

- Introduction
- 2 scenarios
- Areas needed, food model
- Logistic, market
- Impact on jobs
- Point of view of inhabitants
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# Ville Vivrière

*Scenarios of Food autonomy for Rennes  
Metropole (France) and Strasbourg*

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Zurich, september 2015

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# Rennes Metropole



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# Rennes métropole, « Urban archipelago » model



## Rennes Métropole

- 1 central city
- 37 rural communes
- 1 green belt protected for over 30 years
- 1 modèle of urbanism : « the urban archipelago »
- 400 000 inhabitants  
Superficie : 60 755 ha  
5th French metropole
- 2nd French higher demographic rate since 2000 - 60 % of the population is less than 40 years old

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# Eating locally ?

## A prospective for Rennes 2020

- Could everybody be fed ? (space, quantities...)
- Would local (agro-industrial) jobs be destroyed ?
- Who would want it ?

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# Phases of this work

## ■ Year 1 : 2010-2011

### Aims

- defining prospective scenarios for 2020
- Food model, farming model
- Areas necessary to feed Rennes Metropole
- Point of view of the population

## ■ Year 2 : 2011-2012

### Aims

- Defining a logistic and marketing model for those scenarios
- Impact of each scenarios on jobs
- Point of views and habits of the population

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# Two scenarios where elaborated for this research

	Tendencial scenario	"Virtuous" scenario
Food regime	Actual (2150 calories/inhabitants)	Moderated (1900 calories/inhabitants)
Farm Production		Organic
Food waste	30 % of the groth food ressorces wasted	20 % of the groth food ressorces wasted
Area considered	Farms	Farms + % of public and private gardens, forests, flat roofs...
Marketing	local	local

**Production and food close to the reality, but everything produced and consumed locally**

**Designed to maximise RM's food autonomy**

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# We adopted 8 steps in the calculation → For each scenario

Calculation	Content of the step
Step 1	Defining the <b>average energetic needs</b> in kcal/inhabitant
Step 2	Dividing those caloric needs between the main <b>categories of food</b>
Step 3	Precising the calories/gramme of each category of food, of which at least <b>51 g of proteins/inhabitant</b>
Step 4	Deducting the <b>weight</b> of each type of aliment needed (in g/inhabitant)
Step 5	Precising the <b>regional yields</b> for each crops, and on the content of the ration for each type of animal breded (then connected to the yield of each fodder needed)
Step 6	Deducting the <b>area needed to feed each inhabitant</b> (in ha/inhabitant) on the basis of the steps 4 and 5
Step 7	Deducting the <b>whole area needed</b> (in ha) to feed the whole population of Rennes Metropole ( <i>depending on the food and production scenarion</i> )
Step 8	Comparing this area with the <b>available area</b> ( <i>depending on the food and production scenarion</i> )

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Famille d'aliments	NRJ quot. (kcal/j/p)	Quant. Quot.(kg/j/p)	Teneur protéine (g/p/j)	Quant. An sans perte (kg/an)	Perte = 20 %	Quant. An avec perte (kg/an)
<b>Légumes total :</b>						
Légume feuillus et à tiges	32,97	0,21	3,65	40582508	8116502	48699010
Légume fleurs	19,78	0,10	2,79	19500900	3900180	23401080
Légume fruit	39,57	0,16	1,29	31811450	6362290	38173740
légume racine	52,75	0,21	2,74	40907168	8181434	49088602
légume graine	36,27	0,06	1,95	10816799	2163360	12980159
légume bulbe	16,49	0,06	0,57	11020250	2204050	13224300
<b>légume sec</b>	59,35	0,06	4,53	10926060	2185212	13111272
<b>légume tubercule (pdt)</b>	72,54	0,09	1,34	17360295	3472059	20832354
<b>Graisse végétale :</b>						
Huile de Colza	167,926	0,02	0,00	3661783	732357	4394140
Huile de Tournesol	1,696	0,00	0,00	36988	7398	44385
<b>Fruits :</b>						
Fruits à noyau	69,27	0,107	1,02	20659214	4131843	24791056
Fruits à pépins	69,27	0,140	0,46	27221749	5444350	32666099
Fruits à coque	83,12	0,017	1,70	3235780	647156	3882937
Baies	55,42	0,138	1,62	26690164	5338033	32028197
<b>Céréale</b>	703	0,211	0,00	40949570	8189914	49139485
<b>Viandes autres</b>						
Ovins (100% herbe)	19,00	0,008	1,84	1574038	314808	1888845
Porcs	76	0,036	7,92	6982460	1396492	8378952
Lapins	19	0,010	2,84	1898581	379716	2278298
Volailles de chair	68,4	0,026	6,71	4994234	998847	5993081
Poules de réforme	7,6	0,003	0,75	554915	110983	665898
<b>Viandes bovines</b>						
Bœufs bio (100% herbe)	7,36	0,004	0,98	856487	171297	1027785
Vache de réforme	3,20	0,002	0,43	372731	74546	447277
<b>Œufs</b>	68,02	0,047	5,82	9031526	1806305	10837831
<b>Produits laitiers</b>						
Chèvre 100 % herbe	15,2	0,023	0,80	4533228	906646	5439874
Vache laitière 100% herbe	136,8	0,180	5,76	34893927	6978785	41872712

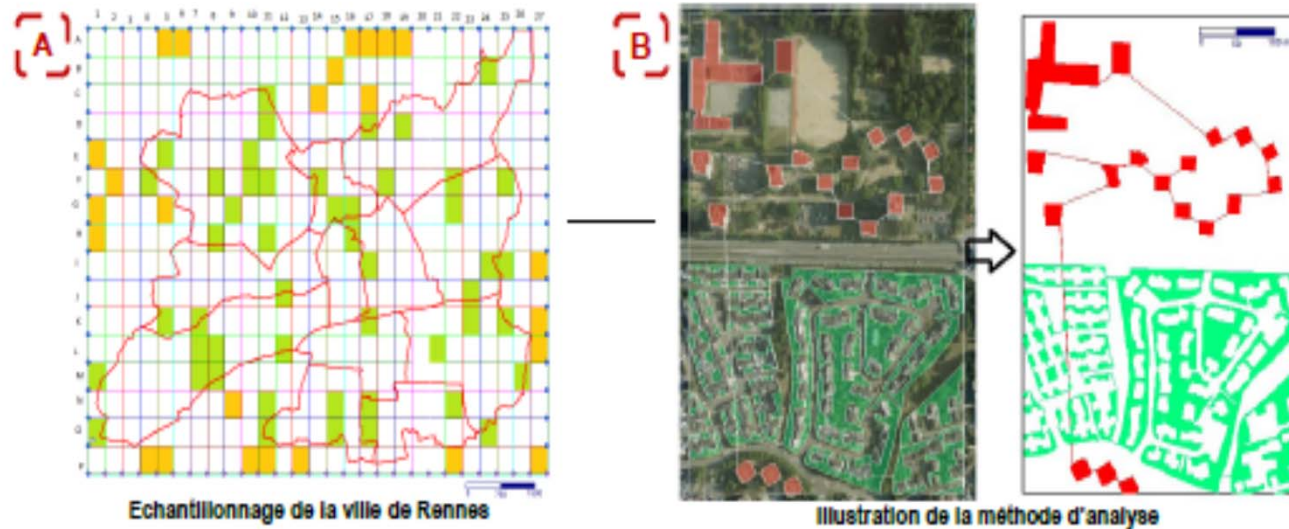
Steps 3 and 4 : Example of calculation for the scenario of autonomy



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# Estimating the available area

**Farming area**  
**Public gardens and parcs**  
**Natural areas**  
**Forests**  
**Private gardens**



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# Area available

Tendancial scenario			Scenario of autonomy	
Productive areas	% used in the scénario	Total area available (41 660 ha)	% used in the scénario	Productive areas
34881	100%	<b>Farm land</b> (34 881 ha)	100%	34881
0	0%	<b>Forest</b> (1 113 ha)	30%	334
442	15%	<b>Private/public gardens</b> (2 919 ha)	40%	1177
0	0%	<b>Natural areas</b> (2 399 ha)	46%	1091
0	0%	<b>Flat roofs</b> (348 ha)	60%	209

Source Cyril Bigot,  
2012

+ 6,7 % = + 2400 ha environ  
= 5 x area needed for the potatos consumed !!

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## In scenario of autonomy, which use of the urban greenways for food production ?

Type of food	Public parcs and areas	Private gardens	Flat roofs	Forest	Arable land	Riversides, roadsides, protected areas
<b>Cereals</b>					Yes	Yes
<b>Fodder production</b>					Yes	Yes
Cereals					Yes	Yes
Oil and proteic seeds					Yes	Yes
Pastures and meadows	Yes			Yes	Yes	Yes
<b>Vegetal fats</b>					Yes	Yes
<b>Vegetables</b>	Yes	Yes	Yes		Yes	Yes
<b>Fruits</b>	Yes	Yes	Yes	Yes	Yes	Yes

Abstract of the virtuous scenario elaborated for Rennes Metropole in this study

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# Results

- Which food autonomy for Rennes Metropole ?

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## Two scenarios : areas needed

Food	Tendential scenario		Virtuous scenario	
	area (ha)	Proportion of the area necessary (%)	area (ha)	Proportion of the area necessary (%)
Vegetables	5 967	3 %	23 733	24 %
Vegetal fats	4 682	2 %	6 040	6 %
Fruits	13 048	7 %	15 738	16 %
Cereals	10 762	6 %	11 449	12 %
Meat	135 113	72 %	25 342	26 %
Dairy	14 774	8 %	12 452	13 %
Eggs	4 008	2 %	2 645	3 %
<b>Total area needed to feed RM's population 2020</b>	<b>188 356 ha</b>		<b>97 402 ha</b>	
<b>Area necessary/inhabitant</b>	<b>0,35 ha/inhabitant</b>		<b>0,18 ha/inhabitant</b>	

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# % of food autonomy of RM

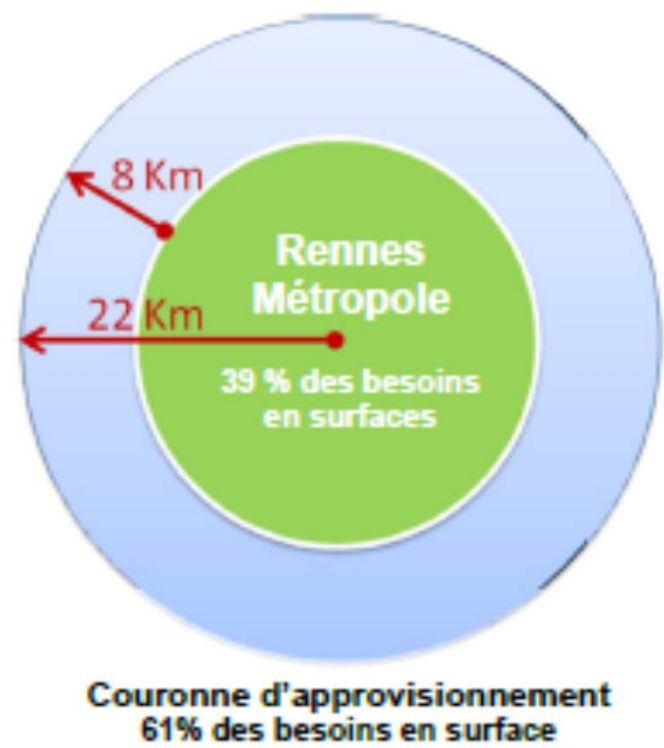
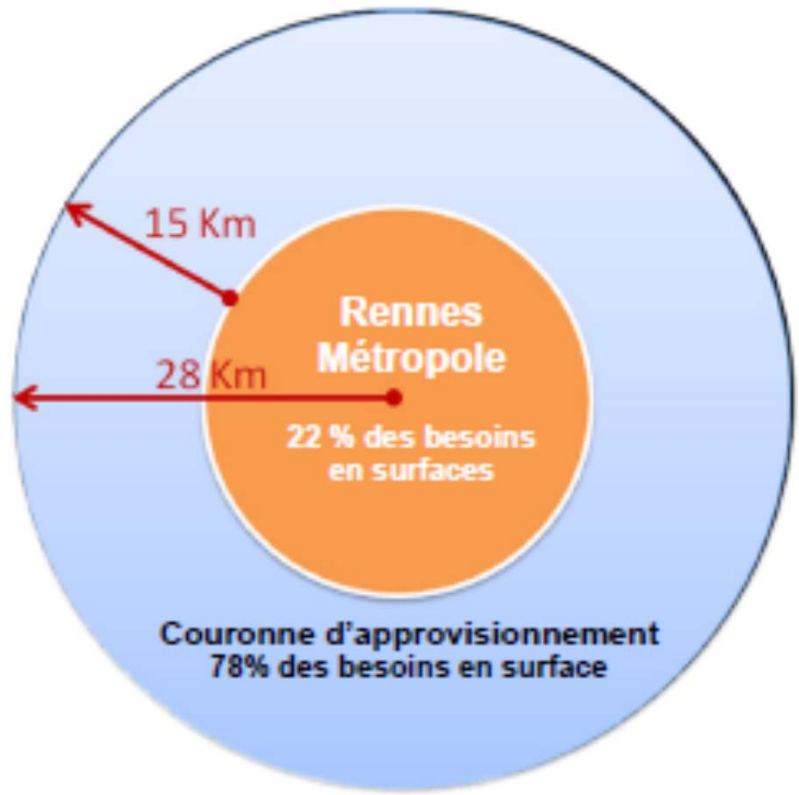
	Tendencial scenario	Virtuous scenario
Area needed to feed RM's population	188 356 ha	97 402 ha
Area of urban greenways available in the scenario	35 322 ha	37 691 ha
<b>% of food autonomy of RM allowed by the scenario</b>	<b>19 %</b>	<b>39 %</b>

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# Total areas needed for Rennes Métropole's autonomy ?

**Scénario tendanciel** Surface consommée par habitant : 0,30 ha

**Scénario d'autonomie** Surface consommée par habitant : 0,18 ha



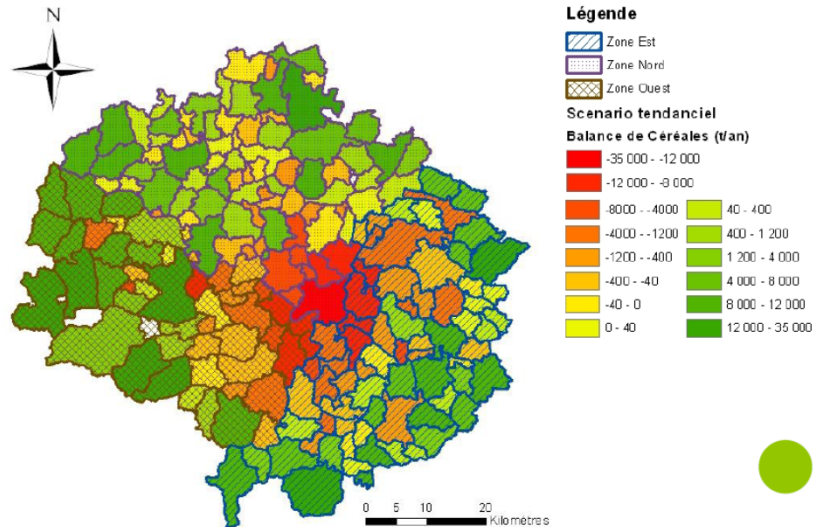
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## 2<sup>nd</sup> step : Territory of autonomy

➔ takes in account all the population of the area

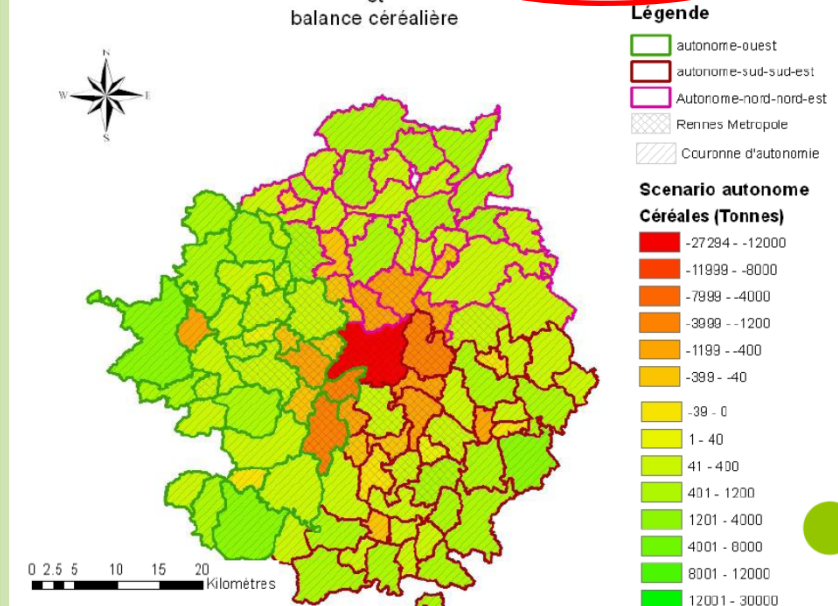
Organisation des filières et conséquences en termes d'emplois

Zones d'organisation de la transformation, scénario TENDANCIEL



Zonage du territoire défini par les besoins alimentaires du scénario autonome

et balance céréalière



In red and orange : communes showing a deficit of food production

In yellow and green : communes showing an exceedent

➔ Complémentarité



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Zone Atelier

UNIVERSITÉ DE STRASBOURG



# Comparing Rennes and Strasbourg

- Some elements...

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- Ar...
- Lo...
- Imj...
- Po...
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**Rennes Métropole**

Habitants en 2008 :  
390 800

Nombres de  
communes : 38

Superficie : 640 km<sup>2</sup>

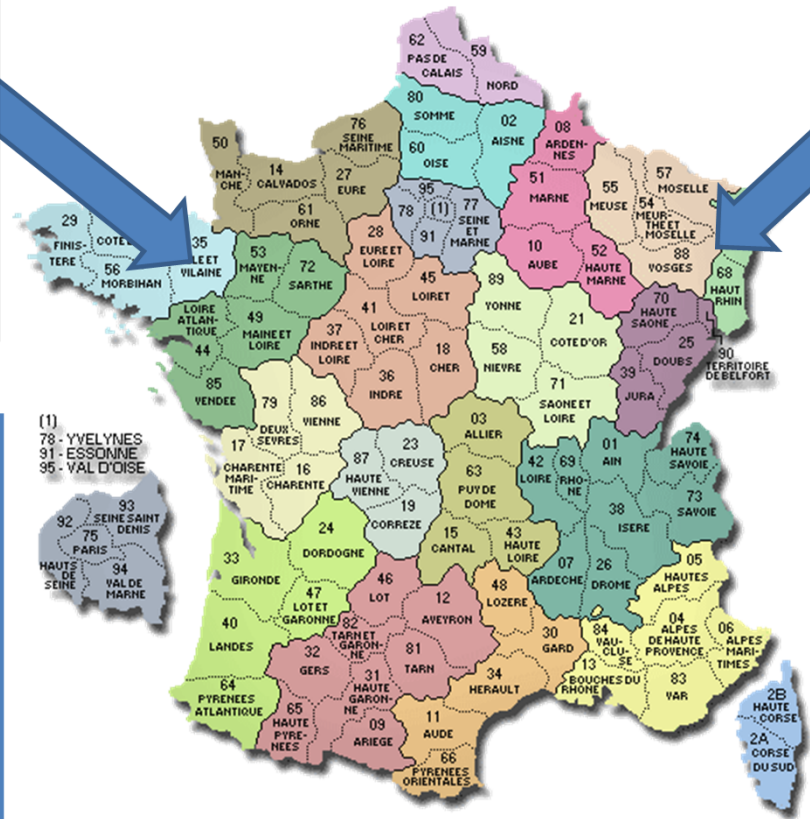
**Bassin d'élevage**

**Bocage**

Métropole dense +  
agriculture = Ville-  
archipel

**4 100 hab/km<sup>2</sup>**

**57,4 % de la  
métropole = SAU**



**Communauté  
Urbaine de  
Strasbourg**

Habitants en 2008  
: 468 730 (INSEE)

Nombres de  
communes : 28

Superficie en  
1999 : 314 km<sup>2</sup>

**Bassin céréalier**

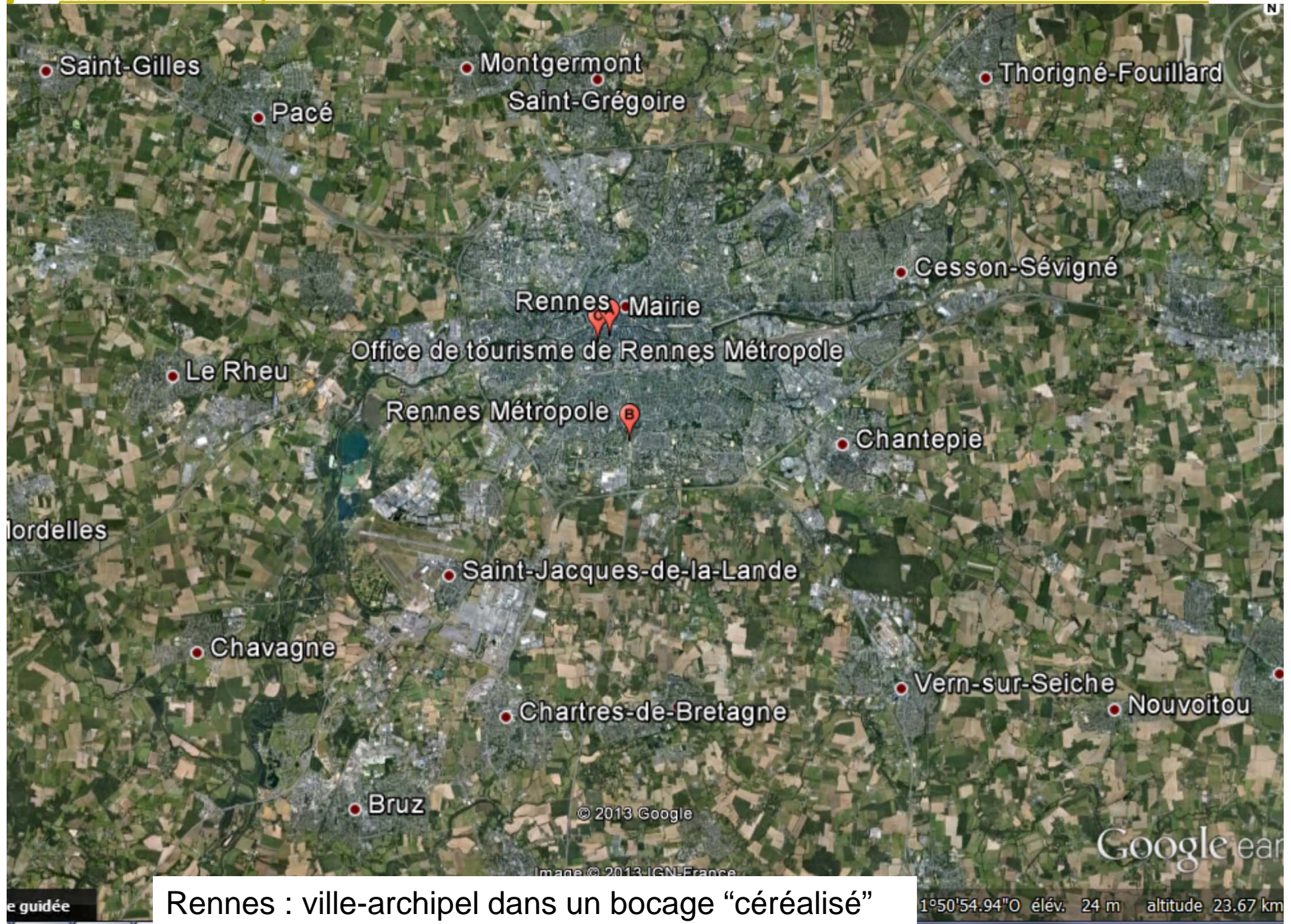
**Forêts**

**Zone frontalière**

**Extension urbaine**

**3 472 hab/km<sup>2</sup>**

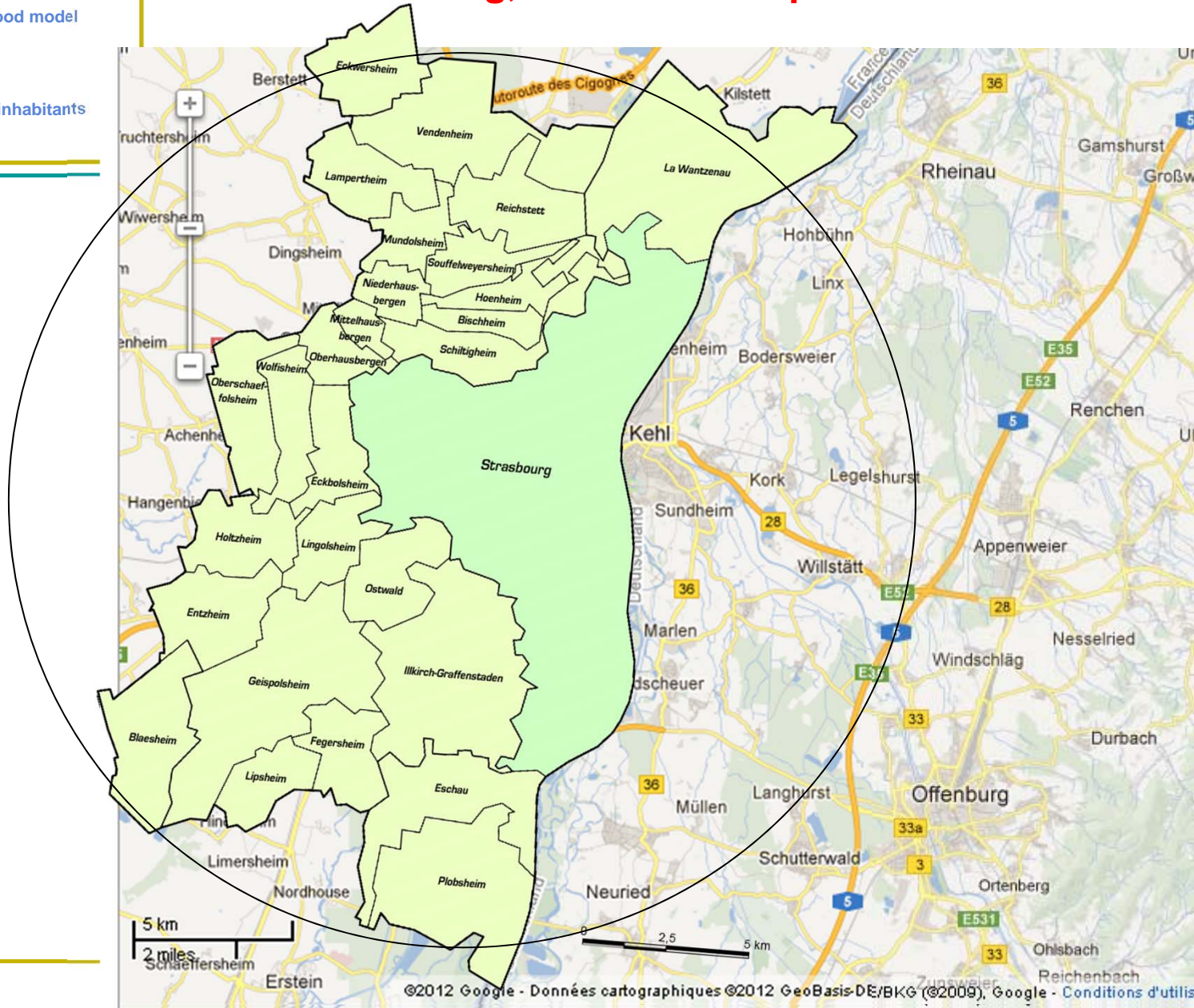
**33 % de la CUS =  
SAU**

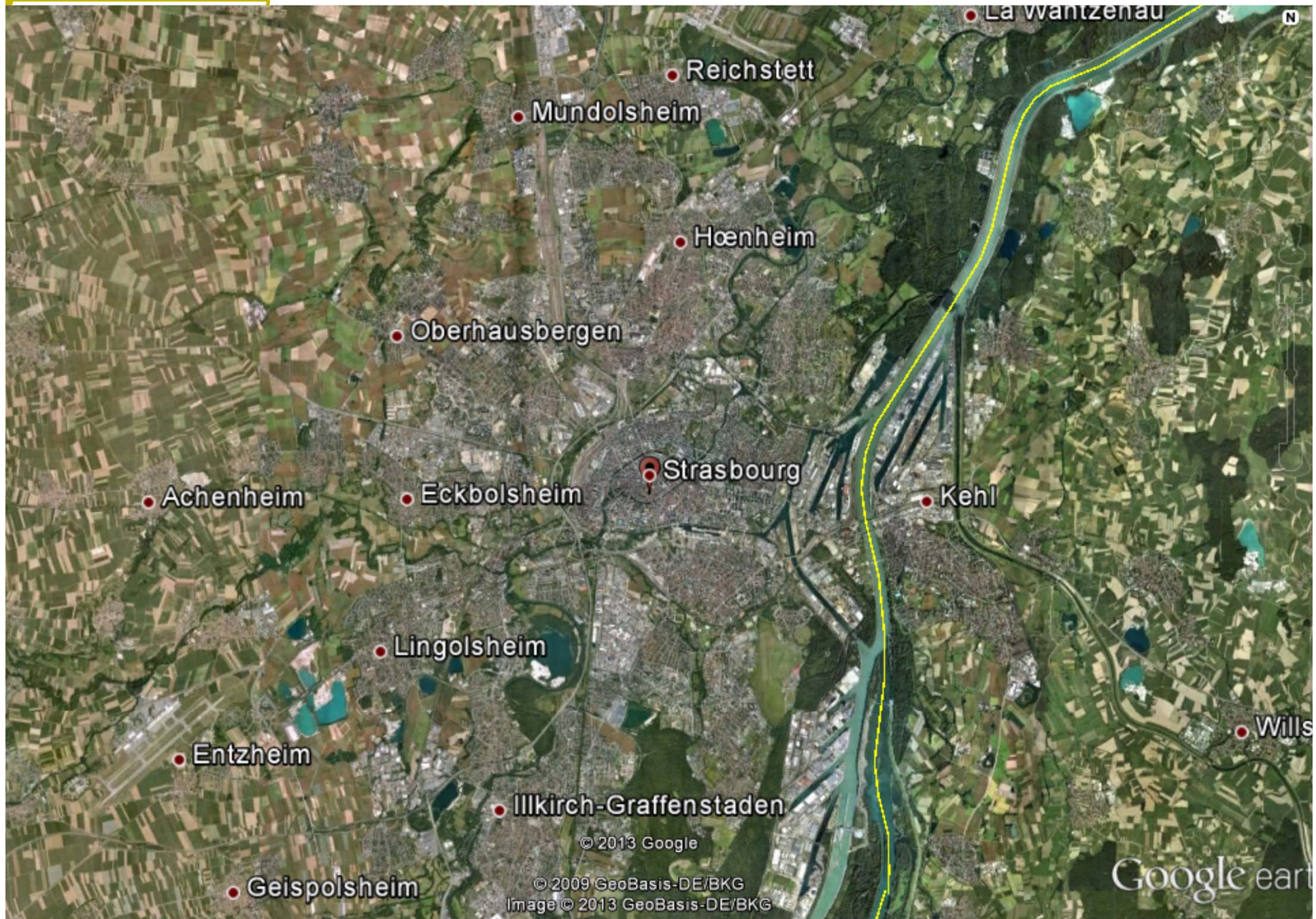


Rennes : ville-archipel dans un bocage "céréalisé"

# Strasbourg, a dense metropole in a cereal landscape

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guidée

Strasbourg, métropole dense en zone céréalière frontalière

145 m altitude 22.45 km

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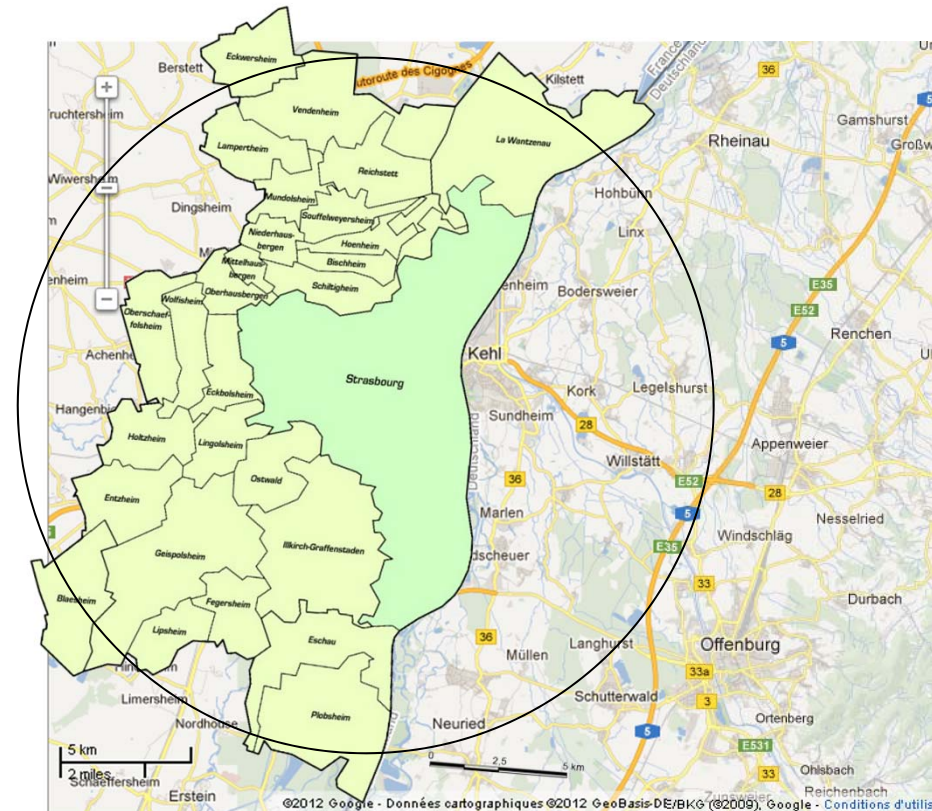
## Deux modèles d'urbanisme, deux résultats en terme d'autonomie

	Rennes Métropole 2020		CUS 2032	
	Tendanciel	Autonomie	Tendanciel	Autonomie
Area needed	188 356 ha	97 402 ha	179 550 ha	92 340 ha
Area available without the greenways	35 323 ha		10 953 ha	
Area available with The greenways		37 691 ha	<i>!! Without the 8 communes of Orthenau</i>	
				<i>13 712 ha (estimate...)</i>
% d'autonomie De la métropole	22 %	39 %	6 %	<i>14 % (estimate...)</i>

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# Methodology for Strasbourg

- The 8 German communes allemandes of the Ortenhau were not taken in account in this first approach of the « food autonomy belt » of the metropole → Not very realistic !



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	Modèle actuel (Bretagne)		Scénario d'autonomie	
	% des besoins alimentaires couverts régionalement	% des calories quotidiennes	% des besoins alimentaires couverts régionalement	% des calories quotidiennes
Viande	156 %	20 %	100 %	11 %
Oeufs	187 %	1 %	100 %	4 %
Lait	182 %	10 %	100 %	8 %
Pommes de terres	37 %	6 %	100 %	17 %
Légumes	69 %		100 %	
Fruits	3 %	15 %	100 %	15 %
Cereales (conso humaine)	51 %	39 %	100 %	37 %
Graisses végétales	12 %	8 %	100 %	9 %

**Rennes : une métropole excédentaire en productions animales, déficitaire en productions végétales**



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# In Rennes, excess of cattle and animal products

- KEY ISSUE :
- Converting some of the fodder areas in crops for human food ?
  - Maize silage → cereals for humans
  - Pastures only in humid and natural areas
  - Recreating a vegetable and fruit belt around the city

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Cultures	Surface (ha)	Kg	Pertes (%)	Kg totaux	Kg d'aliment consommé / an / habitant	Nombre d'habitants nourris	% des besoins alimentaires fournis
<b>Céréales</b>	18091	139 247 712	0,26	103 043 307	88,038	1 170 441	<b>190%</b>
<b>Fruits</b>	1368	28 008 529	0,3	19 605 970	58,5	335 145	<b>54%</b>
<b>Pomme de terre</b>	52	1 782 885	0	1 782 885	21,28	83 782	<b>14%</b>
<b>Total légumes</b>	625	22 089 844	0,3	15 462 891	49,3	313 649	<b>51%</b>
<b>Fruits à huile</b>	308	979 825	0,67	326 608	5,548	58 870	<b>10%</b>

Population : Nous avons additionné la population de la CUS (468 730 habitants) et celle des 8 communes de la Ortenau (148233 habitants), ce qui équivaut, en tout à 616 963 habitants sur toute la zone étudiée.

**STRASBOURG**

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# In Strasbourg excess of cereals

- KEY ISSUE :
- Reincluding fodder and animals breeding in local rotations
  - Recreating pastures
  - Re-distributing crops areas between humans and animals
  - Reinforcing the peri-urban vegetable and fruits belt

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# Comparing Rennes and Strasbourg

## ■ Two similar cities

- Same size (approx. 500 000 inhabitants)
- Temperate northern climate
- Comparable yields
- Lowlands

## ■ → Results could be extrapolated

- To the food and farming models of temperate cold Europe
- **Consequence : can use the same agronomic model for the scenario of autonomy**
- **Similar results for the area/inhabitant needed :**
  - 0,35 ha / inhabitant for the tendencial food scenario
  - 0,18 ha / inhabitant for the autonomy food scenario

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# Perspective for urban food autonomy

- The medium-size French cities all show a belt of at least 40 km away
- In our pedo-climatic conditions, the food autonomy of the large metropolises based on local resources appears as reasonably feasible
  - **The improving condition would be to adopt the autonomy-like scenario** which allows to divide by 2 the area/inhabitant needed !
- **What to do with the free rural areas (> 40 km?)**
  - Renewable energy ? (*cf Afterres 2050 scenario*)
  - Leisure ?
  - Nature ?
  - Food exportation ?

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# Généralisation ?

- Food autonomy is not autarchy !
- Food models show complementarities and can justify inter-territorial exchanges
  - North ← → Mediterranean areas
  - Sea food...
- Sophisticating the model...
  - Covering the local needs with as many local resources as possible
  - Exchanging with other territories for complementary products
    - Different climates and resources
    - Food solidarity with territories showing lower agronomic potentials... → Careful, food sovereignty issues....

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# Logistic and market

- Adapting the scenarios to the territory
  - Processing
  - Marketing

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# Processing

- Sub-areas of Rennes metropole : autonomy for food processing
- Defining a typology of territories : rural, dens rural, peri-urban and dense city
- Consequence : more resilience in each territory, limitation of food streams

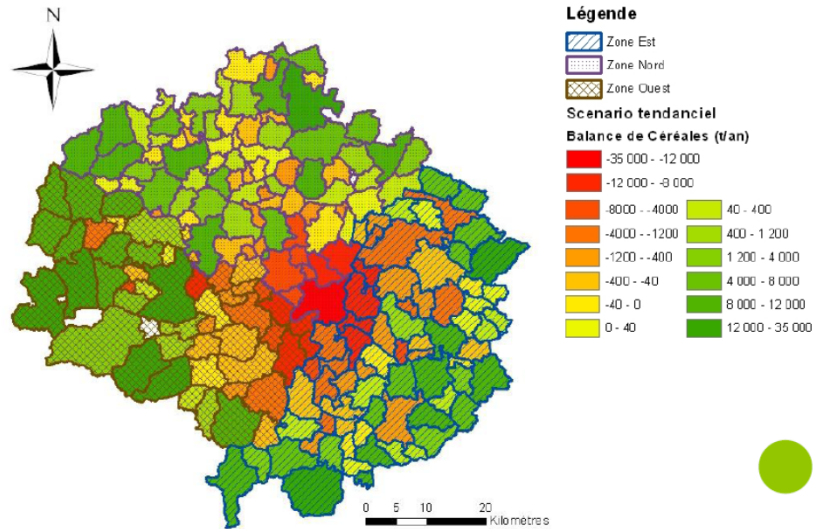


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# Food need / commune for each scenario

Organisation des filières et conséquences en termes d'emplois

Zones d'organisation de la transformation, scénario TENDANCIEL



Zonage du territoire défini par les besoins alimentaires du scénario autonome

et balance céréalière

