

THE ENERGY DIMENSION OF CIRCULAR ECONOMY

A VISION THROUGH URBAN METABOLISM

December the 10th 2020

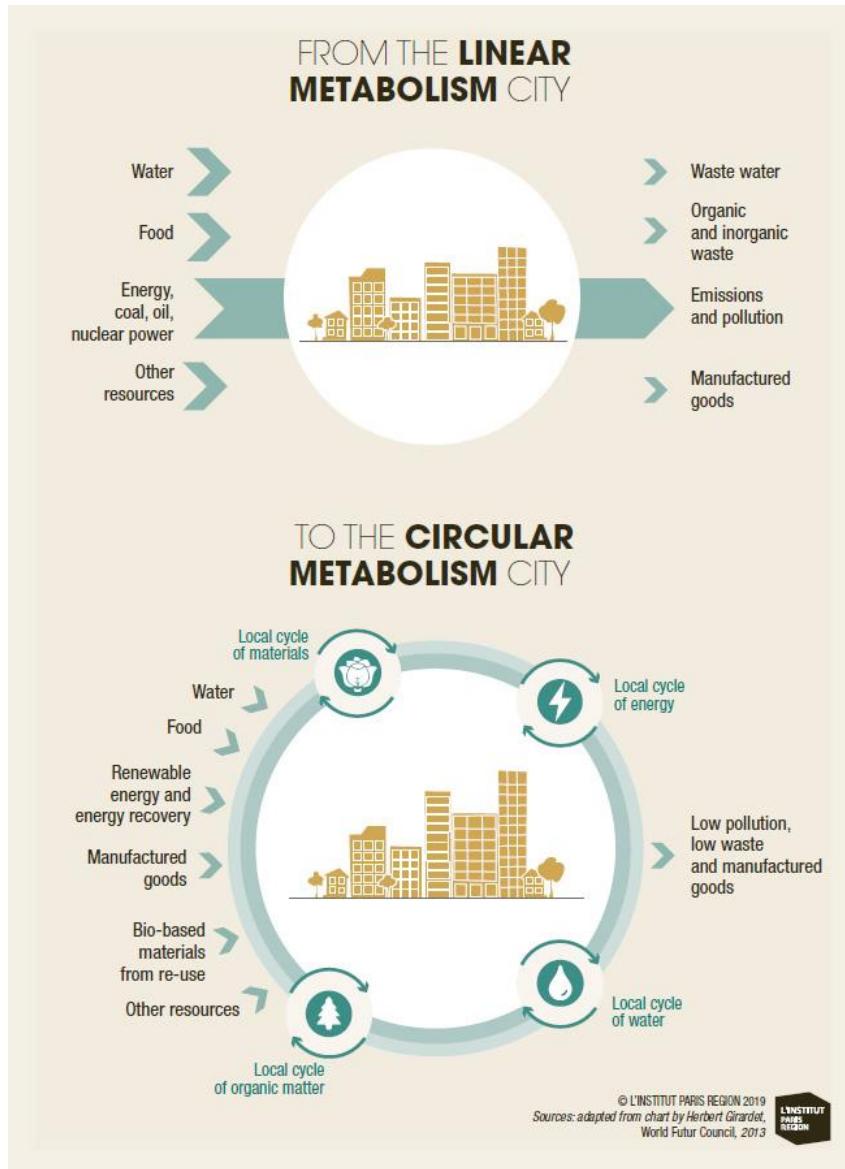
Thomas Hemmerdinger, AREC ÎdF



Isséane, energy recovery unit and recycling center in Issy-les-Moulineaux near Paris

Credits : Systom / 4vents, D. Grandemange

What is urban metabolism ?



Study of flow and stock on a territory or organization

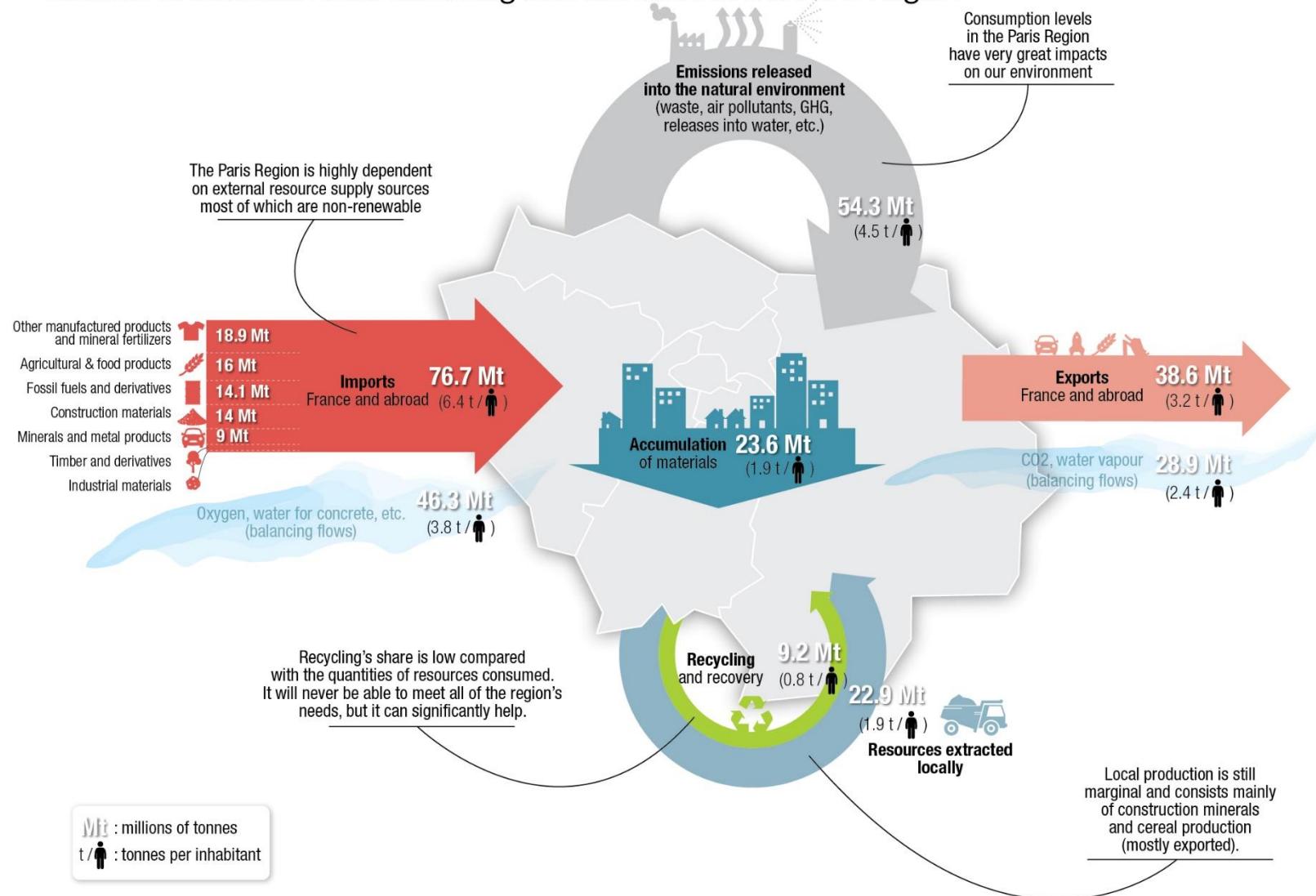
- Energy
- Water
- Construction materials
- Food / biomass
- Waste
- ...

A scientific approach all around the world



The urban metabolism of Paris Region

Balance of material flows excluding indirect flows in the Paris Region

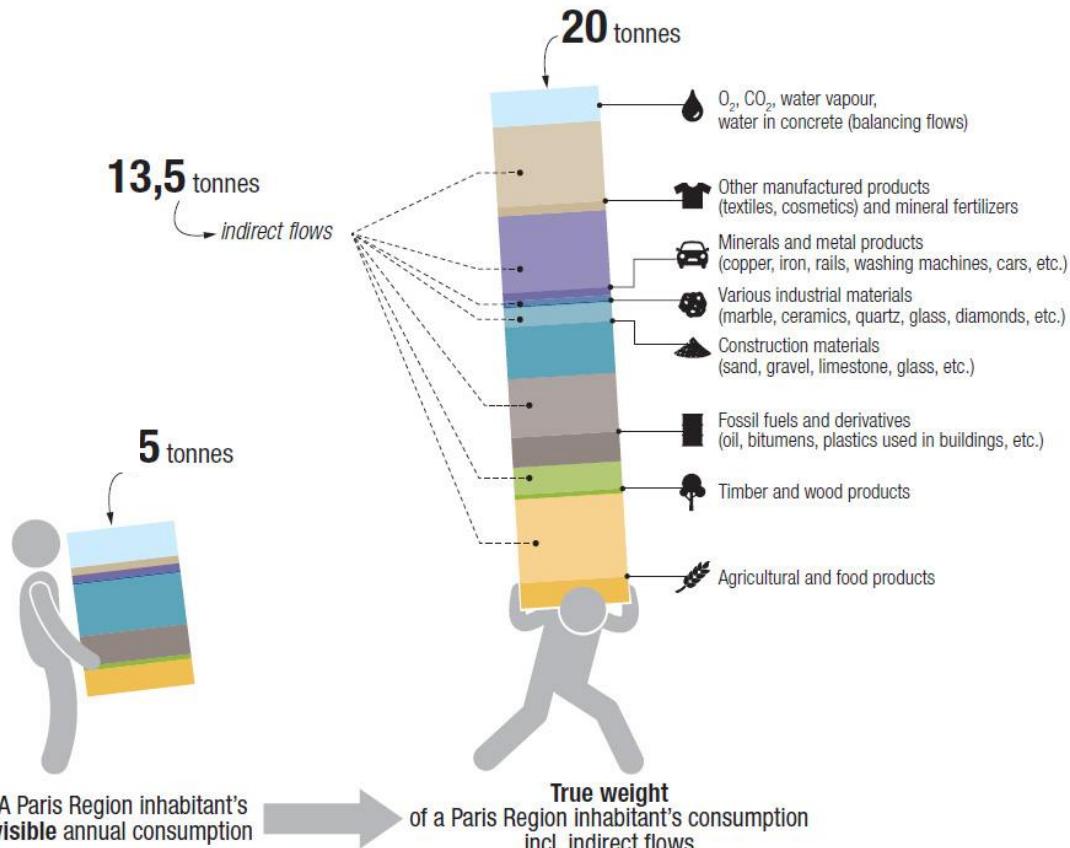


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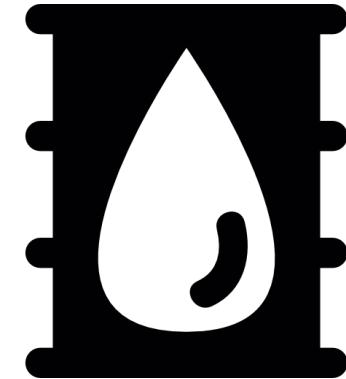
Source: Vincent Augisneau, Sabine Barles, "Bilan de flux de matières de la région Île-de-France en 2015", Paris 1 Panthéon-Sorbonne university, UMR Géographie-cités for the Paris Region, 2018.

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Environmental footprint and hidden fossil fuels



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Source: Vincent Augiseau, Sabine Barles, "Bilan de flux de matières de la région Île-de-France en 2015", Paris 1 Panthéon-Sorbonne university, UMR géographie-cités for the Paris Region, 2018

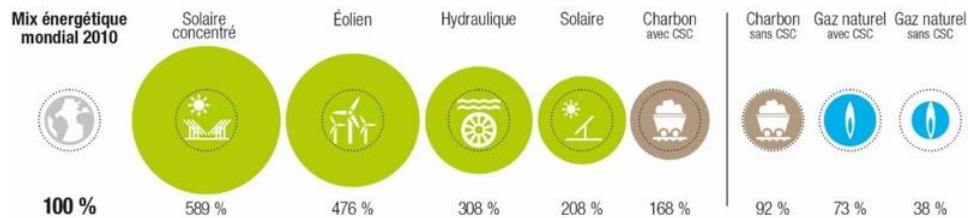


Fossil fuels
Direct consumption
1,2 ton per inhabitant per year

Direct and indirect consumption
3,4 ton per inhabitant per year with the hidden flow

Renewable energy issues and consumption of resources

Resources needs for several electricity generation technologies

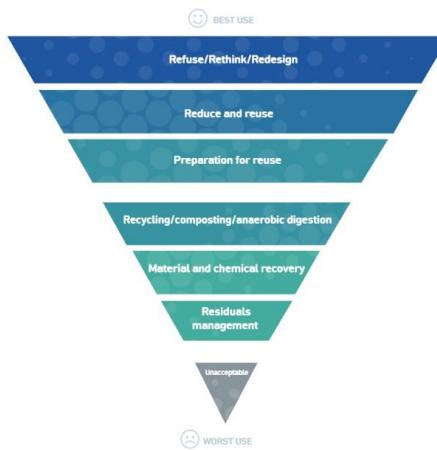


La production d'1 kWh d'électricité à partir d'énergie solaire demande **2 fois plus de matières** que la production d'1 kWh d'électricité produite en 2010 par le mix énergétique mondial

© IAU idF 2017
source : International Resource Panel 2016

Green Energy Choices: the benefits, risks and trade-offs of low-carbon technologies for electricity production

International resource panel, 2016



Repair, Reuse and recycling VS Waste energy recovery

LA PAILLE

CONCURRENCES ET COMPLÉMENTARITÉS DES USAGES DU GISEMENT AGRICOLE EN ÎLE-DE-FRANCE



MAI 2016
411615
1004V0827371 3046
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LE BOIS

CONCURRENCES ET COMPLÉMENTARITÉS DES USAGES DU GISEMENT FORESTIER EN ÎLE-DE-FRANCE

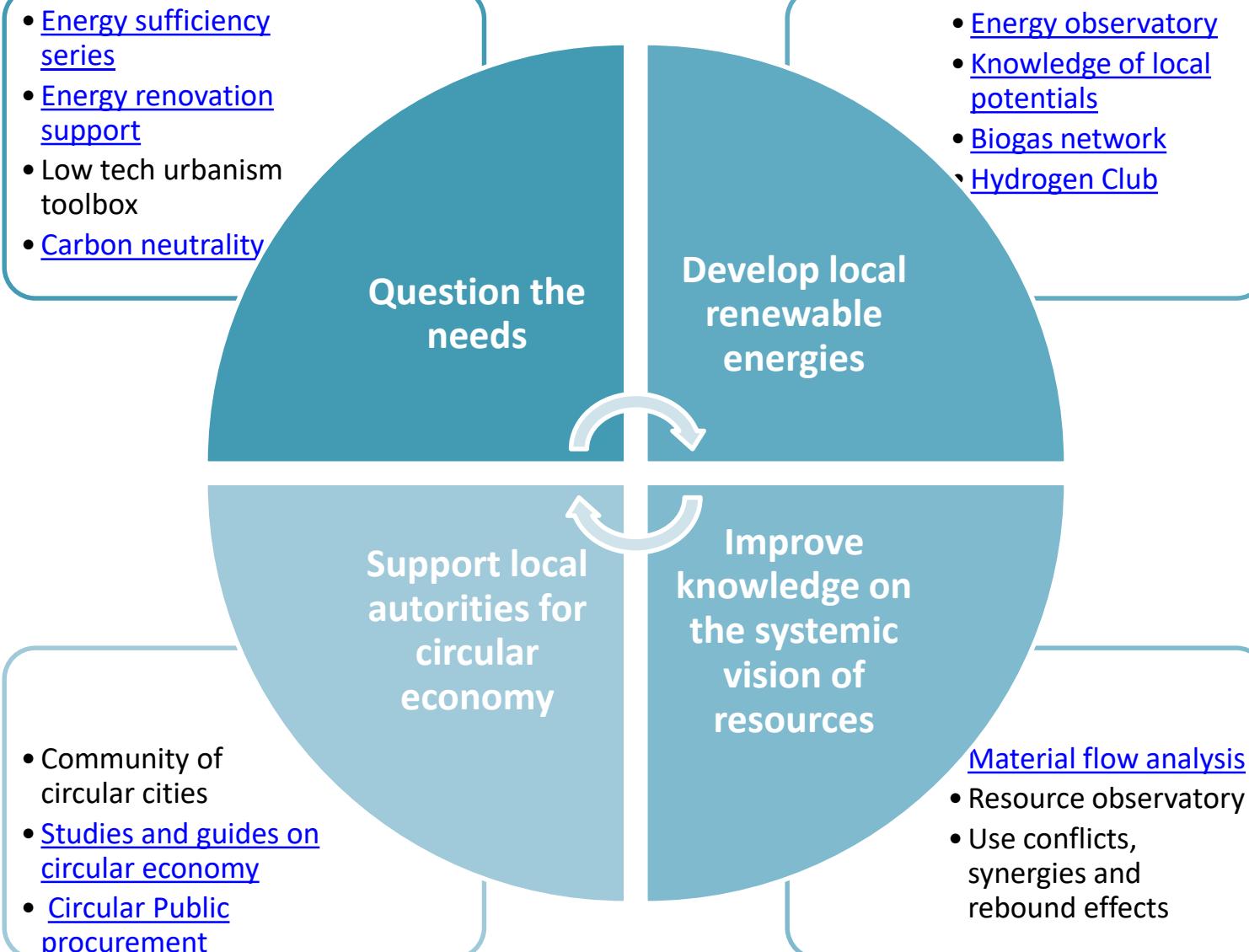


MAI 2016
415633
034 979 275120


Complementarities and conflicts of use on wood and straw between energy and construction



What we do ?



In conclusion, convergences and divergences

Reduction of our overall energy consumption
and fossil fuels in particular

Nuanced vision of the development of
renewable energies

Local resources valorization

Waste energy recovery and waste prevention

Local production and acceptability

Rebound effects and use conflicts between
resources

Limit the externality of the impacts of extraction

Land use and consumption of resources

Energy efficiency and sufficiency actions

Thank you

NOTE RAPIDE

PARIS REGION DEVELOPMENT AND URBAN PLANNING INSTITUTE #25



ENVIRONMENT May 2019 • www.institutparisregion.fr

HOW PARIS REGION RISES TO THE CHALLENGE OF THE CIRCULAR ECONOMY

20 tonnes
OF MATERIALS ARE CONSUMED BY EACH PARIS REGION INHABITANT PER YEAR (INCLUDING INDIRECT FLows)

60%
OF THE TOTAL CONSUMPTION OF MATERIALS IS DEDICATED TO ENERGY, FOOD AND CONSTRUCTION

Over 60% of global resources are consumed¹ by metropolitan areas, and over 80% are consumed² by 20% of the world's population. The Paris Region is no exception to this. Between 1970 and 2010, its population increased from 5 million to 10.5 million inhabitants per year over 30 years, the capital region is a large consumer of resources as each inhabitant consumes 6.5 tonnes of material per year for food, energy or construction materials. These three fields of activity account for 60% of the total volume of material consumed.

However, the ecological footprint of a Paris Region inhabitant is actually much greater due to a high level of consumption of "hidden" products. These account for 31% of the inhabitant's ecological footprint and are mostly manufactured outside the Paris Region, which increases the consumption of "hidden" materials. For example, manufacturing and distributing a TV set that weighs 11 kilograms consumes 2.5 tonnes of extra material. Producing a computer requires 240 kilos of steel, 22 kilos of chemicals and 1.5 tonnes of water, i.e. quantities much larger than the final weight of the computer. All in all, a Paris Region inhabitant's visible and invisible consumption is close to 20 tonnes per year (see the diagram).

HIGH DEPENDENCY ON FOREIGN MARKETS
These high levels of consumption result in strong pressures on natural environments because a significant portion of these resources are non-renewable. This inevitably leads to a gradual deterioration in supply conditions in terms of price, quality and quantity; thus, the region's dependency

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