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WHITE PAPER

ON GOOD PRACTICES IN THE FIELDS OF ENVIRONMENT AND ENERGY IN THE EU MEMBER STATES

STUDENT ENERGY GROUP
OF THE COLLEGE OF EUROPE 2016-2017

students of the College of Europe

Foreword

Given the intense academic offering at the College of Europe – including not only the courses but also the various extra-curricular activities – the present student initiative is a clear token of their strong sense of commitment and responsibility towards an increasingly sustainable future in Europe and further afield. Driven entirely – from the inception to its completion – by students' own personal drive, this White Paper is both a timely and refreshing initiative, and one that has successfully made use of one of the College's main strengths – its diverse student body.

As a professor and a practitioner in the field of energy, a field that is subjected to some of the most pressing challenges of our times with regard to its impact on the environment, I feel both inspired and encouraged by the devotion shown by the students throughout this research project. Furthermore, I feel confident that some of the ideas highlighted below and chosen from a wide variety of best practices identified in all of the EU's member states will present some ample material for further reflection. Europe will most certainly need much broader societal engagement if it is to stand up to the challenges that lie ahead, and no other group will prove more important in doing this than young people.

The present paper is of course but a small step towards the goals it has set out to achieve. That said, it is an important stepping stone in shifting the discussion from the gloomy to the positive, from the obscure to the local and practical. It thus moves the debate from the oft removed controversies related to governance frameworks to an examination and appraisal of the countless local initiatives that bring change on the ground across Europe as well as their uptake in other corners of the EU. As such, it contributes to the much needed transition towards an increasingly holistic approach in facing the EU's environmental dilemmas – one that considers both the European, the national and the local dimensions all at the same time.

I wish you a pleasant reading.

Dirk Buschle
European Energy Policy Chair
College of Europe

Preface

Cette aventure a commencé il y a déjà plusieurs années, d'une idée de découvrir et de parcourir l'Union européenne à la recherche de ses trésors naturels et surtout à la rencontre des gens qui la peuplent et l'embellissent chaque jour.

Ce livre blanc s'est écrit grâce à l'écrin formidable qu'est le Collège d'Europe, qui nous offre à la fois un lieu de réflexion mais également la matière pour réaliser et faire évoluer de tels projets. J'ai eu l'incroyable chance de faire partie de cette merveilleuse promotion Keynes 2016-2017, de côtoyer des êtres, des idées et des espoirs d'une qualité toujours surprenante.

Ce travail a nécessité beaucoup d'efforts de la part de chacun des contributeurs que je souhaite remercier pour leur passion et leur engagement, ici dans ces quelques mots. Il n'a pas été chose aisée que de mener cette année si particulière et intense. Mais, telle une famille, chacun a murmuré et pensé cette recherche jusqu'à la réaliser.

Il est parfois des feux d'artifices intellectuels qu'il est bon de contenir, mais pas tout le temps, et chacun a montré son réalisme et sa ténacité face à ce torrent de réflexions qui nous a submergé. Du choix de la méthodologie à l'élaboration entière du papier, chacun a pris part et place dans ce processus.

Il est désormais à vous lecteurs de faire vivre cette aventure, de l'accompagner et de la faire évoluer. Telle une goutte d'eau supplémentaire dans un océan déjà bien fourni, j'espère que ce travail d'équipe accentuera cette transition nécessaire vers un nouveau monde. Un monde où l'énergie se marie avec l'environnement pour permettre à nos générations et aux suivantes de vivre en harmonie avec notre Planète Terre.

A toute cette fabuleuse équipe et ceux qui ont gravité de manière bienveillante autour,

Claire Calmels

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Introduction

The White Paper on Environmental and Energy Practices in the European Union comes from the idea to discover the EU and to observe how powerful citizens' initiatives can be. Civil Society is indeed particularly proactive on the energy and environmental issues. Society is moving faster than policy-makers on specific matters and has the capacity to spark movements and initiatives (such as the ones presented in this paper and many others identified by the White Paper Team) that may benefit from an adequate policy framework.

The College of Europe seemed to be the best place to assess the quality of the EU policy framework and find leads for improvement. This international post-graduate school dedicated to European Affairs gathers students from more than 50 countries around the world inclined to work together and to promote relevant initiatives. This holds true for energy and environment issues in particular. Students are stimulated via the activities of the European Energy Policy Chair and through the Energy Group of the Students of the College of Europe, both dedicated to these specific questions. It is in this unique atmosphere that 25 students from various EU Member States – the White Paper team - engaged in this project from October 2016 until March 2018.

For the first part of the research, the team chose to highlight three best practices per EU Member State preferably one at national level and two at local level. Contributors however had full autonomy to choose practices that they really believed in: hence, some countries were exclusively represented by national or regional practices, for instance. The one rule we had set was not to include practices that fall within the (rather extensive) corpus of European law, although the fact that European policy-makers followed their legislative agenda during the elaboration of this White Paper somewhat compromised our rule to avoid practices already covered by EU legislation. This is true in particular with regard to proposals within the Clean Energy Package for All Europeans.

The coordination Committee then selected some of the good practices that could benefit from an improved legal framework, following a strict methodology which is explained below.

Energy and environment are interlinked and more than ever must be seen as a single issue that literally defines the way we live. It is quite extraordinary to observe how Civil Society, Member States and the EU have already linked these two essential and inseparable topics – and to think how they could do so even better.

The practices selected for this White Paper are but a few manifestations of the creativity and engagement of European citizens. The role of the EU in the projects identified cannot be understated, as energy and environment policies are among the most successful and visible EU policies conducted to date. It is, now more than ever, up to the EU to reap the fruits of the environmental consciousness it helped raise and rise to the environmental challenge of our world, together with its citizens.

Anthology - Reflexions on a more innovative energy and environmental policy

Introduction

As explained above, the first phase of our work aimed at collecting the data on a large amount of environmental good practices in the EU. This data came from open sources and sometimes from the instigator of the practice themselves. We set the goal of collecting 3 practices per Member State, for a total of 84 practices. This objective was ambitious given that the White Paper was written in parallel of our studies, yet achievable. Indeed, after one year of work, we have reached this goal.

After the end of this first phase in September 2017, the coordination team started selecting the best practices, as defined by a ranking based on 4 criteria:

- First, the **positive effect of the practice** (10 points). Naturally, it would make little sense to advocate for the harmonisation of a practice that does not have a tangible positive effect where it is already implemented across the EU. We have assessed the effect of the practice essentially by looking at its effect on the protection of the environment and its contribution to the building of a cleaner energy mix for Europe, although social and economic aspects also played a role in the ranking of the practices. While resources were lacking to conduct real impact assessments, our evaluation rested on the analysis of reported or foreseeable positive effects given 1) the existing legal framework, 2) the availability of targeted funding solutions for this type of practice, and 3) the seriousness of the problems that these practices were striving to tackle. The less a practice was supported by public policy and the more pressing the problem addressed was, the higher we ranked the practice.
- Second, the **replicability of the practice** (10 points). The aim of this Paper is to propose harmonisation at the European level. The objective is then to find practices that are easy to duplicate. The practice must be efficient, easy to develop, and have a low cost. The easier a practice is to replicate, the higher the "return on investment" of promoting the practice for a public administration with limited resources. This is especially important in the context of declining budget spending, at all levels of administration.
- Third, the **uniqueness of the practice** (5 points). Indeed, the practice must be innovative and new to maximise the added value of its harmonisation.
- Fourth, the **acceptability of the practice** (5 points). This criterion deals with the acceptability for the public sector – at local, national and European levels – including by the private sector that could invest in this type of practices or develop them as well as by the Civil Society, which is at the heart of the European project. Regardless of its positive effects, replicability, and uniqueness, a practice that is not acceptable will be very hard to promote, while what is aimed here is the maximisation of the impact that the White Paper could have.

This resulting matrix attributes a score out of 30 points for every practice that composed the first part of this study. One additional criterion that has been defined by the team is the

disqualification of practices already enshrined in European Law or contained in existing legislative proposals. On the other hand, practices that could be the subject of proposals the content of which is not yet defined (which are at the stage of a public consultation, for instance) were favoured, as they could fit within the Commission's political agenda and would be the easiest to advocate for.

The selection process for the practices was conducted in three stages.

Each member of the coordination team conducted a first reading of all the practices and ranked them according to the matrix previously created. Each member gave its own appreciation of the quality of the practice, both through the previously presented grading system and through qualitative comments. The final note given to each practice was the average of the grades given. At the end of this first reading, 21 practices received 20 points or more and were shortlisted. The size of this shortlist demonstrated the quality of practices all over the EU.

The coordination team then conducted a second reading and reviewed all these high graded practices to confirm the viability of the selection criteria to ensure that the ranking of the practices is consistent with the qualitative comments made on each practice.

Lastly, each of the three students from the coordination team proposed a list of 6 practices according to the points they have attributed to the 21 shortlisted practices and their general appreciation of the practice. The students then presented their personal choices in front of their peers in order to create a consensus on the final list of the practices chosen. Each of the three students was to express his feelings, thoughts and doubts about the practices in question. Further research was undertaken at this stage by the team to confirm the viability of the practices chosen.

After the selection of the best practices, the authors whose practices were selected pursued further research on the practices and identified leads for harmonisation. The Coordination team also contributed to the reflexion and the analysis of the existing legal framework.

This process allowed us to identify 6 practices which were not only highly graded, but also could benefit from a stronger policy framework. Some of these practices were then bundled together because of their complementarity. As a consequence, the following four practices are developed in this second part of the study:

- Urban green initiatives in the European Union (Urban farms and green roofs): from empty spaces to green opportunities
- The case for bee inspection: filling the gap between policy makers and beekeepers
- The Junker App: a new practice for waste management
- From biowaste to agricultural production and beyond: How to think the circularity of the European food system

Urban green initiatives in the European Union (Urban farms and green roofs): from empty spaces to green opportunities

By Axel DARUT

The objective of linking these two practices is to highlight the fact that there are numerous urban farm and green roof initiatives across the European Union but no coherent European framework or direct funds allocated to support such initiatives.

What is "Urban farm"?

Urban and rooftop agriculture takes many forms[1]. These can range from household, school and community gardens, to vertical and indoor farms. A fundamental distinction is often made between urban agriculture (involving food production in urban area) and peri-urban agriculture, which occurs on the fringes of cities[2].

Urban agriculture could be defined as "the growing, processing and distribution of food or livestock within and around urban centres with the goal of generating income"[3]. Another definition considers urban agriculture to encompass "the production of food and non-food plants, as well as husbandry, in urban and peri-urban areas"[4].

Urban agriculture also has social, political and administrative aims. This includes opportunities such as proximity to consumers' markets, a growing demand for high-quality food quality and activities like environmental education or ecotourism.

In this perspective, urban agriculture embraces many forms, including a broad range of meanings and challenges on what it entails.

Differences between conventional and urban agriculture

- Rural agriculture may involve "agricultural activities with low economic dependence on material outputs, while using the production of food for achieving other, mostly social, goals"[5]. In contrast, urban farming is based on a business model that takes advantages of proximity to a city or town by offering local or regional agricultural products or services. In this perspective, the urban agriculture model is in line with the Special Eurobarometer 440 on "Europeans, Agriculture and the CAP" from 2016[6] which finds that four out of five EU citizens consider that "strengthening the farmer's role in the food chain"[7] is either "important" or "of a high importance".

[1] For a list of examples, see https://citiesintransition.eu/tag/urban-farming/
[2] "Urban agriculture in Europe: Patterns, challenges and policies", European Parliamentary Research Service, December 2017.
[3] Roggema (ed.), Sustainable urban agriculture and food planning, Routledge, 2016
[4] Santo, Palmer and Kim, "Vacant lots to Vibrant Plots: a review of the benefits and limitations of urban agriculture", Johns Hopkins Center for a Liveable Future, May 2016
[5] Rojo & al., "From urban food gardening to urban farming".
[6] Eurobarometer survey available at: http://ec.europa.eu/commfrontoffice/publicopinion/index.cfm/survey/getsurveydetail/instruments/special/surveyky/2161 (viewed in January 2018)
[7] *Ibidem*.

- Urban agriculture engages new technologies different from the ones employed by rural agriculture. Urban agriculture is seen as an alternative to conventional agriculture (which involves longer food supply chains). This is also another way to reconnect producers to consumers, and to re-localise agricultural production[8].

Dimensions of urban farming in the European Union

Large scope of urban agriculture: School garden; Urban farm; Community garden; Backyard garden; Edible landscape; Building integrated agriculture (Indoor farming, vertical farming, open – air rooftop, rooftop greenhouses); Aquaponics (hydroponics, aquaculture); Hydroponics; Indoor farming.

Main dimensions of urban agriculture:

- **Food security dimension:** at global level, it has been estimated that 67% of the world population by 2050 will be living in urban areas. Reliably feeding such a population might prove challenging.
- **Economic dimension**: Urban agriculture has made important contributions to food production and is a real opportunity for the development of small-scale entrepreneurs.
- **Social dimension**: whether for recreation and leisure time, for education or health issues, or for disadvantaged people in the form of specialized-care farming[9].
- **Environmental dimension**: environmental benefits and constraints of urban agriculture and the real need of building a European framework on this specific topic are summarized in the table below[10] :

Reported benefits	**Reported limitations**
Local ecosystem services	
Increased biodiversity	Soil management, irrigation and fertilizer use practices by Urban agriculture growers may not be ecologically sound
Habitat and food source for pollinators	
Reduction in urban "heat island effect"	

[8] Urban agriculture could be analysed as a model of short food supply chain, in line with Article 11 of the Regulation EU n°807/2014 regarding the European agricultural fund for rural development, which stipulates that "Support for the establishment and development of short supply chains...shall cover only supply chains involving no more than one intermediary between farmer and consumer"

[9] Lohrberg, Licka, Scazzosi and Timpe (eds), Chapter 3.2 : "Creating added value : societal benefits for urban agriculture", in Urban Agriculture Europe,, European co-operation in Science and Technology (COST), 2016

[10] Urban agriculture in Europe, Patterns, challenges and policies, EPRS, December 2017

Increased rainwater drainage, reducing risk of flooding, groundwater contamination and groundwater depletion	
Recycling of organic water	
Climate change mitigation	
Potential reduction in greenhouse gas emissions (GHG)	If plants are grown in energy or resource-intensive locations, this may increase GHG emissions
Carbon sequestration by vegetation and crops	Small-scale, fragmented urban agricultures may be less efficient in resource use and transport emissions than conventional agriculture
Potentially reduced energy and resource inputs using some technological urban agriculture operations	If urban agriculture became ubiquitous in cities, it could reduce population density, requiring more driving and greenhouse gas emissions than the current system
Adds to collective memory of food production and protects urban green spaces reinforcing cities' capacity to produce food in times of crisis	

Practical cases of urban agriculture across the European Union

Across the European Union, a number of local initiatives could be underlined to explain how urban agriculture has an important social and economic benefit for territories. This White Paper focuses on two relevant initiatives that prove EU needs to build a framework to take full advantage of urban agriculture both for the citizens and the private sector.
The first focus project is *the Rotterdam Climate initiative of Rotterdam*[11,12] in the Netherlands, which promotes the benefits of green roofs for a cleaner city. The city of Rotterdam has implemented an initiative called Rotterdam Climate Initiative in 2006 with the aim of reducing CO2 emissions by 50% by 2025 while promoting the economy in the Rotterdam region. With this initiative, the municipality launched the Green Roofs Programme by covering roofs with soil and plants. This program answers to the following specific goals:

- Absorb rainwater and diminish run-offs. This is a way to protect roofs and to extend their lifespan that can make significant savings for buildings.
- Reduce CO2 emissions by absorbing them in the city, as a forest could do. Air pollution is one of the main environmental priorities of 2018, as many cities are committed

[11] Gemeente Rotterdam Website : https://www.rotterdam.nl/wonen-leven/groene-daken/
[12] Rotterdam Climate Initiative Website: http://www.rotterdamclimateinitiative.nl/UK

to highlight this issue. Urban agriculture is a creative way to fight against air pollution and climate change, while rehabilitating and embellishing unused urban and peri-urban spaces.

- The city also encourages other forms of initiatives related to sustainable use of the roof, such as solar panels to produce renewable energy.

The second focus initiative is *the urban agriculture project of Antakalnis* (suburb of Vilnius) in Lithuania. This project is led by inhabitants in Antakalnis who wanted to revitalise a greenhouse. This specific greenhouse was abandoned for 10 years[13] before the launch of the project. This initiative aims to develop a growing local community and to bring people from urban areas in the Country closer. It also aims at promoting new technologies that could be complementary to this kind of activity (e.g., Solar panels or permaculture)[14].

Such initiatives, located in two different member states where economy, demography and urbanization are heterogeneous proved that while promoting them in urban and peri-urban areas can have positive social and economic impacts. It is also a good opportunity for the European Union to include its Citizens in the design of its environmental policy.

	Vilnius	Rotterdam
Name of the initiative	*Vilnius urban farm*	*The Green Roofs Programme*
Investments	*Invest in solar panels, permaculture gardening or aquaponics*	*Invest in sustainability by creating special funds for eco-innovations and green systems for roofs to build a greener, more innovative and safer city*
Goal	*Source of inspiration for a European aid program for urban agriculture that links technological, educational and environmental issues by taking into account the public and the private sectors.*	*Fighting against air pollution and climate change, as well as increasing use and embellishment of inaccessible areas.*

European perspectives for green urban initiatives

At the level of the EU, there is currently no specific policy to promote agriculture in cities.

However, this type of initiative would fall in line with the achievement of the "sustainable development" objective of the Europe 2020 strategy. The EU rural development (ERD) policy over the period 2007 to 2013 did not include any specific support for city farms: financial

[13] A green pioneer in Vilnius: The first Lithuanian urban farm, 2015, available at: https://citiesintransition.eu/cityreport/a-pioneer-in-vilnius-the-first-lithuanian-urban-farm
[14] *Ibidem*.

support under the ERD could only be provided if the urban farm was located on land fulfilling the eligibility criteria established by the Member State. These could potentially include aid for activities such as modernization of agricultural and food sector or aid for participation in food quality schemes as well as others forms of aid, such as agro-environmental measures. The European Commission also confirmed in August 2012 that support to urban farms was available under both pillars of the common agricultural policy so long as the eligibility conditions were met.

Operations from the rural development programmes (2014-2020) could be used to the benefit of urban or peri-urban agriculture. Member States can do so by choosing to set urban or peri-urban agriculture as priorities in their rural development programmes, but these programmes do not specifically concern urban agriculture. Examples of priorities set by Member States include support to investments in agricultural holdings; agri-environmental measures; organic farming; quality schemes; cooperation actions, including assistance towards involvement in short supply chains; LEADER-type projects[15]; support for fruit and vegetable growers through producer organisations; support for young farmers; support through the community-led local development tool (CLLD), which can address the issue of urban-rural linkages. The European Economic and Social Committee (EESC), with its own-initiative opinion on agriculture in peri-urban areas, recognized since 2004, that urban agriculture presents unique characteristics, which in its view "must be exploited to the full"[16].

LIFE programme[17], is also a program that could be used for projects related to urban agriculture but without any specific funding for this type of projects[18].

Over the years, Members of the European Parliament have raised the issue of urban agriculture through questions asked to the European Commission. For instance, in June 2010 a question[19] was put to the European Commission to identify what has been doing to support, encourage and fund city farm initiatives in Europe.

Since then, while none of the available measures of the rural development programmes (2014-2010) have targeted urban – or peri-urban - agricultures. Thus, the future framework of the Common Agricultural Policy (CAP) post 2020 might include measures for the promotion of these types of agriculture[20].

[15] LEADER is method of public-private partnerships that aims to develop rural communities.
[16] European Economic and Social Committee, Agriculture in peri-urban areas, available at: http://www.eesc.europa.eu/en/our-work/opinions-information-reports/opinions/agriculture-peri-urban-areas (viewed in January 2018)
[17] Life programme webpage: http://ec.europa.eu/environment/life/ (viewed in January 2018)
[18] See one example in Colombes (France): http://www.urbantactics.org/projets/agrocite/
[19] Question for written answer to the Commission on city farms, submitted in 10 June 2010, and answer given by Mr Ciolos on behalf on the European Commission on 20 July 2020.
[20] To know more about the future of the Common Agricultural Policy, see: https://ec.europa.eu/agriculture/future-cap_en (Viewed in January 2018)

Suggestions

1. Create a European observatory of urban farms under the AGRI committee of the European Parliament or European Committee of the Regions to reinforce the link between Civil Society, private and public sectors for those projects around the EU. In this perspective, such observatory could integrate municipalities, private sector, farmers and citizens to reinforce exchanges on this topic and provide impulse for new projects;
2. Instruct the European observatory of urban farms to create a database of all urban agriculture projects across Europe, to the benefit of the private sector, stakeholders (farmers) and policy makers. As an inspiration for the platform, the COST project website, although not a database of all urban agriculture projects across Europe, provides useful case studies reflecting a diversity of experiences in urban agricultural practices with case studies from Barcelona, Dublin, Geneva, Milan, Sofia, Warsaw, and the Ruhr metropolis[21];
3. Establish a direct link between rural development programmes and the promotion of urban farming;
4. Create a label for urban farm products to certify the quality and promote the short food chain in a circular economy perspective.

[21] COST- Action Urban Agriculture Europe Website: http://www.urban-agriculture-europe.org

The case for bee inspection: filling the gap between policy makers and beekeepers

By Alexandre LICHY

The aim of this practice is to propose the creation of a network of referents for bee protection and bee inspectors in each Member State in order to strengthen the link between beekeepers and policy makers.

Why protect bees?

Bees are one of the animal species that contribute the most to economic activity around the globe, and are one of the only insects that are systematically used in economic activities. While domestic bees (the best-known species being *apis mellifera*) are active in the direct production of goods (honey, wax, propolis), non-domestic species are also capable to pollinate flowering plants, which usually need insects to survive (*entomophily*). It is estimated that around 30% of world's agriculture uses insects to pollinate (including soybean, cotton, and apple production, for instance).[22] The economic value of pollination is estimated at EUR 153 billion worldwide,[23] of which at least EUR 22 billion in the EU.[24] Domestic bees play a major, albeit decreasing, role in this activity: in the UK, they covered 70% of the pollination demand in 1986, but this number shrank to 34% in 2007.[25]

This decrease in the role of honeybees in pollination worldwide can be explained by the shrinking population of domestic honeybees around the world. While no statistics regarding worldwide bee population are available, it is estimated that bee populations in Europe shrunk by approximately 20% over the last 20 years.[26] In the United States, the bee population decreased from 4.5 million hives in 1945 to 2 million hives in 2007,[27] and colony loss was of no less than 44% in the 2015-2016 season.[28] The causes of this decline are diverse and not always identified. Known causes of bee population declines include land use change (*e.g.*, monoculture and the increasing number of flowerless landscapes), the widespread use of pesticides, as well as various parasites and infectious diseases.[29]

The effects of this population decrease are exacerbated by the large increase in crop production requiring pollination by bees worldwide.[30] This means that bees not only become rarer in absolute numbers, but also relatively to the importance of the services they could provide.

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[22] Lautenbach, Seppelt, Liebscher, Dormann, Spatial and Temporal Trends of Global Pollination Benefit. PLoS ONE 7(4): e35954, 2012
[23] Gallai et al., Economic valuation of the vulnerability of world agriculture confronted with pollinator decline, Ecological Economics 68 (2009) 810-826, 2007
[24] https://ec.europa.eu/food/animals/live_animals/bees_en
[25] Breeze, Bailey, Balcombe, Potts, Pollination services in the UK: How important are honeybees? Agriculture, Ecosystems & Environment 6–12, 2011
[26] Miller-Struttmann, the complex causes of worldwide bee declines, 2016, available at https://phys.org/news/2016-01-complex-worldwide-bee-declines.html
[27] Spivak, "Why Bees are disappearing", presentation given in June 2013 at TEDGlobal 2013
[28] https://beeinformed.org/results/colony-loss-2015-2016-preliminary-results/
[29] Shahrouzi, Causes of bee colony mortality, OIE News 2009-4, 2009
[30] Lautenbach, Seppelt, Liebscher, Dormann, *op. cit.*

This White Paper relies on the axiom that the decrease in bee population is not due to economically sound and politically acceptable causes like reduced demand for pollination services or products made by bees, but largely to a scientifically documented change in European bees' environment.

This decrease in bee population is not irreversible. Public authorities, engaged citizens and the private sector (not least of all beekeepers themselves) have been implementing diverse good practices in order to revert this trend, with a degree of success.

Among these practices, Belgium's BeeOdiversity drew our attention. This initiative shone by its intention to create a link between different issues and communities: by helping corporations and other urban actors install beehives in their premises, it contributes to preserving domestic bee populations, improving companies' public relations and promoting engagement at work. From this practice grew a reflection around the need to create links between communities that all have an interest in bee health protection, but are more or less hermetic to one another: the general public, beekeepers, research communities and public administration. This White Paper takes the view that, just like BeeOdiversity managed to create links between the general public and beekeepers to increase the visibility of issues related to bee health, so could the link between public administrations and beekeepers be reinforced.

In this study, we will first have a closer look at the causes behind the decrease in bee populations in the EU (I). We will then try to give an overview of the current status of bee protection, listing the most significant measures used in bee protection. This will allow us to identify gaps in the existing legislative and regulatory framework that could call for further action by public authorities (II). Last, and drawing inspiration from BeeOdiversity's action in favour of creating interactions between communities, we propose the development of a framework for the cooperation of Referent Bee Protectors (III).

The causes behind bee disappearance in the EU

As mentioned above, there are three main known causes for the decrease in the population of honeybees in the EU: land use change (including monoculture and the increasing number of flowerless landscapes), the widespread use of pesticides, as well as various parasites and infectious diseases.[31]

Land use change can be segmented in two parts: agricultural practices and urbanisation of landscapes. Agricultural practices essentially refer to the increasing tendency to cultivate only a single type of crop over a wide area (monoculture). Monoculture can be detrimental to bee populations for at least two reasons. First, the presence of a single type of seed (and the systematic elimination of other plants on cultivated areas) limits the diversity of the nutritional input of bees, which weakens them and makes them more susceptible to other affections.[32] Second, monoculture turns large areas into "food deserts" outside of the narrow

[31] Shahrouzi, *op. cit.*
[32] BEKIC´, JELOC˘NIK and SUBIC´, *HONEY BEE COLONY COLLAPSE DISORDER (Apis mellifera L.) - POSSIBLE CAUSES*, Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development Vol. 14, Issue 2, 2014

period in which a particular type of crop is prone to pollination, which leads to a significantly reduced nutritional input in quantity as well.[33] Moreover, the destruction of local ecosystems can be very detrimental to other kinds of pollinators, including non-domestic bee species.

The urbanisation of landscapes also plays a role in the decrease of honeybee populations. Infrastructure development directly translates into a decrease in the number of food sources for bees. While plants tend to be included (and increasingly so) in urban landscapes, they are not always varied enough (or sometimes simply not entomophilic) to counterbalance the destruction of natural or semi-natural habitats. In this perspective, urban farming, one of the initiatives that we selected, is also a way to protect bees.

Besides land use, the widespread use of pesticides is widely recognised as a potential explanation to the decrease in honeybee populations. Modern agriculture employs a large array of insecticides, fungicides and herbicides to increase agricultural outputs. Chemicals meant to fend off various pests also significantly affect honeybees feeding on the nectar and pollen of crops. The intensity of the effects depends on the type of pesticide, on its administration mode, and on the overall health of bee populations.[34] Obviously, different types of chemicals mean different effects on honeybees. Pesticides that are particularly harmful to bees include imidacloprid (affecting neuronal development and pollen gathering patterns), thiamethoxam (affecting olfactive memory, cerebral and digestive functions) or fipronil (affecting mobility and learning capacity).[35] The way in which the pesticide is administered is also relevant. Neonicotinoids, unlike other types of pesticides, are present in equally high concentrations in the whole of the plant and are not concentrated around the seeds themselves. For this reason, pesticide concentrations are high in the pollen and nectar of the flowers, leading to an increased pesticide intake by the bees.[36]

Lastly, diverse pests have developed in recent years that have a large effect on honeybees. The main such pest is undoubtedly *varroa destructor*, a blood-sucking mite infecting honeybee colonies and spreading diseases. This mite was originally found in South-East Asia but has spread around the globe since the 1970s. Various viruses and infections affect honeybees' development and can kill off entire swarms. In certain Member States, the proliferation of invasive alien species (IAS) like Asian hornets (*vespa velutina*) also took its toll on bee populations as honeybees can constitute up to 70% of Asian hornets' diet.[37]

These three elements (land use change, pesticide use, development of parasites and pests) act in concert to significantly weaken honeybee colonies and to a large extent explain the problematic situation of honeybees today. Indeed, poorer nutrient intake (in quality and quantity) makes bees more sensitive to pesticides and more likely to be infected. This,in

[33] Spivak, *op. cit.*
[34] Spivak, *op. cit.*
[35] Greenpeace, The Environmental Risks of Neonicotinoid Pesticides: a review of the evidence post-2013, January 2017
[36] Spivak, *op. cit.*
[37] http://www.vespavelutina.eu/en-us/vespa-velutina

turn, reduces the population of working bees of the swarm, which may further reduce nutrient intake, for instance. To these known causes of bee population decline, one should also add unknown causes. The causes for the Colony Collapse Disorder (CCD) that causes bees to flee otherwise healthy hives have not been discovered, for instance. It should be noted that colony loss, which can reach 30% of existing colonies per year in Europe,[38] can be mitigated by splitting colonies as well as by using various chemical and mechanical countermeasures. Such action however only limits population loss without reverting the tendency, while threatening the financial viability of professional beekeeping activities (as they are expensive, and should be repeated frequently to the extent that the underlying causes are not addressed).

The existing protection framework for bees, and the loopholes therein

Bee protection is a problem that is more and more widely recognised in the EU and abroad. Actions to allow for the survival of bee populations have been taken at European, national and local levels.

At the European level, bee protection is included in several instruments of the EU Environmental Policy. First and foremost, species conservation measures under the EU Biodiversity Strategy 2011-2020 set the objective to halt the loss of biodiversity and the loss of ecosystem services by 2020, and restore them in so far as possible.[39] Protected areas, mass flower crops and agri-environment schemes have been identified as particularly beneficial to bee conservation.[40]

Habitat conservation measures like Natura 2000 aim at further protecting endangered or threatened species (14.5% of all bee species in the EU27 in 2013).[41] The designation of particular areas in which human activity is constrained proved to be particularly beneficial to some rare and scarce species. Mass-flower crops, the culture of which is encouraged under the Common Agricultural Policy (CAP), provide bee populations with plentiful sources of food and support the population of many pollinators. Action has already been undertaken in the field of food safety policy to limit the use of neonicotinoids;[42] the European Food Safety Authority (EFSA) further published a report on 28 February 2018 concluding that neonicotinoids present a risk to bee health.[43] Lastly, agri-environment schemes, as part of the EU Rural Development (ERD) Programmes, sustain bee populations by encouraging the maintenance of semi-natural habitats, promoting low-input farming[44] and supporting mixed crop culture as an alternative to monocultures.[45] In addition, support activities like research funding support the gathering of knowledge related to bee conservation. In 2011, the Sofia-Antipolis laboratory of ANSES was appointed EU Reference Laboratory for Bee

[38] Van Engelsdorp, "A plea for bees", Presentation given at TEDGlobal 2008
[39] The EU Biodiversity Strategy to 2020, 2011
[40] European Red List of Bees, 2014
[41] European Red List of Bees, 2014, Executive summary
[42] See the Commission press release "Bee Health: EU takes additional measures on pesticides to better protect Europe's bees", available at: http://europa.eu/rapid/press-release_IP-13-708_en.htm
[43] See the EFSA press release "Neonicotinoids: risks to bees confirmed", available at: https://www.efsa.europa.eu/en/press/news/180228
[44] ERD project "Diverfarming" (project ID 728003), May 2017
[45] ERD project "Diversifood" (project ID 633571), March 2015

Health with the role of coordinating research methodologies and promoting best research practices between National Reference Laboratories.[46] On 11 January 2018, the European Commission launched a public consultation on a European initiative on pollinators, with the objectives of (i) improving knowledge of pollinators, (ii) tackling the causes of the decline of pollinators, (iii) raising awareness and improving collaboration and knowledge sharing in the EU.[47]

Policies at the national level were also developed for the protection of bees, some of them very ambitious. The United Kingdom for instance developed a "National Pollinators Strategy"[48] following 5 objectives:

i. supporting pollinators on farmland;
ii. supporting pollinators in cities and the countryside;
iii. enhancing the response to pest and disease risks;
iv. raising awareness of what pollinators need; and
v. improving evidence on the status of pollinators and the services they provide.

This national strategy involved, among other things, the creation of a network of bee inspectors in England and Wales, whose role consists of the collection of data, good practices and feeding it back to beekeepers and policy makers. It also involved the creation of a national database named BeeBase that helps monitor and control the spread of serious honeybee pests and diseases.[49]

Local initiatives also greatly contribute to the protection of bees in the EU. Numerous cities, local administrations and associations have launched initiatives aimed at promoting beekeeping, such as subsidising activities aimed at raising awareness on issues linked to local beekeeping.

Last but not least, beekeeping remains an economic, agricultural activity for a large proportion of the 620,000 beekeepers in the EU.[50] Beekeeping allows the survival of domestic bee colonies. So do new economic activities such as those of startups like BeeOdiversity or Hostabee, which contribute to spreading awareness on the decrease of bee populations in Europe and which use bees to promote cohesion at the workplace, for instance.

All these policies are however not necessarily tightly integrated together. In particular, while there is a coordination framework for scientific research on the causes for the extinction of bees, there seems to be an insufficient amount of data being collected to move research forward and reach strong conclusions. For example, the EU Reference Laboratory for bee health could only reach conclusions on the conservation status of less than 45% of all European bee species, due to the lack of precise data on the remaining 55%.[51] The EPILOBEE program for the surveillance of bee mortality in the EU, between 2012 and 2014, could only

[46] Commission Regulation (EU) No 87/2011 of 2 February 2011
[47] Information about the public consultation is available at: https://ec.europa.eu/info/consultations/public-consultation-eu-initiative-pollinators_en
[48] Information on the strategy is available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/409431/pb14221-national-pollinators-strategy.pdf
[49] Information on BeeBase is available at: http://www.nationalbeeunit.com/
[50] data for 2010. See https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3827320/
[51] European Red List of Bees, 2014, Executive summary

run in 17 Member States because it was not mandatory. In addition, there is -to the best of the author's knowledge- no knowledge sharing mechanism between public administrations in the EU with regard to bee health. If a relevant practice is developed in a Member State, there is no mechanism that would allow it to be quickly and reliably spread to other Member States. All these elements push for the establishment of a tighter framework for knowledge and best practice sharing between Member States.

Proposal for action at EU level: a network of bee inspectors

In this backdrop, it seems that 1) diverse actions at EU, national, local, and private levels are taking place in favour of the protection of bees; 2) these actions have not proven sufficient to offset the decrease in bee populations across Europe (although it seems that, in the US at least, bee population increased in 2017).[52]

In order to make action in favour of bee protection more effective, we propose for the EU to develop a framework for the sharing of best practices and information exchange between public administrations, beekeepers and research communities. It consists in the designation of a referent entity (Referent for Bee Protection, or RBP) at national level; RBPs would then collaborate with each other at the EU level to ensure the circulation of knowledge and good practices. It would also involve the designation of bee inspectors in each Member State, who would be in charge of gathering good practices, field data on bee health, reporting this data to the RBP entity, and conducting education actions to the benefit of beekeepers.

This framework could be beneficial to bee health in at least two ways. As developed below, the creation of the status of bee inspector could improve communication between beekeepers and public administrations by creating a point of contact through which information on bee health and good practices could be collected, and education could be dispensed. These national networks would also interact with each other at the European level and would share problems, information and solutions. Such a framework is possible under the European Environmental Policy and Common Agricultural Policy.

The framework would first improve the exchange of information, within Member States and between Member States. The lack of available information can be partially explained by the variety of national beekeeping scenes (where beekeeping is not always a reported activity for instance) and the lack of common statistical standards. Most scientific studies on the causes of the decrease in bee populations are thus based on incomplete data, although strong trends could be identified and a scientific consensus exists around probable causes for bee population decreases. The proposed cooperation framework involves the designation of an RBP with the duty of gathering information from bee inspectors regarding best practices across beekeepers and relevant actors (sellers of queens, hives, or bee-derived products for instance). The RBP would report on the status of bee health in the Member State, including with regard to the main threats on bee health. Such an information-gathering mechanism would allow researchers to tap into new sources of data (following harmonised standards). The effects would be amplified by the relatively high degree of cooperation existing within

[52] https://www.usda.gov/media/press-releases/2016/05/12/usda-releases-results-new-survey-honey-bee-colony-health

research communities in the EU, as evidenced by the coordination activities of the EU Reference Laboratory on honeybee health since 2011. As a matter of fact, this improved corpus of information would doubtlessly help further advance research on bee health. Cooperation between the EU Reference Laboratory and RBPs would go both ways: the former could steer data collection in certain directions, while the latter could advise on which pieces of data would easily be accessible or not in order to allow research to be driven by data availability.

The framework would also improve the way in which good practices are shared throughout the EU. Bee inspectors would be in direct contact with beekeepers, and could thus identify practices that are more efficient at preserving bee health than others. This would be part of the information-gathering duty of bee inspectors; these best practices would then be reported at EU level by RBPs to ensure that, if they are relevant in other environments, they can be replicated elsewhere. For this purpose, regular meetings at EU level would ensure a speedy transmission of good practices. Moreover, the framework would allow bad or ineffective practices not to be replicated, making experimentation in the EU more efficient (administrations do not need to replicate an experimentation if they are confident that they can benefit from the fruits of the experimentations made by other public administrations in the EU).

Lastly, such a framework would allow for the efficient transmission of good practices directly to beekeepers. In addition to gathering information from beekeepers, bee inspectors would also be tasked with education missions. Bee inspectors would benefit from the experience of their European colleagues, and directly spread good practices to the beekeepers themselves. The idea is not to impose these practices to beekeepers, but to educate them as to what could be done better to improve bee health (in an economically sensible way).

Suggestions

1. Put in place a framework for National Referents for Bee Protection and bee inspectors
2. Ensure the possibility of information and best practice exchange between National Referents for Bee Protection and between National Referents for Bee Protection and the EU reference laboratory

The Junker App: a new practice for waste management

By Francesca NANTE & Francesca LEUCCI

Junker is a mobile application for smartphones and tablets that helps citizens to recycle products in a new, quick and easy way.

What is "Junker"?

The need for Junker stems from two fundamental observations. The EU Strategy for a Circular Economy, on the one hand, is aimed at making Europe's economy more sustainable and provides for a framework for public action. The high complexity of waste management, on the other hand, is one of the main hurdles to building a circular European economy and makes new technologies a precious tool to reach this objective.

Just to give an example, uncertainties about the composition of products turn out to be time-consuming and annoying for people used to move and think so fast nowadays.

Junker offers a viable solution to overcome these and other problems arising from waste management. It also relies upon the active involvement of the users themselves whose contribution becomes another smart way to deliver significant results towards effective recycling of waste[53].

How the app works is quite easy. Through the camera of mobile devices, it identifies each product using its barcode and provides citizens with all the needed information for recycling its components in a correct and fast way. Therefore, users will be able to know the composing materials of the product that they want to throw away, the right bin, door-to-door collection calendars and other relevant information.

Junker is a national platform available throughout the country. Furthermore, it is already available in four languages, so that even tourists can take benefit of it. Users just need to change their location in order to have updated information in any new town.

The Junker app pursues three main objectives which involve the three dimensions of sustainable development:

1. **Economic sustainability**, meaning the ability of using existing resources in an optimal way (improving the quantity and quality of separate waste), so that municipalities can support a defined level of economic production for an undefined period of time;
2. **Social sustainability**, meaning the ability of current and future generations to create healthy, liveable and successful communities that promote well-being for everyone;
3. **Environmental sustainability**, meaning the ability of natural resources to be renovated or depleted indefinitely with no quality loss.

[53] Junker overview, available at: https://www.slideshare.net/gnoma9/junker-app-motore-per-economia-circolare-dellambiente

Source: https://www.slideshare.net/gnoma9/junker-app-presentation-english

How does "Junker" work?

The idea: a simple solution for a complex problem

The idea of the app came in 2014 from a group of Italian engineers and computer scientists during their travels within Italy and the EU. Willing to recycle products in a proper way, they noticed that complying with locally applicable waste regulation requires time and effort. They had to search for information, download always different apps and visit websites. At some point, they decided to develop a new database *able to associate the barcode of products with their composing materials*. In fact, the barcode is the only element on packaging usually capable of identifying a product in a unique way.

The Junker app put into practice that idea and was released for the first time in March 2015 both on Android and iOS.[54] It had an immediate and great success among users.

[54] For more information on the functioning of the application, see: https://www.youtube.com/watch?v=1NcGmkziURs&feature=youtu.be

Source https://www.slideshare.net/gnoma9/junker-app-presentation-english

Junker in practice: a successful story of implementation

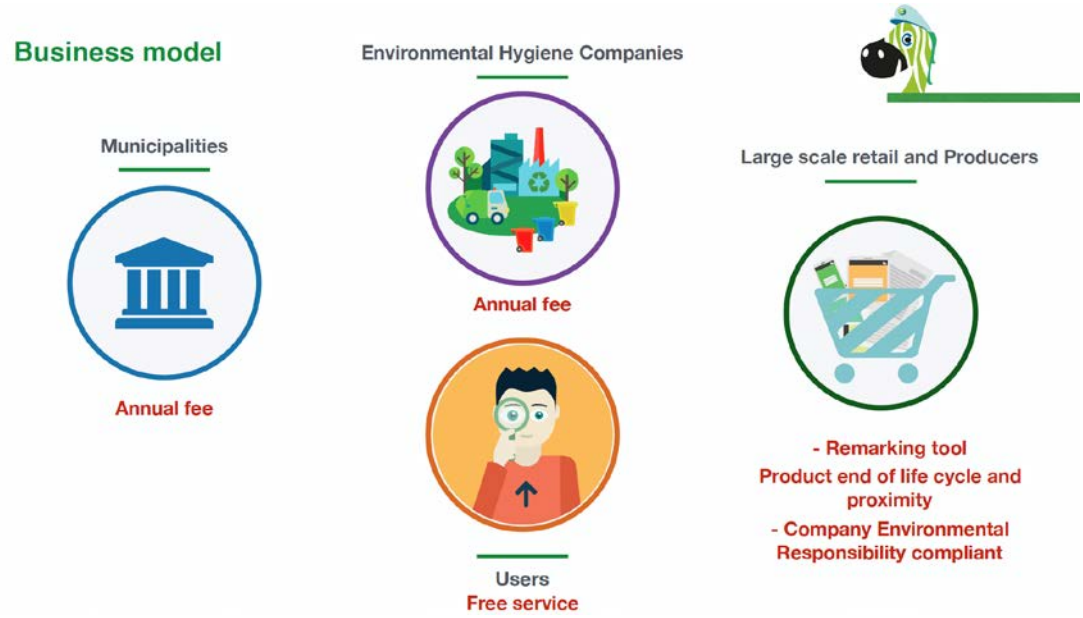
Junker's primary aim is to facilitate life of European citizens. Since Member States are bound under the European Waste Framework Directive to undertake measures for the handling of waste within the EU, the app might be a perfect tool to avoid incurring heavy penalties in case of infringements and to facilitate the achievement of the European goals[55].

Moreover, while large municipalities are already equipped to provide instructions for recycling in electronic (websites or applications) or paper format, small municipalities encounter much more difficulties to implement an efficient service of waste management information because of the costs and technical skills required. This is the reason why Junker app's first clients were mostly small or medium municipalities, although Junker's customer base also includes big municipalities like Bari, or or large utility companies like HERA.

By subscribing to Junker platform, municipalities get huge benefits.

First of all, they can optimize costs of recycling while maintaining very high quality of data provided to citizens. At the same time the app is enriched with data and zero internal costs for the client. Secondly, the municipalities pay a fee for the service that is financially sustainable, as it is proportionate to the number of inhabitants. Finally, Junker is also a "turnkey" service, since the municipality only has to tell the public how to download and use Junker. All the rest is "up to the app".

[55] According to the latest data on municipal waste generation and treatment, every person in Europe is currently producing, on average, half a ton of household waste per year. Approximately 40% of wastes are reused or recycled. For some countries more than 80% of wastes still go to landfill (source: Environmental Data Centre on Waste, Eurostat). The management of waste continues to improve in the EU but individuals, businesses and households have to play a bigger role if we wish to achieve the targets laid down in Commission Decision 2011/753/EU (e.g., the increase of waste materials for re-use or recycle to 50% by 2020). See DG Environment website: http://ec.europa.eu/environment/waste/index.htm



Source https://www.slideshare.net/gnoma9/junker-app-presentation-english

To date, Junker successfully serves Italian municipalities for over 5 million inhabitants all over Italy, standardizing the way of providing information and, at the same time, respecting the differences in local services.

A strategic tool to foster EU policies and suggestions

The Junker app is likely to become a powerful tool to help Member States comply with the minimum requirements set forth in the European Waste Framework Directive as well as the more ambitious objectives of the Circular Economy Package launched in 2015.

The Package established a concrete programme of actions to transform the European economy to make it more sustainable (from linear to circular economy). In January 2018, the European Commission adopted a new series of measures within the Circular Economy Action Plan which includes revised legislative proposals on waste. Among them, new targets for reduction of waste and more concrete measures to overcome different situations across Member States. For instance, a new target has been established for recycling municipal waste by 2030 (65%), packaging waste (75%) and for reducing landfill (10%). In addition to that, the EU will introduce economic instruments to discourage landfilling, harmonised calculation methods for recycling, and incentives for producing greener products[56].

Within this framework, the Junker app would play a strategic role because it links the new technologies with the active participation of citizens towards a circular economy.

Given the widespread use of smartphones and tablets in Europe, the Junker app provides a service available everywhere and at any time. Furthermore, it considerably increases the dialogue between the administration and citizens. In fact, citizens become more responsible

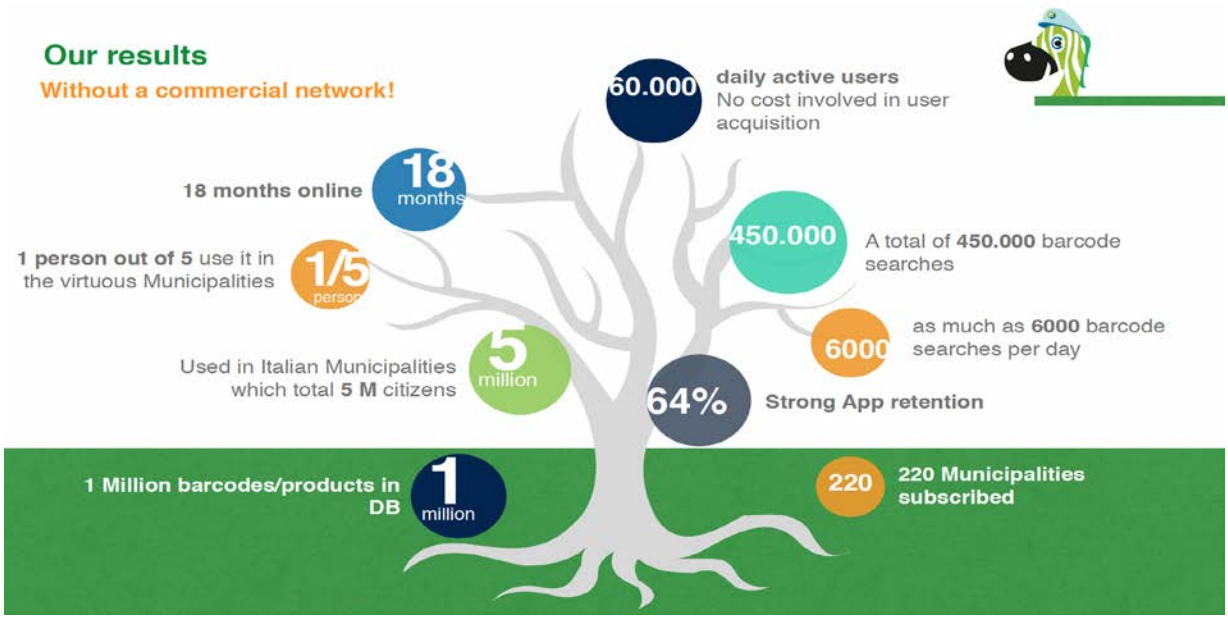
[56] See http://ec.europa.eu/environment/waste/target_review.htm

with regard to recycling. By increasing cooperation at local level, Junker app fosters the achievement of EU sustainability goals.

Eventually, the app has the potential to make available a significant amount of data on waste collection and disposal varying from place to place. Its spread throughout Europe would be a first step towards a possible harmonization of waste regulations.

The acknowledgement of Junker app through the White Paper would ideally lead to the following positive outcomes:

- Firstly, the app is likely to provide an important source of inspiration for similar projects related to waste management within other Member States, triggering the dialogue between administrations and European citizens by means of the technology already available;
- Once Junker app or apps with similar features have spread all over Europe, the European institutions could take advantage of a considerable and precise amount of data concerning the differences in waste management;
- Lastly, on the basis of the data collected, the European Commission would be able to lay out a more detailed framework for the harmonization of waste regulations.



Source https://www.slideshare.net/gnoma9/junker-app-presentation-english

From biowaste to agricultural production and beyond: how to think the circularity of the European food system

By Claire CALMELS

The selected practices presented below are interlinked and could be a good example of potential partnership between stakeholders.

***Startup Moulinot Compost et Biogaz** is dealing with biowaste management. Biowastes are converted into compost and biogas towards a direct and short-circuited distribution. The startup is also following social goals.*

***Greenhouse farming and research hubs** is a different way to think of a competitive and sustainable agricultural production.*

How does Startup Moulinot Compost & Biogaz[57] work?

The project started in 2013 in Paris, France, and has been launched by Stephan Martinez and Fabrice Martinez. This project comes from the Civil Society and is mainly held by its founding members[58]. An investment fund dealing with the social and solidarity economy, called "fond d'investissement de l'économie sociale et solidaire", is also engaged in the project[59]. Moulinot works with more than 80 clients and has established a partnership with a catering union to develop the start-up[60].

Meanwhile, the startup checked for opportunities to further expand and develop the project. The idea was to link the lack of adapted collection of waste regarding catering and the soil depletion in France[61]. A precise and efficient waste management can contribute to enrich soils and help a competitive and sustainable agriculture. Here is the first link that the Coordination Team made with greenhouse farming and research hubs practice: the transformation of an existing product to create another one of similar or better quality.

Indeed, it was Moulinot creators' thought to develop a practice in line with the circular economy ambition: waste can be used for production thus closing the circle. To fulfil this objective, the practice focuses on two main aspects: methanization and composting[62].

Moulinot's starting point is to help its clients to accurately and systematically sort waste through the installation of signaling equipment, sensitization to food waste, as well as training of workforce[63]. These objectives could also be pursued at the European level through the sensitisation of European Citizens and the provision of information needed for a better sorting of waste, as proposed above in the section about the Junker App.

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[57] Website of Moulinot Compost & Biogaz, available at: https://www.moulinot.fr/moulinot
[58] Moulinot - Dossier de Présentation, p.5.
[59] *Ibidem*.
[60] Interview with Fabien Delory, Director General at Moulinot Compost & Biogaz, 23 January 2018.
[61] Moulinot – Dossier de Présentation, p.2.
[62] Website of Moulinot Compost & Biogaz, available at: https://www.moulinot.fr/moulinot
[63] Moulinot – Dossier de Présentation, p.7.

The second step is the collection of biowastes. Moulinot continues to innovate in its value chain using environment-friendly trucks that only consume biogas, which reduces emissions. This is also a way to fight against air pollution in cities, which is one of 2018's burning topics. The startup is currently using 18 vehicles of various types. Each of them is equipped with a weighing system that can calculate quantity of biowaste collected for every client and then bill according to the weigh[64]. It is possible for every client to follow the journey of the truck and to trace their wastes[65]. Moulinot also made the choice of digitalisation regarding biowaste's collection at various stages, which simplifies the process[66].

Then, the third step is the transformation of biowastes that have been collected. Since 2017, Moulinot, in partnership with Semardel - a company specialized in collection, treatment and recovery of waste with environmental, social and economic objectives[67] - rolls out its own platform for composting the biowaste collected. This platform is the first one in France to use vermicomposting at the industrial level as explained in the presentation of the project[68]. This is also something that could be developed at different levels of waste management. For instance, for 5 000 tons of wastes collected in a year, this vermicomposting platform can produce 2 000 tons of high quality compost[69].

The composting process is divided into five main parts. Deconditioning process which is the action to separate the biowaste from other waste (e.g., plastic) following by the disposition of biowaste in piles of 2 meters high. Fermentation process of this biowaste piles can then start and the piles are watered every day. The following and fourth step is called 'maturation' and includes earthworms that will finish the transformation of biowaste into a high quality compost through a process known as vermicomposting. Finally, after being milled the compost is wrapped to be redistributed. The Moulinot compost is reallocated to private individual, local farmers or gardeners[70].

The collection also allows to generate electricity and heat via a methanisation process and the production of biogas.

Moulinot's method holds many promises. Its simplicity and its methodology makes the collection of waste and its management easier. Clients recommend this process because of its efficiency and clarity. This is why Moulinot could be reproducible. Indeed, the practice is well accepted, the method easy to export and the impact on the environment, agriculture and energy highly positive.

This practice also has social aims that is an interesting complement giving more value to the practice. Moulinot recruits people with work re-entry difficulties and offers them a professional training through a tailor-made programme focusing on insertion issue and profes-

[64] *Ibid.*, p. 11.
[65] Website of Moulinot Compost & Biogaz, available at: https://www.moulinot.fr/moulinot
[66] Moulinot – Dossier de Présentation, p.13.
[67] Semardel's Website, available at: http://semardel.fr/ (viewed in February 2018)
[68] Moulinot – Dossier de Présentation, p.9.
[69] *Ibidem*.
[70] *Ibid.*, p. 10.

sional development. The main aim, in a short term period, is to have a qualification recognized at the national level[71]. Moulinot also encourages its drivers to complete further training and gain further experience. The startup has been officially recognized as acting for a better social and solidary economy[72].

Moulinot is working with a variety of clients from private and public sectors, from individual and collectivities, hostels and school canteens, to fast food or traditional restaurants. The startup also collected biowaste for the COP 21 in Paris in 2015[73].

Moulinot has been honoured a numerous of times for its action in fighting against climate change, as well as for its innovative methodology and its action on social and solidary economy/financing.

Moulinot main figures[74]: 25 jobs created in 4 years; around 100 000 meals collected daily; more than 5 000 persons trained on the collection of waste; 7 000 tons of collected wastes; 300 000 m^3 of gas produced; 400 collection points.

Challenges[75]

Economic aspect, because of existing rules regarding taxation, the novelty of the sector, and the lack of an incentive system. This sector and the startup are looking for assistance, support and effective tools to develop a long-term solution benefiting everyone and achieving environmental and international goals. The practice is still quite new and expensive but it is another way to consume, and if its standardized the price will be accessible for all and will benefit everyone.

- **Energy transition**, regulations exist but more audits and inspections are required to make sure that waste management is successful and followed. A stable framework is essential at the European level.
- **Replicability**, the practice is in theory applicable everywhere. The materials needed are environment-friendly trucks, a methanization factory and a platform to collect biowastes and to produce compost. In practice, there are economic and investment challenges, and support from policy-makers and finance sectors are needed.

This practice could be a part of something bigger that can close the circle of food transformed as a biowaste and then as compost that enriches soils. Why don't we observe the entire life of the product? Indeed, agriculture is the way to produce food which is going to be consumed and converted as biowaste to return the nutrients to the soils. This is what this research will propose: to link agriculture and compost production via consumption. Then, it is high time to develop the notion of greenhouse farming as observed in the Netherlands.

[71] Interview with Fabien Delory, *op. cit.*
[72] Moulinot – Dossier de Présentation, p.4.
[73] Website of Moulinot Compost & Biogaz, available at: https://www.moulinot.fr/moulinot
[74] Moulinot - Dossier de Présentation, p. 23.
[75] Interview with Fabien Delory, *op. cit.*

How does Greenhouse farming work?

The Netherlands demonstrates how to produce more with less energy, less pesticides and less fertilisers. Their solution is an agricultural production in a controlled environment: greenhouse farming.

This practice is based on the premise that the reduction of inputs in agricultural production could have positive economic and ecological consequences. Indeed, the water issue, which is has grown to become bigger over the past years and which will stay on the top of the agenda for the foreseeable future, is also taken into account. Water use is significantly reduced in indoor production, making it possible to rely principally on rainwater[76]. This translates into a non-negligible reduction of water consumption. Furthermore, this practice has a positive impact on production costs as farmers saw their invoices for water, but also energy, fertilisers and pesticides decrease significantly. The final consumers also see advantages of such practices in buying healthier foods at reasonable prices.

The necessity to work with appropriate equipment makes the Coordination Team think that a compost of high quality could be another benefit to this healthier agricultural method. For instance, greenhouse farming can develop partnerships with Startups like Moulinot to entirely close the circle of food production: from products to biowastes alimenting new production and creating bioenergy.

This kind of initiatives could allow to think of new business models, more innovative and creating positive synergies. This is why research is essential. The Dutch practice of greenhouse farming highlights this aspect with national support developed for research focusing on agro-technologies. The country decided around 20 years ago to promote sustainable agriculture.[77] Universities for life sciences and agricultural sciences are consulted to implement innovative healthier practices in agricultural sector all over the country.

Like Moulinot, greenhouse farming could have a social impact in making agricultural production less expensive. Indeed, if the need for water, pesticides, fertilisers and energy decreases, production costs also decrease. This could reduce social disparities and permit to develop more indoor agricultural production. In addition, some greenhouse farmers produce their energy or fertilisers from waste itself[78]. That is perfectly in line with Moulinot's aims.

Some of the particularities of this practice are replicable and could influence other Member States in the EU. For instance, the construction of greenhouses could be further developed, and more research could be done on agro-technologies in Member States. Closer cooperation at the European level is possible as well. Digitalisation, which is one of the top priorities on the current EU's agenda, can provide invaluable assistance, as exemplified by various greenhouse farming experiences in the Netherlands where drones are used to monitor plant needs with regard to water or nutrients[79]. In other vein, some greenhouse farms use bees to provide pollination services, which provides the latter with less hostile environment (e.g.,

[76] Viviano, 'How the Netherlands feeds the World', National Geographic, September 2017. Available at: https://www.nationalgeographic.com/magazine/2017/09/holland-agriculture-sustainable-farming/
[77] *Ibidem*.
[78] *Ibidem*.
[79] *Ibidem*.

lower levels of pesticides and a lower concentration of hostile species)[80]. It is another practical example of cooperation between practices for more circularity in food production.

Even if greenhouse farming is ripe with opportunities, challenges also exist. For instance, economic conditions needed to make greenhouse farming efficient and competitive may not exist in all the Member States. The lack of available space makes greenhouse farming particularly well suited in the Netherlands but may not concern other Member States to the same extent.

European policies related to these practices

As explained, the legal framework and its enforcement are key for such projects. The European Union has recently subjected the rules overseeing sectors related to practices described to an overhaul.

The Clean Energy Package for all Europeans launched in 2016[81], and which is still under negotiations, is one of those reviews focusing on the link between energy and the protection of the environment in aiming to reach the Paris Agreement's goals (e.g., the review of Governance Regulation or Energy Efficiency Directive, among others).

The European Union also decided to encourage circularity in production and consumption. Therefore, the recast Waste Framework Directive and the Circular Economy Package[82] are currently discussed in the European Institutions. The final form of these texts will have very significant consequences on the way environmental protection is carried out in the EU: this is why the White Paper Team wants to bring its own vision to show what the future could hold and contribute to this major undertaking.

In November 2017, a Communication on the Common Agricultural Policy (CAP) post-2020[83] on ideas on the future of food and farming in the EU has equally been presented by the European Commission. The main objective of this review is to put CAP in line with the fight against climate change and the preservation of the environment. Indeed, this is a major challenge for agricultural sector as highlighted above.

Financing and insurance sectors also made good progress focusing on green finance or on projects that better take the environment into account. The fact that environmental investment becomes increasingly viable is a strong indicator of the fact that technological, legal (and, arguably, societal) progress moved the EU towards a new way of thinking energy and environment policies that is more respectful of the planetary limits.

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[80] *Ibidem*.
[81] Commission proposes new rules for consumer centred clean energy transition, European Commission website, 30 November 2016. Available at: https://ec.europa.eu/energy/en/news/commission-proposes-new-rules-consumer-centred-clean-energy-transition
[82] Circular Economy: Implementation of the Circular Economy Action Plan, The European Commission website. Available at: http://ec.europa.eu/environment/circular-economy/ (viewed in February 2018)
[83] The future of food and farming - Communication on the Common Agricultural Policy post-2020, 29 November 2017, European Commission, available at: http://europa.eu/rapid/press-release_MEMO-17-4842_en.htm

Suggestions

1. To create a platform at the European Level that classifies by topic (e.g., Energy, Transport, Environment, Waste) and subtopics (e.g., biogas, renewables, water) good practices from all over the European Union. The Coordination Team is aware of existing platforms such as the Covenant of Mayors[84], the European Circular Economy Stakeholder Platform[85], the EIP-Agri[86] or the European Energy Efficiency Platform (E3P)[87], among others. The global platform proposed could contribute to building stronger and faster links between innovators, creators and owners of good practices who could pull together to carry out their projects. The platform will also put closer Energy and Environment. Projects could be selected with precise criteria that can be defined according to a specific methodology. This is also an easy way to indicate the needs for every project to policy-makers or banks and insurers who could help in framework and financial support. Public and private sectors are part of the transition. As the European Union is currently making a transition toward greener society involving all stakeholders, this suggestion could facilitate its work and stimulate to move faster. This also a good opportunity to show European Citizens how the EU is improving their daily life and to build stronger links between all parts of the European Society.

2. To rethink the Common Agricultural Policy (CAP) including more support for innovative projects (e.g., specific funds) and system of audits obliging Europeans to fulfil their commitments. As the EU is working on a reform of the CAP post-2020, policy-makers are aware of what the Civil Society calls for but the creation of the platform mentioned above could be a way to go beyond and be a part of a better and healthier future.

[84] Covenant of Mayors for Climate and Energy, available at https://www.covenantofmayors.eu/en/ (viewed in February 2018)

[85] European Circular Economy Stakeholder Platform. Available at: https://circulareconomy.europa.eu/platform/en (viewed in Ferbuary 2018)

[86] Platform EIP-Agri, available at: https://ec.europa.eu/eip/agriculture/en (viewed in February 2017)

[87] European Energy Efficiency Plateform. Available at : https://ec.europa.eu/jrc/en/energy-efficiency/e3p (viewed in February 2018)

Conclusion

This work allowed us to identify a large number of initiatives, in different domains, all of which entailing unique characteristics and varying degrees of funding. As authors we typically knew about a few existing practices prior to the production of the White Paper, but the richness and quality of the practices we learned about well exceeded our expectations. Analysing the 84 practices in detail, three elements struck us in particular.

The first element is most definitely the gap between Member States. Overall, priorities tend to differ between Member States acting in order to reach the objectives set out in European legislation and those striving to go beyond these objectives. Contrary to what one might presume, the line is not drawn between "Western European countries" and "Eastern European countries"; some countries like Croatia and Latvia (or local administrations therein) strive to become leaders in environmental protection, for both environmental and economic reasons. Unsurprisingly however, countries like Sweden, Denmark and Germany invest massively in green energies and are at the forefront of green energy policy. It is essential to bear in mind the fact that all Member States face geographical and social challenges of their own, which explains -and justifies- some of the differences in the existing policy framework.

This tells us two things. Firstly, it demonstrates that making environmental and energy policies a political priority is a necessary step to exceeding the goals set in European legislation, although the latter are sufficiently ambitious to ensure that all Member States make significant efforts. Secondly, political engagement must translate into sufficient funding to make decisions having large-scale, durable consequences (like changing the energy mix of a whole economy). In this regard, Member States are not on an equal footing.

As a consequence, effective European environmental and energy policies should be made 1) as acceptable as possible, and 2) as cheap to implement as possible in order to ensure the highest rate of adoption. This does not preclude innovation, but low-tech solutions that can be easily replicated in all Member States (like promoting urban farming), as opposed to more ambitious and expensive practices, may be the most suited for harmonisation. Obviously, the incentive to invest in becoming a leader in the environmental field remains, as such a status comes with very strong economic, political and social benefits. Having Member States at the forefront of energetic and environmental policies and technologies is of prime importance for the EU, all the more since today's cutting edge practices may well be tomorrow's low-tech solutions.

The second element that we noticed was the strong involvement of the private sector and the Civil Society. Initiatives stemming from the action of citizens and entrepreneurs are the true core of innovation in Europe, and they should not be discarded lightheartedly; instead, adequate communication actions, legal framework and financing opportunities should be put in place. Environmental policy is probably one of the European policies where the EU can create the most links with its citizens. Likewise, green economy is one of the economic sectors where the potential for EU companies is the largest. These opportunities should not be wasted.

Thirdly, certain practices made us realize the potential of digital tools for environmental and energy policies. From the Junker app to fully digitalized environmental permits in Estonia, the potential to transform environmental policy is tremendous, although it comes at the cost of accepting deep changes in the way administrations operate. In the context of European environmental and energy policies, digitalisation is particularly significant. There are at least two reasons for that. Firstly, and as explained above, digitalisation is closely linked to the need to use resources more efficiently in order to ensure that environmental policy remains affordable. Early investments into automation can translate into decreased operating costs for years to come, which in turns opens the door for more productive investments down the line. Secondly, the digital economy fundamentally operates across borders, and can reach citizens in all Member States at once (although language remains an important obstacle); the potential for projects like Junker to reach citizens in the whole EU is huge. Moreover, good practices could easily be shared across the EU to those who could benefit from them the most; this White Paper is our attempt at doing so, but we believe that knowledge and good practice sharing should be a continuous effort in order to genuinely bear fruits. We are convinced that the creation of a platform that would collect such good practices and contribute to disseminating them throughout the EU, as explained above, would be a significant step in this direction.

Although arguably amongst the most committed actors in the fight against climate change, the EU, its Members States and Citizens are still facing significant challenges. The aim of this White Paper was to demonstrate how collective action at the EU level could help address problems that are currently not being considered comprehensively. We are convinced that diversity across the EU's Member States is not necessarily an obstacle when it comes to acting together, and proves to be an asset when it comes to comparing and choosing between different courses of action.

For many years, a real movement has been created promoting another way to consume and to live together. Through practices explored, we perceived the huge potential of the EU to facilitate its Citizens' daily life and to give them access to environmental friendly practices. Even if there is a lot of critics against the European System over the last years, the EU is moving fast. European Citizens inspire each other and the EU must give them necessary tools to continue to cooperate and build all together a better, safer and greener future.

Acknowledgements

The White Paper team wishes to thank Mr Arimont (MEP), Mr Bayet (MEP), Mr Vandenkendelaere (MEP) for their faith in our project and its selection as Belgium national winner of the European Charlemagne Youth Prize 2017.

We want to thank the European Parliament Information Office in Belgium as well for its continuous support through the redaction of this White Paper, since our selection for the European Charlemagne Youth Prize and to the organisation of the presentation of our results in the European Parliament.

We would also like to warmly thank the Rector of the College of Europe, Prof. Dr. Dr. Jörg Monar, and the European Energy Policy Chair of the College of Europe Prof. Dr. Dirk Buschle for their support in the publication of this paper, as well as the Academic Assistants Samuel Verschraegen, Thijs Vandenbussche, Ariane Aumaitre Balado and Ernestas Oldyrevas. We are also forever grateful to the College of Europe for being the exceptional environment which was indispensable to the inception of this White Paper, as well as for its material assistance in getting the White Paper published. All of our gratitude goes to Benedikt Laloo for the design of the logo and the cover of the White Paper.

We are also indebted to all those - teachers, members of the associative world, inventors of practices, friends - who enriched this White Paper through a variety of indications of worthy practices, comments on our analyses, and advice regarding our recommendations. We want to address a special thanks to the Team Junker (Benedetta De Santis, Noemi De Santis, Giacomo Farneti, Todor S. Petkov), to Fabien Delory, General Director of Moulinot Compost & Biogaz, to Florent Tarrisse, Directeur general des services du Parc Naturel Regional des Grands Causses, and Dr. Gábor Kecskés associate professor, Széchenyi István University (Győr, Hungary).

But most of all, this White Paper is for all these citizens that have made it their purpose to act for the preservation of the environment and for an effective energy transition; they bring so much more to Europe and the world than they could ever get.

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