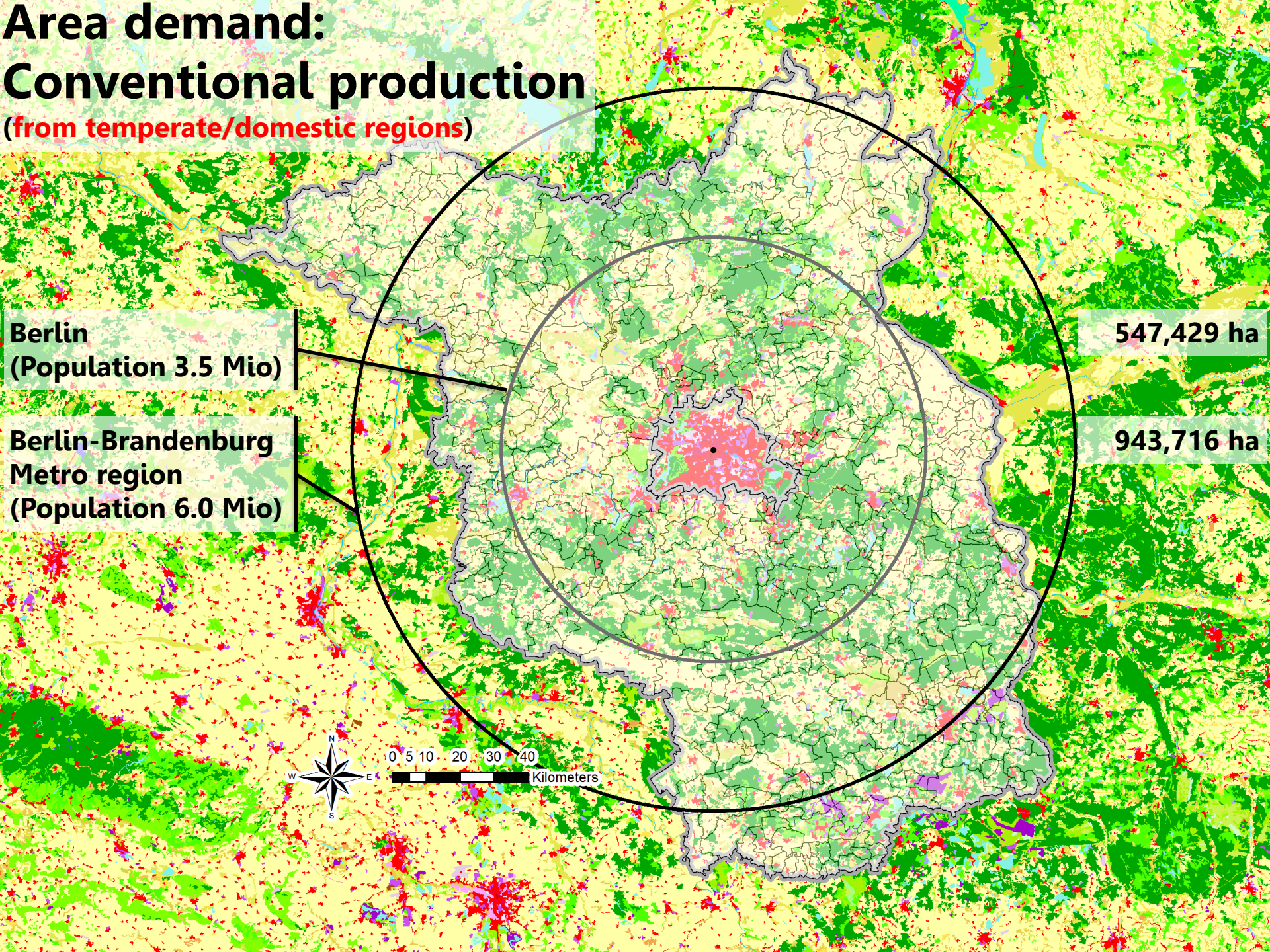
**Berlin-Brandenburg
Metro region**
(Population 6.0 Mio)

547,429 ha

943,716 ha



0 5 10 20 30 40
Kilometers



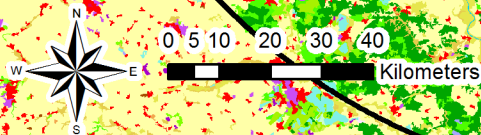
Area demand: **Organic production** (from temperate/domestic regions)

Berlin
(Population 3.5 Mio)

**Berlin-Brandenburg
Metro region**
(Population 6.0 Mio)

779,116 ha

1,343.122 ha



Area demand: Organic production

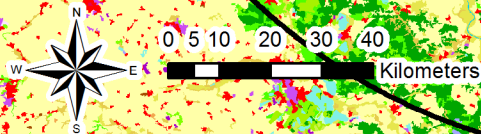
(from temperate/domestic regions;
minus food waste from production &
processing & retail)

Berlin
(Population 3.5 Mio)

Berlin-Brandenburg
Metro region
(Population 6.0 Mio)

687.102 ha

1,184,498 ha



Area demand: Organic production

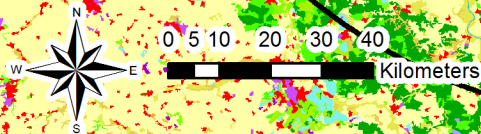
(from temperate/domestic regions;
minus food waste from production &
processing, retail & **households**)

Berlin
(Population 3.5 Mio)

Berlin-Brandenburg
Metro region
(Population 6.0 Mio)

542,601 ha

935,393 ha



London Metropolitan Agri-food System



London

vs. Berlin

City

8 million (m)

3.5 m

MAS

23 m

6 m

Growth 2030

+17%

-3%

Total area

3.8 m ha

3 m ha

Agriculture

2.5 m ha

1.4 m ha

per person

0.3 acre

0.6 acre

Diet

less meat

more meat

Country

mono-centric

poly-centric

Soils

Clay Loam

Sand

Yields

higher

lower

Latitude

=

Altitude

=

Rainfall

=

Metropolitan Agri-Food Systems (MAS)

- **Berlin MAS:**
City State of Berlin,
Federal State of Brandenburg
- **London MAS:**
Greater London,
East England and South-East England regions

London data sources

Family food survey London 2014

household food + eating out

(Source: Living Costs and Food Survey, 2014, Food Statistics familyfood@defra.gsi.gov.uk)

Current population and projections

(Source: ONS, Office for National Statistics, projections@ons.gsi.gov.uk)

Household food and drink waste: A product focus

(Source: WRAP, 2004 www.wrap.co.uk)

MAS London scenarios

0. Today population

1. Future population (2030)

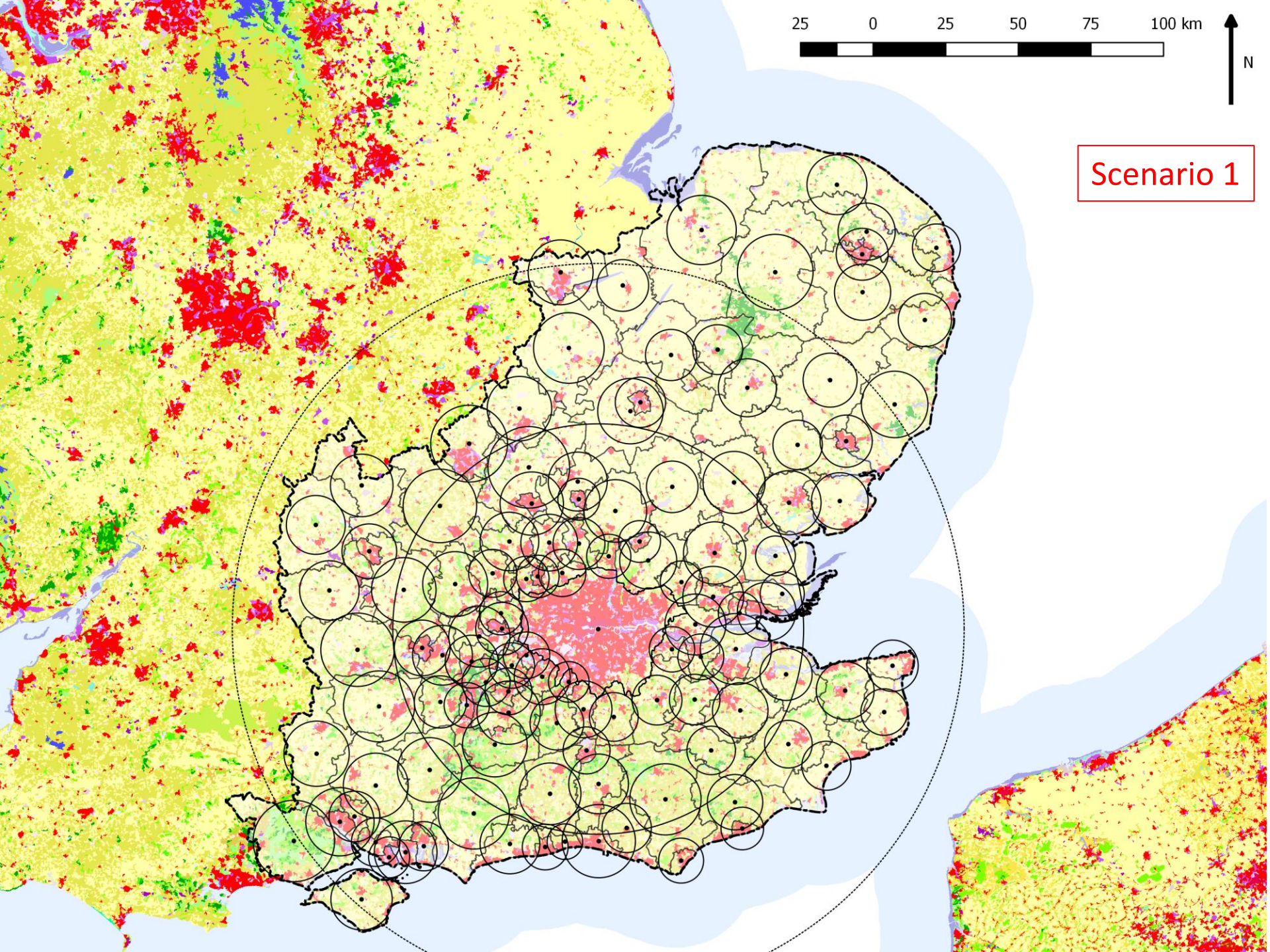
2. Today population - lightly reduced food waste

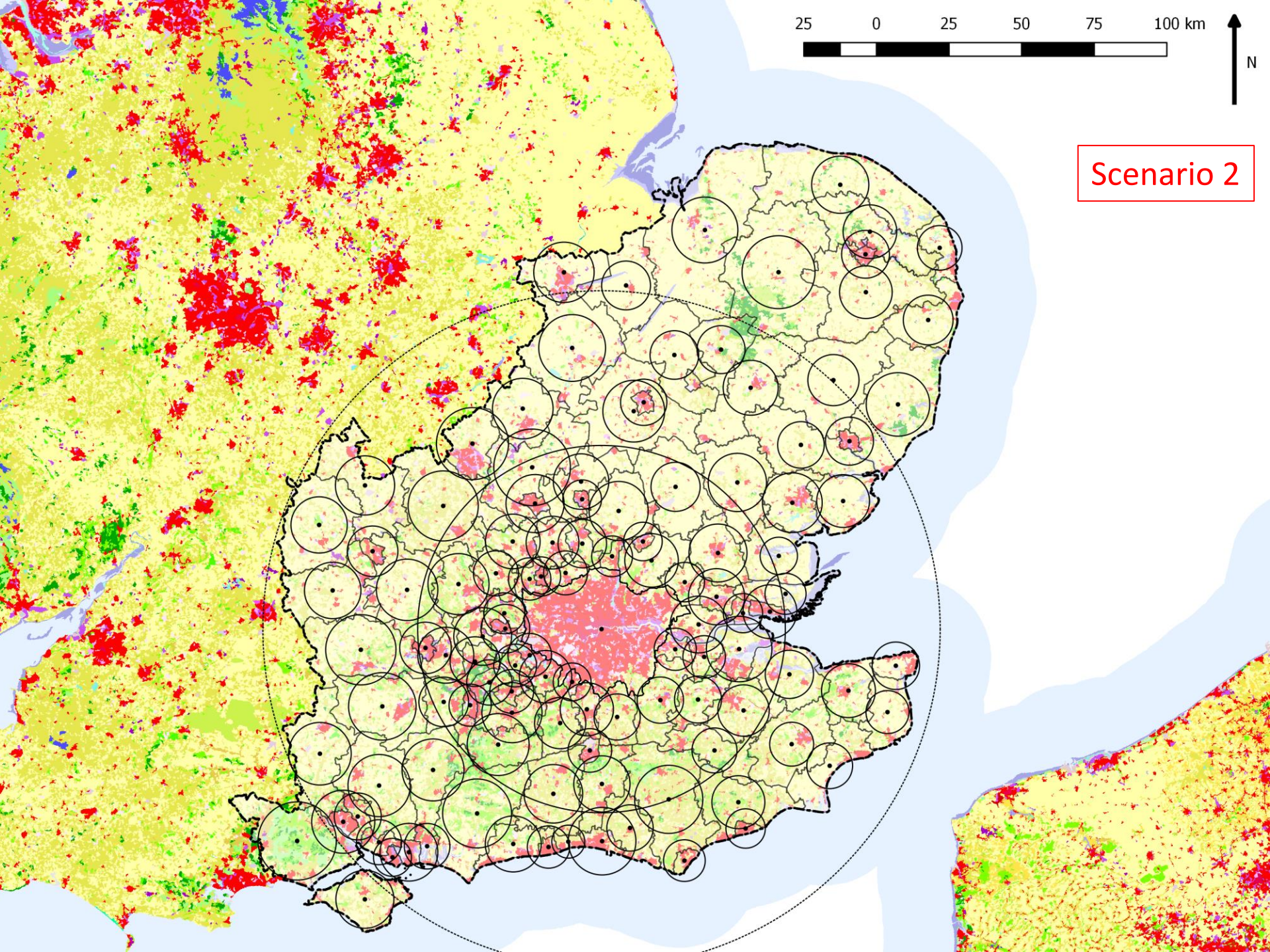
41% - 37% (4% reduction on household level)

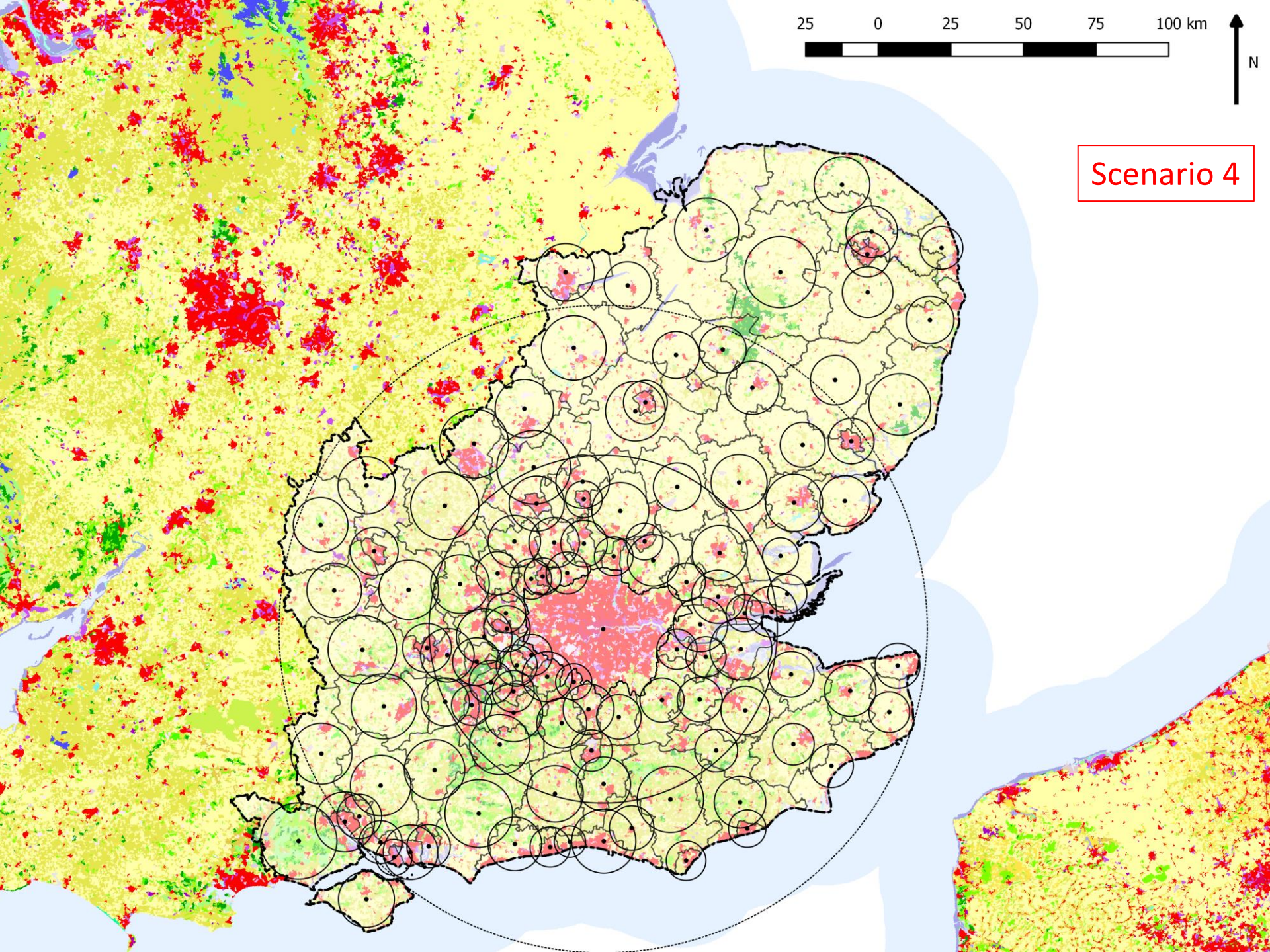
3. Today population - different diets

Eatwell (3a), reduced meat (3b), vegetarian (3c)

4. Combined 1+2+3b + 100% organic production







Scenario 4

MAS London scenarios

0. Today	0.1 ha or 0.25 acre per person	
1. Future (2030) population		+ 17% *
2. Today population- Reduced food waste		- 5% *
3. Eatwell (3a)		- 16%
Reduced meat (3b)		- 19% *
Vegetarian (3c)		- 33%
4. 1+2+3b and 100% organic production		- 2% ***

A vision for a future with 10m Londoners and 26.5m in the MAS

4. 1+2+3b and 100% organic - 2%

2 days vegetarian - 7%

half week (3.5 days) vegetarian -10%

or food waste halved -15%

=> my vision: “Edible landscapes in a ‘*Terroir*’ food culture”

with land “free” for... more roads, horses, golf, garden cities, hedges, nature reserves, woodlands, solar farms, energy crops...?



Thank you