



Métropole
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SEINE
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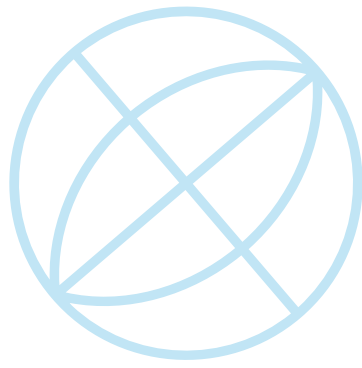
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A few narratives on the future of urban water management

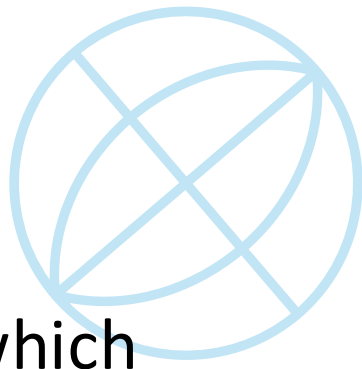
Jean-Pierre TABUCHI, Jean-Claude DEUTSCH & Yves KOVACS

Bilel AFRIT, Catherine CARRÉ, Bernard CHOCAT, Michel DESBORDES, Muriel FLORIAT, Christine GANDOUIN, Bruno NGUYEN, Nelly PEYRON, Pierre-Alain ROCHE, Patrick SAVARY, Elisabeth SIBEUD



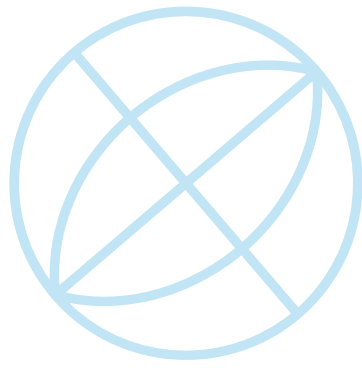
Summary

- What Eurydice is ?
- Goals and methods
- Short presentation of 3 narratives and discussions



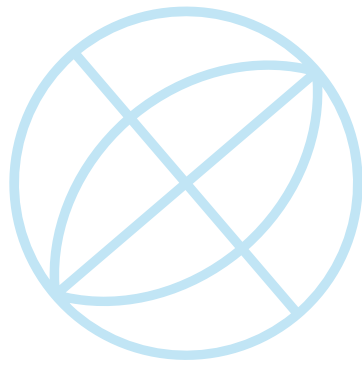
What Eurydice is?

- An association founded in 1989, dedicated to urban hydrology, which brings together scientists, engineers and operators.
- Its main goals :
 - to raise awareness and provide training in urban hydrology
 - to develop and promote a new urban water culture ([see the encyclopaedic dictionary of urban hydrology](#))
 - be a thinktank
- Eurydice recently developed several scenarios of what could be urban water management in 50 years' time!
- These scenarios treat climate change and its consequences on natural conditions as well as on the whole society
- Several questions have been raised, offering perspectives for the future of urban water management.



Our goals with this work

- Conduct forward-thinking analysis to envision the future of urban water management
- Get ideas on Eurydice future activities
- Transform the outputs of this work in a book



The main orientations

- The horizon for our narratives is around 2075
 - Far enough away from the present to imagine that profound changes could be initiated or have already occurred.
 - Climate change scenarios show significant differences at this time horizon.
- We chose to construct narratives about different possible futures for urban water management for the following reasons:
 - We are not prospective specialists
 - No one knows what will happen at that point
- The narratives are based on Eurydice's skills in urban water management
- The authors are free to tell the narrative they want. This is part of the richness of this work

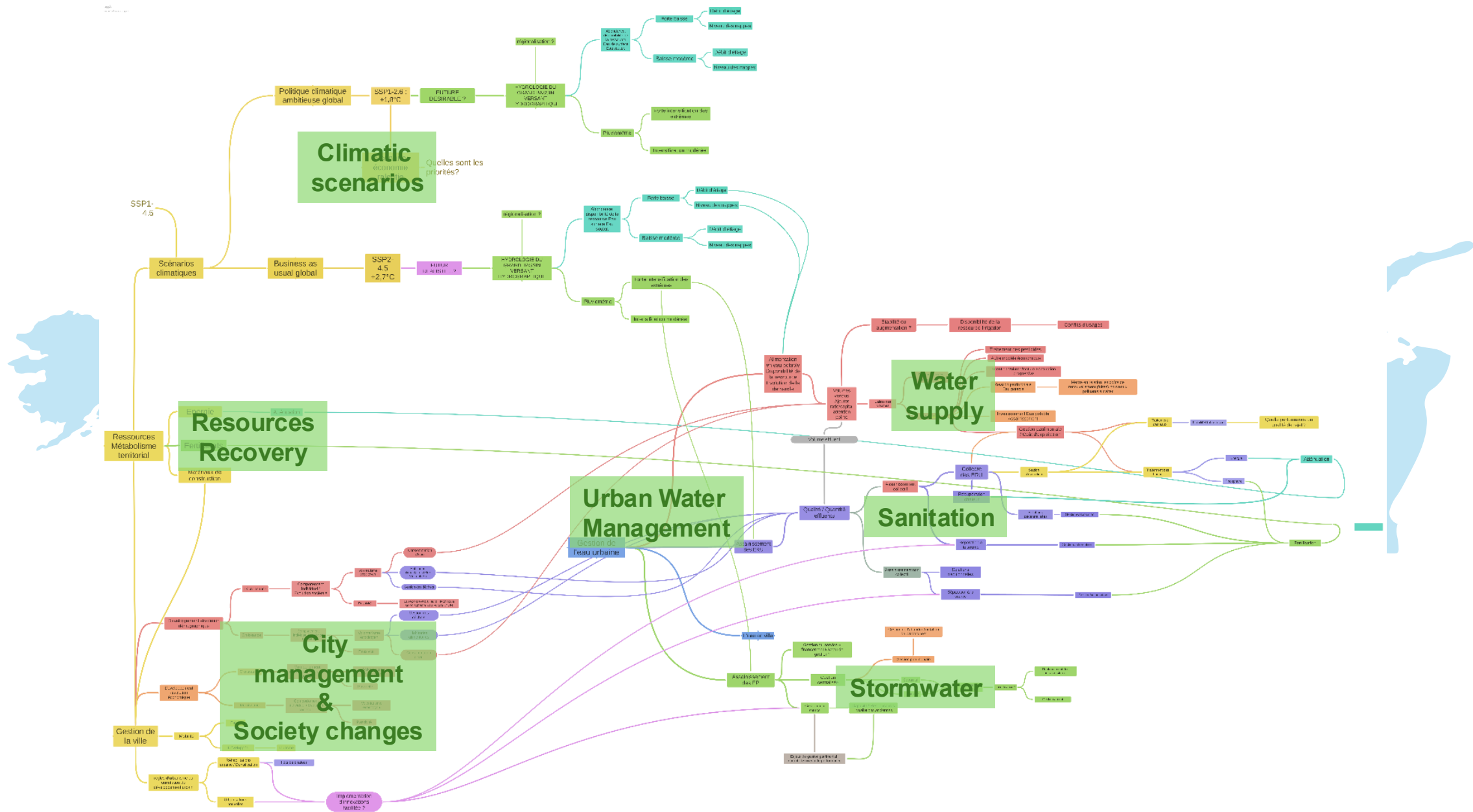
The method



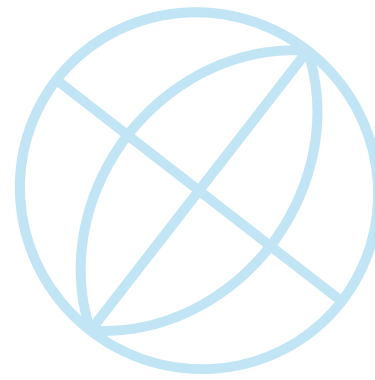
Climate : SSP 2 and SSP3 IPCC scenarios – Two regions : North and South of France

	Context 1 Choosen sobriety Sobriety chosen and accepted by all	Context 2 Technological gamble Preserving mass consumption lifestyles	Context 3 Post-metropolisation Extreme and imposed sobriety
Primary energy	50 GJ/inhab/year	100 GJ/inhab/year	30 GJ/inhab/year
Diet	50% less animal proteins	10% less animal proteins	66% less animal proteins
Water cons.	< 100L/eq.inhab/d	< 150L/eq.inhab/d	< 50L/eq.inhab/d
Demography	growth in urban areas		« Demetropolisation » to middle cities and rural areas
Urbanisation	• Limited expansion of urban areas and strong densification • Large-scale renovation of existing habitat, limitation of new buildings • 15% less in runoff contributing area in existing urbanised area • Sustainable mobility	• Large-scale housing deconstruction and reconstruction • 15% less in runoff contributing area in existing urbanised area • Increased mobility	• Urban development to accommodate “migrants” from large urban areas • 15% less in runoff contributing area in existing urbanised area • Extremely limited mobility
Resources recovery	Water, energy, N, P, K	Moderate recycling High demand for energy biomass, water and farm inputs	Water, energy, local N, P, K recycling
Governance	• Significant organizational and governance changes • User involvement in public services management	Private-Public-Partnerships Vertical governance	Developed local governance and democracy

The starting point: a mind map for a systemic approach driven by sobriety



Suggested frame for the narratives



Water demand and drinking water supply

- Resource availability and quality
- Drinking water production and distribution
- Robustness and resilience
- Etc.

Sanitation

- Urban wastewater production
- Urban wastewater networks design and operation
- Stormwater management
- WWTP
- Resource recovery
- Environmental impacts
- Robustness and Resilience
- Etc.

Water in the city

- Cooling « urban heat islands »
- Nature in the city even « Wilding »
- Amenities
- Overall quality of the environment
- Etc.

Governance

- Public services management
- Funding system
- The citizen involvement
- Etc.

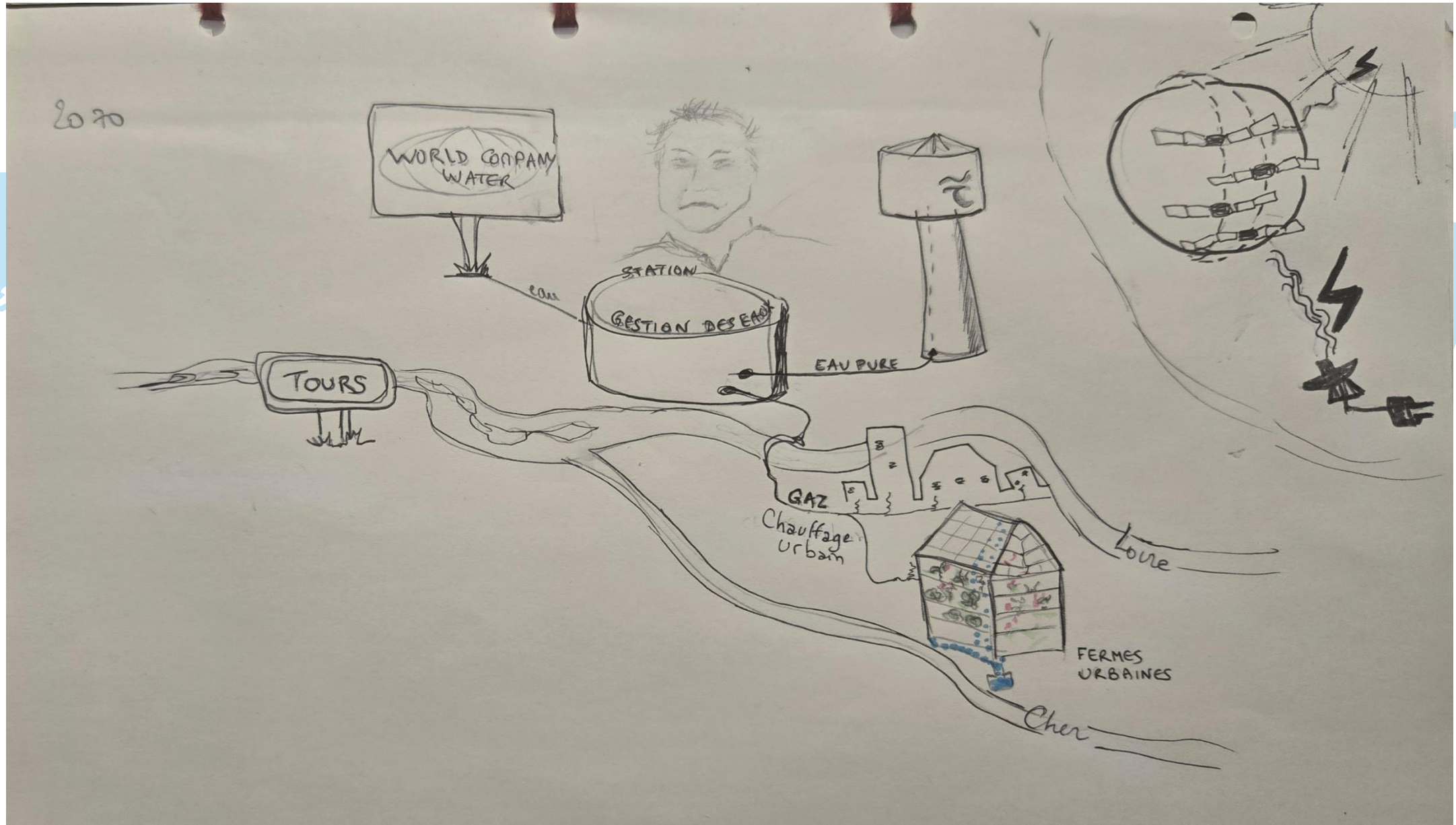
Narrative n°1 : moving Dunkirk and Calais to Lille in a choosen context of sobriety – North of France



Narrative n°2 : a new city, Epsopolis, South West of France, sobriety and technical gamble



Narrative n°3 : city of Tours – Technical Gamble



Climate : SSP 2 and SSP3 IPCC scenarios

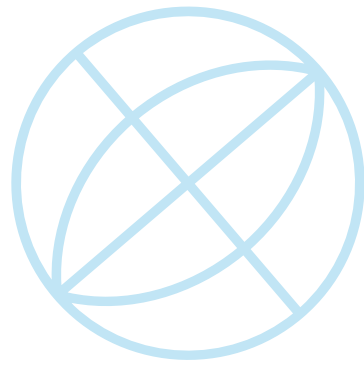
	Example 1 Chooosen sobriety Northern part of France	Example 2 Technological gamble Northern part of France	Example 3 Post-metropolisation Southern part of France
Teasing	The planet is on track for a +3°C increase in temperature. Significant instability and a series of extreme events. Sea levels are rising rapidly. Dunkirk and Calais are vulnerable to this sea rise level: the decision has been made to relocate to Lille. New rules are needed to succeed in this challenge: densification of the city on top of the city, end of cars in the city, acceptance of austerity. Population has grown from 1.2 Minhab to 1.7 inhab.	AMOC has stopped Freezing winters, scorching summers, snow, and lack of autumn rainfall... are damaging urban green spaces and agriculture. Aging population. Establishment of a strong (and) protective government. Water and energy management is concentrated in a global company and focuses on large cities to maximize profitability. 100% automated agricultural production in greenhouses Population tripled. 1Minhab.	An accident at the Golfech nuclear power plant raises awareness of the dangers: population displacement, A new city has been created, whose inhabitants are convinced that adapting to climate change requires a change in society. This new city will have a population of 70,000 in 2070 and will welcome climate refugees.

	Example 1 Chosen sobriety Northern part of France	Example 2 Technological gamble Northern part of France	Example 3 Post-metropolisation Southern part of France
Habitat	Urban densification to accommodate the population of coastal cities and limit travel by bringing services closer to residents. Development of source management for rainwater, gray water, urine, and organic matter. Opportunity to include the population in governance. Creation of islands of approximately 10,000 residents for a Public Environmental Service.	The city of Tours has become part of the ring of satellite cities surrounding Paris. To adapt, Tours has developed its underground city, a solution inspired by Montreal, but one that remains highly vulnerable to flooding, as 2047 demonstrated. Unitary conversion to separate systems	A few detached villas Groups of buildings manage water and waste. The techniques installed for drinking water fall under the responsibility of co-ownerships. Sanitation via septic tanks Drinking water production facilities in buildings

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Water resources	Use of alternative water sources: treated wastewater, gray water, rainwater to cover reduced needs of 80 liters/day/person. Policy prohibiting the use of pesticides and other chemicals to ensure water quality. Monitoring of saltwater intrusion to avoid impacting agricultural development. 80L/d/p including 40L/d/p of potable water	Storage capacity of 1.5 million cubic meters to get through severe drought months Recovery of evapotranspiration from greenhouses Strategic storage of rainwater Total recycling of urban wastewater Ultra-pure water is fed into water towers. For less densely populated areas, a decentralized water disinfection solution is implemented: compact devices for chlorination/ozonation/UV treatment are installed at the base of buildings. 50L/d/p including 10L of drinkable water	Surface water and groundwater, scarce in autumn due to lack of snow (only one day of snow-capped peaks in 2070) A 6-day reserve (50,000 m3) Domestic water recovered for irrigation, rainwater recovered. Production of PRE-DRINKABLE water, then a device in each home or building for final treatment. 80L/d/p

	Example 1 Chosen sobriety Northern part of France	Example 2 Technological gamble Northern part of France	Example 3 Post-metropolisation Southern part of France
Energy production & Resources management	Solar water heaters, Wind turbines Urban renewal has made it possible to separate four flows: rainwater, urine separated from wastewater, gray water, and biowastes collected from sinks. All of this means nitrogen, phosphorus, biogas, and energy. Plastic packaging has been banned. Biogas primarily meets the needs of agricultural machinery. Liquid and solid waste managed by a unique service	Solar energy captured by satellites in space Concentrated wastewater has a higher nitrogen and phosphorus content. New-generation reactors recover these elements while providing energy. Sludge treatment produces methane and hydrogen, which are used to power district heating and the local economy. Recovery of methane and hydrogen from wastewater treatment for district heating	Deployment of osmotic power plants. Wind turbines + solar + methanization Urine collection, struvite production as fertilizer for local producers Biogas recovery Laser and ultrasound solutions for plastic disposal and urine treatment, which are very energy-intensive
Food production	Local production in short supply chains	Greenhouses and Hydroponics	
Governance	Participatory democracy User involvement in the management of public services	Authoritarian political regime Increase in water prices, significant fixed portion of water prices Delegation of public service to the World Water Company	Participatory democracy Important role of the building coordinator

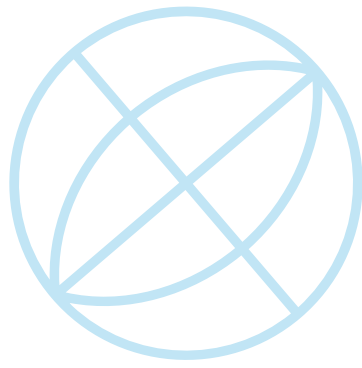
Main questions raised by these narratives



- As with many areas of the ecological transition, how will it be possible to finance the adaptation of our cities and water assets to the new conditions?
- How can existing infrastructure be adapted to new operating conditions? For example, sewerage or drinking water networks with very low flow rates.
Or what will be the future of the gas network if we manage to abandon fossil fuels?
- The involvement of users and the general public as actors in the ecological transition is a major challenge.



Thank you for your attention



The basements to sketch our futurs

- The French Agency for Ecological Transition (ADEME) report:
« *2050 transition(s), choose now, act for the climate* »
4 scenarios of society changes to reach the carbon neutrality by 2050
- France's electricity Transmission System Operator (RTE) report
“*Energy Futures 2050*”
- Météo France “*New climate reference projections for the metropolitan area – DRIAS 2020*”
- PIREN Seine – CNRS Research program on the Seine River.
“*Agri-food and urban scenarios for 2050*”
- France Stratégie report : “*Water demand - Regional outlook for 2050*”

Climate change impacts on average yearly rainfalls

