



OPENAGRI

Zoom-in

March 2020

OpenAgri Participative Urban Metabolism

Context

Like the human body, cities are living, ever-evolving organisms. Just as diet, exercise, sleep, or laughter can be seen as indicators of our personal physical and emotional wellbeing, **the ways in which goods, water, commuters, or food move through the urban ecosystem** determines a city's health and sustainability within larger regional and global natural systems. The more knowledge we have of which resources flow into our system, how these resources are being used, and what happens with any output the organism doesn't need to sustain itself, the more likely we are to live balanced and healthy lives.

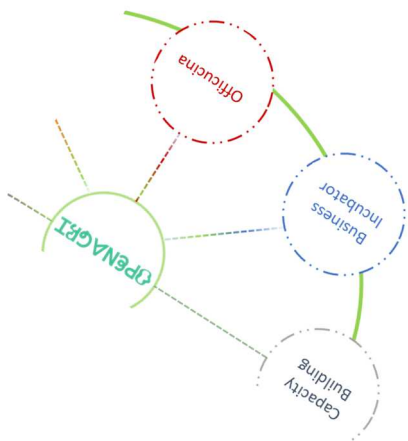
A **wave of international policy vision for sustainable development** has recognised the need to use natural resources more efficiently and encourage local governments to implement regulations and tools that support local resource efficiency initiatives.

Urban metabolism is the idea to look at cities from a

systemic point of view linking all the social, economic, political, territorial, ecological, resource, waste, etc. challenges that coexist in the extremely complex systems that cities are. **The metaphor conceptualises the city as a living organism where resource flows enter, are transformed or stocked and waste flows exit the territory.** This multi-disciplinary research field aims to create an understanding of and for the workings and interdependencies of urban systems, which in turn can be applied for a transition to a restorative future.

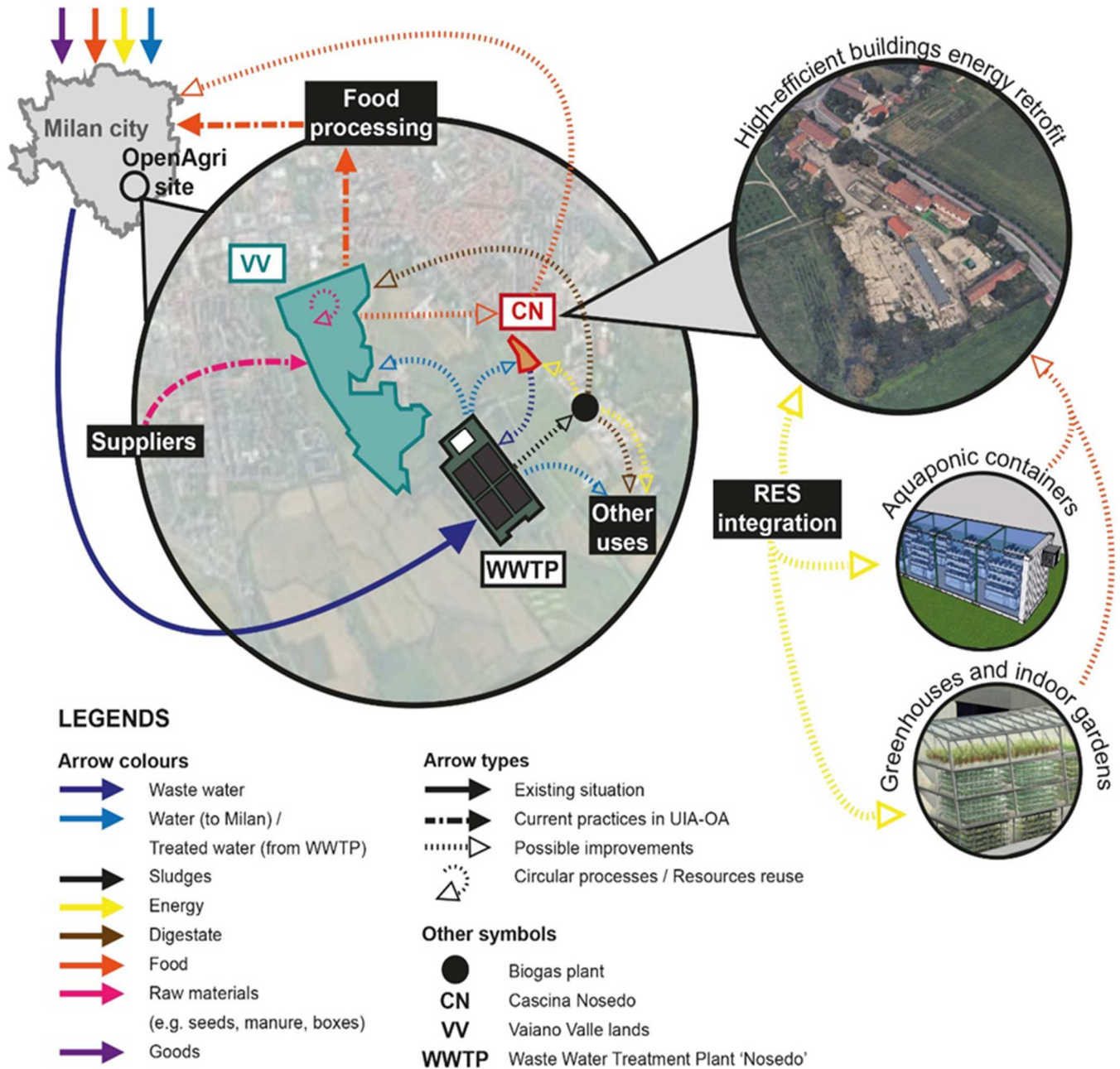


OpenAgri hub involves the Waste-Water Treatment Plant near the Cascina, the lands of Vaiano Valle and all the buildings included in the Cascina (about 4000 m²). These three pivotal elements underline the possibility of creating connections toward the realization of real urban metabolism practices with a promising potential of diffusion and penetration.



OpenAgri Urban Metabolism Approach

In order to provide a view of the OpenAgri urban metabolic approach, the diagram below shows a scheme of the flows between the urban area of Milan and the OpenAgri site, in **terms of water, energy, material and food flows** with reference to the existing situation (i.e. baseline before the UIA-OpenAgri project), current situation (i.e. the end of the project) and possible improvements for increasing circularity.



To provide a view of the metabolic approach considered in the previous diagram, **in terms of water, energy, material, and food flows to/from the district and the city**, it shows the relationship among the agro-ecologic laboratory in VV, the innovative farming and the socio-economic activities inside CN and other innovative laboratories devoted to the study of the water cycle (concerning the WWTP) by a metabolic approach.

Converting the VV in a productive area would increase some relevant impacts categories as Lands **Use, GWP, and energy consumptions as well as transportation inside the selected area**, while it can reduce the import of food from other agriculture areas or other Milan districts.

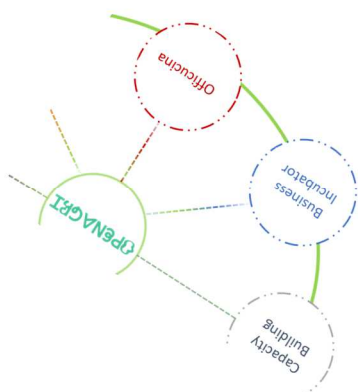
A metabolic analysis could highlight that, **by adopting in the VV lands the circular farming practices** which were foreseen in the initial plan but consolidating them thanks to the networking of local markets and suppliers (e.g. reuse of seeds, of agricultural waste as mulching layer, creation of natural treatments based on the local availability and animals integration for reducing the use of agrochemicals, reuse of boxes for collecting produces, etc.), positive effects in terms of matters exploitation would be implied.

Moreover, it allows to **recover water from the WWTP for irrigating the lands** and estimating the positive effect derived, for instance in terms of diversification of agricultural products, an increase of crops yields, etc.

In the next period, **the retrofit of some CN buildings will be able to strongly reduce the energy demand of the complex**. Obviously higher energy performances could be implied by retrofitting all buildings of CN complex. Additionally, implementing local renewable electricity generation would be able to reduce fossil energy consumption, increasing a self-consume of energy and pushing buildings towards nearly Zero Energy Buildings target (nZEB).

Although the renovation of buildings impacts in terms of materials construction and energy consumed, it could reduce the energy for space heating and cooling during the operational use in comparison to a not retrofitted building. Moreover, the **WWTP and the local sewerage collector could be considered as a source of heat**. Further, **sludge by the WWTP can be transformed in biogas and digestate, which**

could be used as fertilizer in the VV lands, and the tanks of the plant can be integrated by PV systems. Furthermore, the agro-ecologic approach can determine the availability of biomass to be adopted as energy sources, involving Parco della Vettabbia and other pertinent areas.



Circular economy, urban metabolism and energy-environmental effects of food production and consumption. The metabolic approach is considered in a broad sense, as a support to the design choices related to agronomic practices and food production. Depending on the aims of the different analyses, scenarios and goals, the boundary of the system can overlap the area strictly involved in the OpenAgri project or a larger area, including the surrounding.

The lands have been analysed from the point of view of quality of soil, availability of water and abusive exploitation, implying the promotion of awareness and the proposal of mid-terms (i.e. beyond the timeframe of the project) follow-up actions and projects.

Due to the emerged criticalities (e.g. unavailability of water and buildings, uncertain conditions of soils, presence of squatters etc.), the different stakeholders deepened their awareness about the involved territory and supported each other in the agri-



Water grid and partitions of lots dedicated to selected agri-food startups

food activities, **creating a network able to connect other farms and farmhouses nearby.** The local conditions have implied also a sort of natural selection: only the start-ups able to face these criticalities by low impact agronomic practices and by a creative and smart organization of their activities have been successful.

Many strategies could be considered for looping and cascading these flows, i.e. to create a more connected food web within the city. For example, if food waste were to be composted as soil, the soil could be used locally for farming or landscaping so the city would have less need for hauling material by truck and acquiring land for landfill.

OpenAgri is part of broader Milan Circular Strategy. The Milan Circular City has three-pronged focus: **food policy; fashion and design; and urban metabolism.** Milan is already experiencing the benefits of managing its relationship with food in different ways, with citizens and businesses active players in this shift. The OpenAgri is the bridge with **Nosedo Wastewater Treatment Plant** with a focus on **water recycling** in peri-urban agriculture, with Milan Food Policy, Food Hot Pot (with Cariplo Factory) and other related initiatives that are taking place in the city.



Participative Urban Metabolism

Actions of urban transformation involving different situations such as; education-training, hospitality, production and agricultural transformation, cultural production and social inclusion, **can generate resistance to change**. OpenAgri applied a methodology designed to empower citizens and organizations in the area to cooperate in transformation of their communities into more resilient, equitable, and ecologically healthy settlements. This approach brought an increased focus on **moving from a top-down to a bottom-up approach to urban environmental accounting**, in order to capture data that is unavailable in conventional databases while promoting a transdisciplinary approach in which co-design takes place with society and not for society, and to ensure assessment is not a one-off event.

The UIA-OpenAgri project contributes to local food security, health, job and training opportunities, and voluntary work options; strengthens social safety nets; allows developing a sustainable connection with nature and biologic food production; and activates challenges in food distribution via alternative local food retail and delivery systems.



More sustainable and resilient urban futures can be furthered by using urban metabolism methods and approaches in an ongoing and iterative process. Healthy urban metabolism, just like a healthy ecosystem or an organism, **works best when it's frequently monitored and continuously fine-tuned**.

In addition, since it is human beings that are driving the demand for resources that shape a city's metabolism, **it is imperative that citizens are allowed to weigh in and participate in a meaningful way**. Getting this kind of first-hand information is not only invaluable because of the previously unknown data points it provides, but because the personal involvement creates new awareness and provides incentive to the community to become engaged in finding solutions to existing problems.

The OpenAgri **Artist-in-Residence** activity brought the attention of the City of Milan and its community about the beauty of the suburban landscape and the challenges it poses, by establishing a strong bond with its surrounding local dimension and activating processes of social inclusion, urban regeneration and cultural innovation. The **MIST event – Ritual for Landscape in Transition, Participative Urban Metabolism exercise**, was an exploration of the relationship between place and emotional and social space (more information about the MIST event on OpenAgri Journal number 5).



Findings

OpenAgri highlights how the Urban Metabolism approach can be integrated with spatial design in two different ways, according to the scales implicated. On the **metropolitan scale**, Urban Metabolism provides the means to identify and manage key resources (water, energy,...) and proposing interventions that can improve a city's global metabolism. On the **scale of the neighborhood**, the Urban Metabolism approach aims to close the energy and material cycles on the design plot, though without necessarily connecting the neighborhood to the city network.

From the **landscape angle**, when applied on the local scale in an urban landscape, the impact of Urban Metabolism —a technical phenomenon—is remarkable, in the case of the Aquaponic containers, greenhouses or indoor gardens.

Both on the metropolitan and neighborhood level, OpenAgri benefited from a favorable **institutional context in Milan** that permitted experimentation in new resource management systems which could never otherwise been legally put into effect.

Urban Innovative Actions (UIA) is an Initiative of the European Union that provides urban areas throughout Europe with resources to test new and unproven solutions to address urban challenges. Based on article 8 of ERDF, the Initiative has a total ERDF budget of EUR 372 million for 2014-2020.

UIA projects will produce a wealth of knowledge stemming from the implementation of the innovative solutions for sustainable urban development that are of interest for city practitioners and stakeholders across the EU. This journal is a paper written by a UIA Expert that captures and disseminates the lessons learnt from the project implementation and the good practices identified. The journals will be structured around the main challenges of implementation identified and faced at local level by UIA projects. They will be published on a regular basis on the UIA website.

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March 2020

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