



March 2019

Circulating and Ecological Economy – Regional and Local CES: An IGES Proposal

2019

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Printed in Japan

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Acknowledgements

The authors would like to express their sincere appreciation to the many people who contributed to the successful production of this paper. Especially, we would like to thank Hironori Hamanaka, Hidefumi Imura, and Eric Zusman, who provided insightful and helpful comments, which helped improve the content considerably. Emma Fushimi and David Sussman provided crucial support.

Summary

This paper explores the current understanding regarding the Circulating and Ecological Economy (CEE) and the Regional/Local CES concepts put forward by Japan's Fifth Basic Environment Plan. The CEE and the Regional/Local CES advance a low-carbon, self-reliant, and decentralised society based on living in harmony with nature. The Regional/Local CES conceptually restructures (human) settlement systems to optimise carbon and materials circulation and reduce waste at the most efficient scale for each industry or sector.

The CEE takes some of the basic principles underlying other sustainability ideas, such as the Circular Economy or a decarbonised society, but expands them by focusing on mitigating the impact on carbon cycle by shifting to a renewable energy based economy, promoting regional revitalisation, integrating the three dimensions of sustainable development, and stressing space. The multiple case studies from inside and outside Japan have shown practical examples of implementation inspired by or sharing the principles of the Regional/Local CES. They illustrated how holistic and multi-scalar frameworks generate win-win situations for the economy, society and the environment.

Undoubtedly, the CEE has the potential to inspire regional and local governments worldwide to think outside the box when outlining their own sustainability plans. Furthermore, the Regional/Local CES can serve as a model to localise the SGDs. By moving towards a CEE, it will be possible to achieve a sustainable future for all. This report intends to inspire other localities and regions to rethink their tactics for sustainable development and to embrace the principles of the Regional/Local CES.

1. BACKGROUND AND HISTORY OF THE CIRCULATING AND ECOLOGICAL ECONOMY AND THE REGIONAL/LOCAL CES IN JAPAN


In 2015, three milestone global agreements demonstrated the growing international concern for addressing the social, economic, and environmental challenges that face our planet. Together, the signing of the Sendai Framework for Disaster Risk Reduction (DRR) in March, the adoption of the “2030 Agenda for Sustainable Development” and the 17 Sustainable Development Goals (SDGs) in September (Figure 1), and the Paris Agreement that dealt with climate change in December, reveal the variety of environmental difficulties that remain. At the core of these agreements is the need to integrate actions towards a new and more sustainable society. For this to happen, implementation will need to be local.



Figure 1: The 17 Sustainable Development Goals

Simultaneously, Japan is also facing its own host of environmental, economic, and social challenges at the national level. First, the range of environmental issues that it is confronting include a drastic reduction in greenhouse gases (GHG) emissions; the effective use of resources; the progressive destruction of forests and *Satochi-Satoyama* (socioecological production landscapes) damaged by mismanagement and; the need to conserve its biodiversity. Second, in regards to economic challenges, Japan needs to reinvigorate its struggling regional economies; adapt to new global competition with emerging countries, and; respond to technological innovation, including artificial intelligence (AI) and the internet of things (IoT). Third, in terms of social hurdles, Japan will need to address a decreasing birth-rate and ageing demographics which cause a net-population decline; reform its work-style; and prepare for large-scale disasters. To tackle these issues, the Ministry of Environment of Japan (MOEJ), in its Fifth Basic Environment Plan approved on the 17 April 2018, put forward the concept of a “地域循環共生圏 (Circulating and Ecological Economy)”.

This is not the first time that Japan has faced such challenges. For example, the Public Cleansing Act of 1954 responded to public health issues that emerged during the late 1940s, while the Waste Management and Public Cleansing Act of 1970 addressed the environmental pollution problems resulting from post-war rapid reindustrialisation. More recently, amid growing global environmental concerns and to improve resource



efficiency, the Japanese government has passed numerous Recycling Acts since 1995 and the Basic Act for Establishing a Sound Material-Cycle Society in 2000. Unsurprisingly, Japan is actively building a sustainable society where people live in harmony with nature. The idea of a Circulating and Ecological Economy (CEE) integrates environmental, social, and economic aspects to create a new model that promotes the circulation of carbon and resources in a sustainable manner.

This idea has been already introduced to the international community in a myriad of forums, including the UN Biodiversity Conference COP14 - COPMOP9 - COPMOP3 (Sharm El Sheikh, Egypt, November 2018); the 24th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC, Katowice, Poland, December 2018); the G20 Climate Sustainability Working Group (CSWG) 1st Meeting (Tokyo, Japan, February 2019), and; the First African Symposium on Sustainability Science (Nairobi, Kenya, March 2019).

In what follows, this paper explores the intellectual lineage of the Circulating and Ecological Economy in Japan. Then, it goes on to analyse other sustainability frameworks to find similarities and differences between them and the CEE. Finally, the paper showcases examples of sustainable development that embrace the principles of the CEE both inside and outside Japan. In so doing, it proposes a Regional/Local Circulating and Ecological Sphere (CES) as the way forward to attain a more sustainable future for our planet.


2. DEFINING THE CIRCULATING AND ECOLOGICAL ECONOMY IN JAPAN

The CEE and the Regional/Local CES advance a low-carbon, self-reliant, and decentralised society based on living in harmony with nature. The Regional/Local CES conceptually restructures (human) settlement systems to optimise carbon and materials circulation and reduce waste at the most efficient scale for each industry or sector. Every area of our lives, from technology to food or energy, has its own optimal geographic and spatial range of action. Ideally, production and consumption is local, although this might change depending on the product in question. Durable goods have a larger range than non-durable ones. While it will not be efficient to produce and recycle cars or refrigerators at the local level, processing food waste can happen at a smaller scale. The production and consumption of renewable energy also occurs locally. Communities with an energy surplus can direct this to other areas unable to meet their own needs. Within this system, synergies between different communities happen organically based on the exchange of carbon and materials.

The circulation of carbon and materials creates new spatial, economic, social, and environmental relations. The philosophy of the Regional/Local CES invites regions and localities to rediscover their vast untapped potential and encourages urban-rural collaboration. The countryside can provide energy, food, and other natural resources to cities. Urban areas can reciprocate with economic activities. Each region, city, town, village, and neighbourhood will find within themselves their unique assets to specialise in particular products, and ways to collaborate with their surroundings. Exchanges between different geographies make the most effective use of every resource (Figure 2). Moreover, shifting towards a renewable energy-based economy will mitigate the impact of human activities on the carbon cycle by reducing CO₂ emissions – as opposed to fossil fuel-based economies with rising CO₂ emissions and the dangers associated with anthropogenic climate change. The use of renewable energy decentralises power production and helps build self-reliant communities. The application of the Regional/Local CES requires courage to change the planning of economies, infrastructure and communities, but it will pay off with a better and more sustainable future for all.



Figure 2: Conceptual illustration of the Regional/Local CES



The Regional/Local CES also benefits from the natural potential of well-preserved ecosystems to mitigate the effect of natural disasters. The reinvigoration of peripheral communities not only creates more efficient consumption/production cycles but also ecosystem-based solutions for climate change adaptation and disaster risk reduction. Furthermore, a renewable energy-based economy will entail land use changes – as in the case of the forest management of Kanagawa prefecture outlined in this paper – which also mitigate the impact of human activities on the water cycle and reduce the risk of natural disasters such as flooding.


The Fifth Basic Environment Plan of the Government of Japan established the idea of a Regional CES, to serve as the foundation upon which to build the country's future environmental policies. The Regional/Local CES continues in the spirit of previous concepts put forward by the Japanese Government – such as the “regional circular sphere” in 2008, the 3R principles, or the National Biodiversity Strategy (2012-2020) of Japan – to find novel ways to tackle contemporary socioeconomic and environmental challenges. At a later stage, this idea further developed into the “Circulating and Ecological Economy” and the “Regional/Local Circulating and Ecological Sphere” concepts.

According to the Central Environment Council that led the discussion about these ideas, two previous concepts for a sustainable society, namely the Regional Circular Sphere (*Chiiki-Junkan-Ken*) and the Society in Harmony with Nature (*Shizen Kyousei Shakai*), form the basis for the CEE idea. Before the government conceptualised them, however, they appeared in the actions of the local governments and civic organisations, as well as academic research. A review of academic journal papers and magazine articles reveals that the two concepts (regional circulation and harmony with nature) have undergone a fundamental change during the past 20 years.

(a) Regional Circulation

The term “regional circulation” appears in the title of 347 articles (including magazines and academic papers) published from 1989 to 2018. Until 2008, it appeared alongside key words such as “system”, “use”, “establish”, “biomass”, and “agriculture”. After 2009, new key words showed up with “regional circulation”, such as “economy”, “project”, “formulation”, “energy”, and “industry”.

The government of Japan promoted the concept of “Regional Circulating Sphere” in its Second Fundamental Plan for Establishing a Sound Material-Cycle Society in 2008. With this concept, Japan expected to secure waste management facilities; reduce social costs; bring about technology innovation, creation of new businesses, and networking of people, and; formulate a low-carbon society in harmony with nature. To this



end, it carried out many model projects to recycle “environmental resources” such as plastics, household waste, food waste, animal waste, and paper, among others.

Before its conceptualisation by the government, the term “regional circulation” appeared mainly in two contexts. Firstly, many articles used the term to introduce and analyse cases of technologies and systems to recycle household waste and other organic waste (animal waste). Common topics included the impact of waste recycling on local material flows, based on an analysis of the resource stock, transportation infrastructure, or recycling technologies. Secondly, some papers argued for the necessity and potential of circulating wealth in the local society, referring to local currency and concepts by the New Economy Foundation, namely, “plugging the leaks” or “local multiplier effect”.

In the late 2000s, more articles were published with new key words such as “local economy revitalisation”, “linkage” or “collaboration between rural and urban areas”. They discussed the challenges of stakeholder collaboration to motivate societal action activate society, rather than technology and systems. Some typical topics included partnerships with farmers and forestry enterprises, circulation of food and organic resources, and business case development.

Arguments that “regional circulation” could be a way to revitalise local society were further mainstreamed after the Great East Japan Earthquake. Some papers analysed how these types of “circulating” schemes mitigated the disaster impacts and accelerated the recovery. Additionally, the nuclear power plant accident revealed weaknesses in the centralised system and nudged people towards decentralised systems. In particular, renewable energy sources became those “resources” which are dealt with most frequently in discussions on “regional circulation”.

Since 2014, discussions on finding and utilising local resources to mitigate financial outflows and create job opportunities have gained momentum. Arguably, these discussions were influenced by a report entitled “Disappearance of Local Societies” which cautioned against the ever-increasing pace of depopulation.

In summary, Japanese society has changed its views on the benefits (and necessity) of circulation of resources in local societies – from technology and system design, and reduction and recycling of organic waste, to the engagement of local stakeholders, in order to strengthen the local society and economy.

(b) Harmony with Nature


The term “harmony with nature” appears in the title of 318 articles (including magazine and academic papers) issued from 1994 to 2018. In the early 2000s it appeared with key words such as “city”, “watershed”, and

“recovery”. After becoming less popular in the late 2000s, the term came back around 2010, along with new key words such as “environment”, “society in harmony”, “reconstruction”, and “agriculture”.

The idea of “harmony in nature” dates back to the early 1990s in the context of watershed management. In 1998, the Aqua Restoration Research Centre opened in Gifu Prefecture with the Japanese name *Shizen Kyousei Kenkyu Sentaa* (“Centre researching harmony with nature”). The Centre established an experimental river and pond to study watershed conservation and restoration. In 2001, the Council for Science and Technology Policy of the Cabinet Office presented a framework on “Watershed/Urban Regeneration in Accord with Nature”. It aimed to accumulate scientific knowledge and develop technology and systems to promote restoration on a natural and societal basis so that human beings can best take advantage of natural water circulation in the watershed. It took an engineering approach to the idea of “harmony with nature”, based on the understanding that urban living conditions face problems due to their distance from the watershed and natural environment.

Until the early 2000s, the majority of articles covered the activities of the Aqua Restoration Research Centre or the “Watershed/Urban Regeneration in Accord with Nature” framework. However, in 2010 several articles introduced a variety of Japanese cases “in harmony with nature”, such as in rural areas and islands, and the premodern society. All of these contexts were different from the challenges of cities. In local societies suffering from depopulation and shrinking agriculture, fisheries and forestry, “harmony with nature” meant the synergy of economic restoration with the conservation of biodiversity and other natural resources. Thus, the two most important topics were the governance structure and the financing arrangements to facilitate the collaboration between local people, government, researchers, and volunteers.

The Great East Japan Earthquake had a major impact on the discussions on “harmony with nature”. Until the earthquake, this discussion had mostly dealt with the means of enjoying all of nature’s blessings by preventing society’s destruction of vulnerable natural areas. However, the earthquake reminded people of the fact that nature poses a threat to society, and thus if we are to live “in harmony with nature”, we should acknowledge the threat. Additionally, the experience of relief and recovery made people pay more attention to the importance of collaboration and participation in seeking “harmony with nature” as a way to revitalise the local society. Another clear difference between the arguments before and after the earthquake was the emphasis on “harmony with nature” in agriculture and fisheries, or in rural society in general in the more recent articles. The cases introduced were, for instance, the transition of livestock farming from the “industrial” dairy system dependent on imported feed, to ways to improve the health of cattle and farmers, changes of



water flow in rice paddies to enable fish to run upstream, and so on. These cases aimed to strengthen the economy and establish social capital through participation in the actions.


In summary, local governments, workers in the farming and fishing industries, representatives from civil society organisations, and researchers, have gradually shifted the context of “harmony with nature” , from an engineering approach of maintaining watershed for the conservation of water flows, biodiversity, and urban living conditions, to the engagement of stakeholders as a way to revitalise the local economy and society.

(c) Circulating and Ecological Economy

The Circulating and Ecological Economy (CEE) is a multi-scalar and multi-layered concept guiding actions to attain a sustainable future by focusing on the local area. There are three fundamental principles that guide the framing of the CEE. First is the principle of energy and carbon circulation and the need to move towards a decarbonised, or low-carbon, society. It is here where renewable energy plays a key role. Regional and decentralised energy production based on renewables will not only shape a more resilient society, but also will take advantage of underutilised regional resources, and support the revitalisation of local communities. Second is the principle of material circulation and materials recycling. This will minimise the use of raw materials and waste by creating a cycle of reuse. Third is the principle of a society living in harmony with nature. This accentuates rural-urban linkages and the necessity to find mutually beneficial interactions between rural producers and urban consumers. If the CEE is the theoretical foundation of this new framework, the Regional/Local CES becomes the tool that translates its principles on the ground.

Underlying these three principles is the idea that environmental, economic and social problems are inherently interrelated. It would be impossible to grapple with them individually. At its core, the CEE responds to the SDGs’ belief of finding all-inclusive ways of action to accomplish sustainable development (DESA 2018). This aligns with the “Integrated Improvements on Environment, Economy and Society” or II2ES proposed in the Third Basic Environment Plan of Japan. The Regional/Local CES becomes an instrument to create a decentralised and self-resilient society in line with local needs, finding synergic relations between adjacent regions and communities to attain a sustainable use of resources.

The CEE concept turns around the traditional urban/rural dichotomy to find mutual ways to provide sustenance. The Regional/Local CES capitalises on these existing synergies to enable the circulation of local resources – natural, material, energy, human, or financial – while fostering local production for local consumption. In tandem with the introduction of renewable energy, the Regional/Local CES will help to



advance towards a self-contained and localised society. This will only be possible through the localisation of measures to the given assets of a place. Its implementation requires the active participation of multiple stakeholders and the creation of partnerships that include central, regional, and local governments, the private sector, academia, and civil society. There are already examples of good practices among Japanese municipalities that can serve to illustrate this idea. For example, Nagano Prefecture is working towards 100% renewable energy in the region. This is reinvigorating local communities and establishing intra and inter-regional rural-urban linkages. Nagano Prefecture is one of Japan's "SDGs FutureCities".

The Regional/Local CES stresses the vital role of making actions local, becoming a means to achieving the SDGs. It helps their incorporation into national, regional, and local policy frameworks. Following the spirit of the United Nation's Department of Economic and Social Affairs (DESA 2018), the Regional/Local CES enables ownership of the SDGs by bringing all different levels of society on board in the implementation process. It addresses the three dimensions of sustainable development, the inherent interlinkages between the 17 SDGs, and the multiple scales of action to achieve them.

The CEE and the Regional/Local CES ideas are born with the ambition to shape environmental policies not only in Japan but globally. The range of worldwide challenges calls for an integrated response that considers social, economic and environmental linkages. A basic prerequisite to achieve sustainable development is to shift from a linear to a circular material and energy model based on renewable energy. At the same time, to take full advantage of regional resources, governments will need to find innovative ways to rejuvenate rural communities and to balance urban-rural relations. Building policies based on the principles of the CEE and Regional/Local CES will "maximise the vitality of all regions, making sustainable, equitable and efficient use of resources of mountainous agricultural and fishing villages as well as cities in an integrated manner" (Takeuchi 2018).

3. SIMILARITIES AND DIFFERENCES TO OTHER SUSTAINABILITY FRAMEWORKS

In the wake of growing global environmental awareness, policymakers, academics, planners, and civil society alike are exploring innovative avenues towards a sustainable world. The challenges ahead are multi-layered and call for integrative approaches. The magnitude of the problem results in an equally large academic effort to address the issue. As recently as 2018, the term "sustainable development" appeared in the title of 1,722

academic papers¹. There has also been a myriad of frameworks to promote sustainable practices – such as optimising energy consumption, reducing GHG emissions, decreasing water and materials consumption, or exploring ways to live in harmony with nature (Kramers et al. 2014; Brownsword et al. 2005; Kalmykova, Rosado, and Patrício 2016; Schultz 2002; Jordan and Kristjánsson 2017).

This is by no means an extensive review, since each of these ideas is in and of itself the subject of numberless studies; rather, the current discussion explores the intellectual lineage underlying the CEE and the Regional/Local CES ideas. For the sake of clarity, this paper groups the ideas around three key themes in sustainable studies: first, materials and carbon circulation; second spatial considerations, and; third, ecosystem-based solutions for climate change adaptation and disaster risk reduction. The CEE and the Regional/Local CES open avenues to bring these different, but complementary approaches, into fruition. This paper aims to link the Regional/Local CES with current academic studies on sustainable development. In doing so, it intends to spark creative ways of thinking to achieve a sustainable future based on the Circulating and Ecological Economy principles.

(a) Material and Carbon Circulation

The resources required to sustain growing populations, cities, and consumption have put materials and energy use at the forefront of sustainability studies. At first, studies focused on materials consumption, before then shifting towards an emphasis on carbon emissions as a response to the issue of climate change (Solomon et al. 2009; UNEP/Earthprint 2011; Wiedmann et al. 2015). The way humankind expends resources, and whether they are finite or renewable, requires careful planning for their use. Both practitioners and researchers have explored possible ways to optimise production systems to diminish raw materials consumption and the expulsion of waste and pollution into the environment. The circular economy (CE) and the low-carbon economy are two economic systems that stress recycling, lower resource consumption, and the production of renewable energy to reduce the impact of human activities on the environment.

The circular economy has generated much enthusiasm among policymakers and business advocates, such as the European Union or the Ellen MacArthur Foundation (COM 2015; EMAF 2013, 2015a, 2017). Despite becoming one of the hottest topics in sustainability debates and subject of countless recent studies, among academic circles, the CE is still a contested concept that lacks a clear definition (Kalmykova, Sadagopan, and Rosado 2018; Kirchherr, Reike, and Hekkert 2017; Korhonen et al. 2018; Korhonen, Honkasalo, and Seppälä

¹Using ScienceDirect search engine for academic literature.

2018). In a nutshell, the CE aims at simultaneously minimising waste and the introduction of virgin resources into the production/consumption cycle. It increases resource efficiency by shifting from the traditional linear model depleting the planet's resources – where natural materials are transformed, consumed, and ultimately disposed – to a circular one in which rather than being thrown away, materials are recycled and brought back into the system (Cullen 2017; EMAF 2015b; Geissdoerfer et al. 2017). It also considers energy flows and the use of renewable energy. In an ideal CE, only biodegradable materials enter the biosphere, while non-biodegradable materials keep circulating for as long as possible, maximising their value (Wijkman and Skanberg 2015).

The CE has gained traction among multiple governments to shape their sustainable policies. The European Union and some of its member states – such as the Netherlands, the UK, France, Sweden, or Finland – China, and Japan are promoting the CE in their recent frameworks (Korhonen, Honkasalo, and Seppälä 2018). Supporters of CE usually refer not only to the positive environmental impact of its implementation, but also, to the beneficial effects on the economy and job market (COM 2014, 2015). China and the Netherlands are usually considered frontrunners in the implementation of the CE (van Buren et al. 2016; Bastein et al. 2013; Geng et al. 2013; Lieder and Rashid 2016). China pioneered the official application of the CE by adopting its “Circular Economy Promotion Law of the People’s Republic of China” as early as 2008 (CIRAIG 2015; Kirchherr et al. 2018). In the Netherlands, the government-wide programme “A Circular Economy in the Netherlands by 2050” will overhaul the country’s economy to use only renewable raw materials by 2050 (“A Circular Economy in the Netherlands by 2050” 2016). Japan, based on its long history of environmental awareness and protection, is committed to advance the CE and is making this one of the central elements during its presidency of the G20 in 2019 (Laita 2018).

Despite all the excitement surrounding the CE, current understanding of the concept leaves many unanswered questions calling for extensive academic research to maximise its positive impacts. Work to date has clearly focused on fostering the CE within businesses or industrial sectors, emphasising the circulation of materials (Ghisellini, Cialani, and Ulgiati 2016). Korhonen, Honkasalo, and Seppälä (2018) identified six limitations to the CE, including “those concerning thermodynamics, definition of CE system boundaries and challenges in the governance and management of the CE-type inter-organisational and inter-sectoral material and energy flows” (p. 45). Much of the current criticism also comes from the aspects neglected by the current understanding of the CE, and which are key to achieve a sustainable future. One particular example is the built environment: CE bolsters have overlooked both the construction sector and cities alike. The construction sector has the largest share of raw materials consumption, and accounts for 25%-40% of global CO₂ emissions but it has yet to become an integral part of CE models (Pomponi and Moncaster 2017;



WEF 2016). The CE has also failed to address cities at large, including cultural values associated with consumption and lifestyles, and issues emerging from land and infrastructure use and deterioration (J. Williams 2019a, 2019b; Petit-Boix and Leipold 2018). Moreover, the possible rebound effects of applying CE principles (Makov and Font Vivanco 2018; Zink and Geyer 2017), or the lack of evaluation tools to assess their effectiveness need further clarification.

This criticism is not to disregard the ample positive aspects of the CE, but rather, to encourage increasing research efforts including all stakeholders involved. It is clear that if the current linear model continues, many raw materials will be soon at the edge of exhaustion. The implementation of CE principles will help to lower material consumption, to minimise waste, and decrease CO₂ emissions. Furthermore, by triggering a paradigm shift regarding consumption and production, and by advocating for reduced ownership, the CE has the potential to tackle wider socioeconomic problems (J. Williams 2019a). The challenge now is to find novel ways to apply CE principles that take into consideration the concept's own limitations.

Decarbonisation is another buzzword that has gained traction in sustainability debates. It refers to an economy that minimises the emission of greenhouse gases (GHG) in general and CO₂ in particular – the driving forces behind global warming (Kern and Rogge 2016). Following the 2015 Paris Agreement, this is fundamental so as to not surpass the targeted “2 degrees Celsius” limit. A low-carbon society fosters inclusive sustainable development and decreases GHG emissions by means of energy efficiency, low-carbon energy sources, and transforming consumption and lifestyles (Skea and Nishioka 2008). Moreover, decarbonisation can happen without hindering economic growth (Shimada et al. 2007). Inroads in decoupling economic growth from environmental degradation are pointing to a sustainable model in which development is not synonymous with environmental degradation (Gupta 2015). Watanabe, Naveed, and Neittaanmäki (2019) showed an alternative low-carbon economy by using digital solutions to create a bio-economy based circular economy. Turning towards a low-carbon bio-economy might have positive impacts on employment, adding extra incentives to implementing it. This is just but one example of all the possibilities for future development emanating from low-carbon models.

However, achieving a low or zero carbon society is not an easy task. There exist multiple pathways to do so, from technology-driven solutions centring on innovation to slower-paced ones involving a radical reimagining of society and lifestyles (Matsuoka 2007). Key will be how to generate energy. Although continuous technological improvements in wind and solar energy production have lowered their cost, fossil fuels still propel the majority of the world's energy sector (Lechtenböhmer et al. 2016; Soltero et al. 2016; Zawieska and Pieriegud 2018). At the same time, industry, transportation and heating, among other sectors, will need

to adapt to use other fuel sources. Further research and policy innovation should focus on particular sectors or industries to address their own character – energy intensive processing industries have different needs than other industries (Wesseling et al. 2017).


Aside from energy sources, becoming a low-carbon society will require overhauling socioeconomic structures and industrial practices in aspects such as land use, farming, or lifestyles (Geels 2014; Shimada et al. 2007). Transitioning entails multi-level participation from national governments to individuals, and from public bodies to private companies (da Graça Carvalho, Bonifacio, and Dechamps 2011). For example, locally, consumers can help to decentralise energy production by choosing rooftop solar panels and by having their own storage systems; this kind of action creates a more energy resilient and decentralised society (Hiremath et al. 2009, 2010). Just recently, energy studies have made their spatial turn, starting a new path that introduces space into their considerations (Bridge 2018). There is still much work that needs to be done to optimise decarbonisation pathways, but the beginning already seems promising.

(b) Considering Space and Scale

Both the Circular Economy and the low/zero carbon society tackle sustainability from a consumption/production perspective. Nevertheless, they have not dealt in-depth with notions of space and scale, and in particular of the urban areas and the relationship with its hinterland. Cities are growing at an unprecedented pace, increasing environmental pressures and the use of resources. For example, in 2006, cities accounted for 67% of the global energy consumption and 71% of global energy-related CO₂ emissions (UN-Habitat 2011). Cities, as centres of production and consumption, have focused much of the debate on sustainability from the perspective of multiple fields such as transport studies, urban planning, or architecture (Bulkeley and Betsill 2005; Satterthwaite 1997; Shen et al. 2011).

The large body of literature on sustainable cities keeps expanding, with city planners, local authorities and grassroots movements exploring new ways of action. This section summarises two different approaches that emphasise space: Urban Metabolism (UM) and rural-urban linkages. UM is a model to quantify the materials and energy fluxes circulating throughout cities, which potentially can inform the implementation of the CE. Urban-rural linkages consider the relationship between cities and their hinterland.

Wolman's seminal work "The Metabolism of Cities" (Wolman 1965) can serve to bridge the gap between economic systems and urban areas. Originally, his work responded to deteriorating air and water quality in American cities. Wolman explored the nuts and bolts of how cities work in terms of fluxes of materials and




energy, and the generation of waste. Urban Metabolism conceptually assimilates cities to living organisms: for their survival, they require the intake of resources while expelling waste and pollution. UM has emerged as a quantitative framework to analyse the material and energy flows circulating throughout cities (Kennedy, Pincetl, and Bunje 2011; Pincetl, Bunje, and Holmes 2012). For instance, UM can help measure the entrance flows of construction materials, food or water, and the resulting exit flows of construction waste, bio-waste, or wastewater (Kennedy, Cuddihy, and Engel-Yan 2007). It problematises the long-term viability of cities by considering their ecological footprint and their effect upon their surrounding hinterland. Even though economic and social considerations still need to be fully integrated under the UM umbrella (Kennedy, Pincetl, and Bunje 2011), there are some inroads towards this direction – such as the inclusion of aspects of liveability and health (Newman 1999).

There are some possible positive synergies between the ideas of Urban Metabolism and the Circular Economy. UM can inform and become a framework to evaluate, develop and implement CE notions in cities (Kalmykova and Rosado 2015). By understanding the metabolism of an urban area, UM can work as an assessment tool of the linearity or circularity of cities as systems and can, therefore, help to advance appropriate policy responses. Among other advantages, Pincetl and Bunje (2009) note that UM helps to identify a system's boundaries. It brings into consideration the spatial dimension, which until now has been lacking in the study of the Circular Economy.

Urban Metabolism also draws attention to the inherent relationship between cities and their hinterland. Cities need the countryside for their own survival. They are unable to produce enough food, energy, or raw materials to meet their needs. However, UM still limits its analysis to material fluxes passing through cities without questioning the urban/rural divide. The rise of the “urban age” thesis is leading to the assumption that the optimal scale to address global problems is the urban scale (Wachsmuth 2012). This idea extends the traditional opposition between urban and rural areas that came along with the industrial revolution (Smith 2008; R. Williams 2011). The end result is the preponderance of compartmentalised policies that either focus on cities or on rural areas (Caffyn and Dahlström 2005).

Under the aegis of the “urban age”, worldwide settlement systems are becoming increasingly urban while rural areas are progressively undergoing depopulation. It is undeniable that the clustering force of cities has amplified during the current stage of post-industrial capitalism (Florida 2018; Scott 2012). Cities concentrate the majority of economic activities, production structures and population, with rural areas being left behind. As such, this poses a wide range of environmental problems as a consequence of unattended and abandoned crop fields and natural resources. Rural areas, encompassing mountainous, agricultural, and



fishing villages are rich in natural resources and ecosystem services. They provide food and water to urban areas, and have the capacity to become centres of renewable energy production. In them, water is purified, natural resources are extracted, and natural ecosystems can help to prevent or mitigate natural disasters.

The growth of cities and their economies happened at the expense of rural and peripheral regions, which in most cases could not withstand the transformation of production modes and lifestyles. Elsewhere, the population of rural areas is ageing and dwindling due to their incapability to stop the rural exodus of the younger population to cities. A shrinking rural population is leaving unattended natural resources, which deteriorate with time and exacerbate the ill effects of environmental problems. Yet, cities have the power to offer funds and human resources to rural areas. Urbanities enjoy participating in a wide range of natural preservation activities, such as eco-tourism, which underpins both rural areas' economy and natural preservation. The consumption of local products further supports the economy of rural areas. Certainly, cities and the countryside are socioeconomically and environmentally intertwined.

Elsewhere, local and regional governments hastened to respond to this issue with initiatives to promote the countryside as a viable alternative to urban areas. These schemes showcase rural lifestyles in a positive light, as opposed to stressful city living. Urbanites look back to the country seeking to reconnect with nature and with the place they feel connected to. While temporal experiences, such as eco-tourism and resource-based tourism have become popular in recent years and are aiding the economic survival of many rural regions, other more ambitious plans target urban-to-rural migration to reverse the current negative population growth (Esaki, Arai, and Kawaguchi 2000; Knight 1994; Wiltshire 1979).

To truly pave the way towards a sustainable future, policymakers and academics ought to complement existing actions with holistic initiatives that consider the connections between cities and their environs at the regional level. The distribution of population and economic activities within the wider territory and the relationship between cities, their hinterland and rural areas should be the subject of further research. This should seek to break with the urban/rural dichotomy to find mutually beneficial synergies aiming at a more sustainable future in harmony with nature.

(c) Ecosystem-based Solutions for Climate Change Adaptation and Disaster Risk Reduction

Two interrelated approaches, namely, the Ecosystem Based Adaptation (EbA) and Ecosystem-based Disaster Risk Reduction (Eco-DRR) have promoted the benefits of maintaining sound ecosystems toward building

resilient societies. Regional development programmes addressing Climate Adaptation and Disaster Risk Reduction have become popular worldwide, including the EU Action Plan on the Sendai Framework for Disaster Risk Reduction (MOEJ 2016; Faivre et al. 2018).

The two concepts have many aspects in common and naturally are often introduced simultaneously as “ecosystem-based solutions” or “ecosystem-based strategies” (McVittie et al. 2018; Triyanti and Chu 2018). Eco-DRR is “the sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim of achieving sustainable and resilient development” (Estrella and Saalismaa 2013). EbA is “the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change” (Secretariat of the Convention on Biological Diversity 2009). Both approaches “enable people and ecosystems to adapt to the impacts of climate change and/or disasters through the sustainable management, conservation and restoration of ecosystems to provide ecosystem goods and services” (McVittie et al. 2018). EbA and Eco-DRR have a couple of potential contributions in the context of our discussion on the potential of the CEE – or the revitalisation of local economy and society through utilisation and circulation of local resources.

Firstly, the adoption of these approaches require local stakeholders to revisit their natural and socioeconomic conditions, and thus encourage them to seek opportunities to strengthen their economic and social activities (Figure 3). According to MOEJ (2016), Eco-DRR has two major methodologies of reducing disaster risks through: a) avoiding exposure of human lives and properties through setting buffer zones; and b) reducing vulnerability through conserving, restoring, and managing healthy



Figure 3: Coastal forest buffer zone against hazards. Source: Hamamatsu City, Japan

ecosystems that serve as barriers against disasters. To put these methodologies into action, stakeholders should examine options from a comprehensive perspective and spatial-planning approach, develop a regional consensus, and establish a mechanism for conservation and maintenance. While these steps require active participation of the local stakeholders including the groups of farmers, forestry and fishery workers, those of local small and micro enterprises, and community organisations. Thus, the process of establishing the Eco-DRR or EbA would provide opportunities for local stakeholders to assess and re-evaluate the natural and socioeconomic conditions of their localities, and build relationships that would also contribute to an

effective response to hazardous incidents. Additionally, maintenance and enhancement of ecosystem functions contribute to the creation of job opportunities (Faivre et al. 2018; McVittie et al. 2018; MOEJ 2016). Secondly, EbA and Eco-DRR require spatial-planning not only from the current status of land usage, but also in relation to the changes in the use of land over time, as well as local memories of disasters and local wisdom that has been developed and handed down. Such re-examination of the heritages of local societies enable local stakeholders to create a new combination of both traditional wisdoms and modern technologies for building viable and resilient systems of livelihood options (Mohri et al. 2018; Takeuchi et al. 2018).

(d) The Circulating and Ecological Economy and the Regional/Local CES

The above-mentioned notions are related and non-conflicting approaches towards sustainability. Nonetheless, seeking patterns for sustainable growth requires new ideas that go beyond current research and practices. The CEE brings together these wells of knowledge to put forward a multi-layered and all-encompassing framework. Contrary to other models, it recognises that social, economic and environmental aspects are indissoluble and cannot be addressed in isolation.

There are essential differences between the CEE and other frameworks. While much of the focus to date has been on materials circulation, the Regional/Local CES emphasises carbon circulation and renewable energy as being the foundations of a sustainable future. Promoting renewable energy not only reduces carbon emissions but also brings about a decentralised and more resilient society. This looks for the hidden natural potential of peripheral areas and revitalises their economies.

Second, most of the current initiatives and sustainability schemes are sectoral in scope – addressing one single aspect such as materials or energy circulation, transport, or waste management. They are also in scale – focusing on cities or the countryside – but not considering the indissoluble relationship between them. What is lacking is a holistic approach addressing the three dimensions of sustainable development, as highlighted by the United Nations, which has made its priority the mainstreaming of integrative lines of attack to achieve sustainability. The CEE fills this gap by making the three dimensions of sustainable development the core of the proposal and encouraging coordination between regional and local actions.

Third, the CEE stresses that any action towards achieving a sustainable future must come about through regional and local efforts. In doing so, the Regional/Local CES idea becomes the tool to make actions local. It brings spatial considerations to the forefront and questions the optimal scale to maximise the efficiency of the circulation of each resource. The Regional/Local CES creates new urban-rural synergies. Its

implementation is individualised to a particular geographic delimitation (depending on the element under consideration) and based on the identity, existing assets and strengths of a place. Therefore, it is fundamental to take into account local behaviours and to incentivise local and decentralised sustainable initiatives. Lastly, the Regional/Local CES has one more dimension. It considers natural disasters and looks for ecosystem-based ways to mitigate their effect.

Local communities and regions in Japan are putting into practice the underlying ideas of the CEE and the Regional/Local CES to structure their sustainability plans. In doing so, they are imagining novel sustainable development paths that have the potential to inspire other communities inside and outside Japan.

Summary Box

The Regional/Local CES:

- Emphasises decarbonisation based on the use of renewable energy to put forward a decentralised and self-resilient society.
- Adopts a holistic approach to sustainable development integrating the three dimensions – social, economic, and environmental.
- Focuses on space. It becomes a tool to localise actions, and questions the optimal scale to maximise the efficiency of the circulation of carbon and each resource.
- Reinvigorates local communities.
- Highlights the need to find ecosystem-based solutions for climate change adaptation and disaster risk reduction.

4. CASE STUDIES FROM INSIDE AND OUTSIDE JAPAN

Both inside and outside Japan, there are already good examples of regions, cities or initiatives that follow the spirit of the Circulating and Ecological Economy and the Regional/Local CES. Whether managing forests systems and water resources at the prefectural level in Japan, or reinvigorating rural communities through winemaking and enotourism in Spain, the Regional/Local CES opens avenues for innovative paths for sustainable development. Analysis on these concepts illustrates how their underlying principles can be applied in practice.

(a) Building a Circulating and Ecological Economy in Nagano Prefecture, Japan.


Nagano Prefecture is home to more than 2,100,000 inhabitants. Dominated by mountain ranges, the prefecture is famous for its ski resorts, but also for the health and long-living of its inhabitants. Nagano is leading the way to achieving a more sustainable future. The prefecture has included in its “Nagano Comprehensive Five-year Plan (2018-2022)” a range of commitments to achieve the SDGs including the three dimensions of sustainable development. Its multiple schemes and ambitious decarbonisation targets – aiming at 100% renewable energy production – has gained Nagano the designation of “SDGs Future City”. The prefectural project aims at establishing a self-sufficient society and is modelled on the principles of the CEE.

In line with the principles of the CEE, Nagano SDGs Future City Project is structure around four main pillars: (1) Providing a learning environment for all (alignment with SDGs 4, 8, and 13); (2) Promoting localisation of food, energy, and timber (SDGs 7, 8, 12, and 13); (3) Planning sustainable cities (SGDs 3, 9, 11, and 13); and (4) Accomplishing a 100% renewable energy community (SDGs 7, 8, and 13). These efforts are catalysed through a prefectural SDGs consortium bringing together municipalities, private enterprises, financial companies and academia.

Nagano Prefecture is bringing these objectives to the ground level by implementing particular Regional/Local CES actions. Nagano’s Regional/Local CES plan seeks a 100% renewable energy and a bioeconomy based on de-carbonisation, resource circulation, and biodiversity (Figure 4). This will



Figure 4: Example of one of the multiple efforts made by Nagano Prefecture. Electricity Sale Scheme, selling electricity to big cities from two new hydropower plants.



simultaneously revitalise local economies, and increase health and welfare. Nagano promotes three points to attain a Regional/Local CES. First is to create municipal and regional level models of CEE through coordination, leadership, and resources. Second is to promote community-based energy saving and renewable energy projects through public support, such as financial mechanisms leading to community development and an “equitable and people-centred transition”. The final point is to advance international exchange and cooperation in realms such as human resources development and/or technology and knowledge transfer.

Nagano’s Regional/Local CES brings to the forefront decarbonisation and renewable energy. The Nagano Sustainable Energy Policy Strategy (2013-2020) targets a GHG reduction of 36% by 2030, exceeding Japan’s target of 26%. Japan’s government awarded Nagano Prefecture the Best Long Term Targets Award. Nagano is already implementing concrete decarbonisation projects. For example, the regional government is promoting community-based renewable projects, energy efficiency for business and buildings, or a solar mapping system. The prefecture has also drawn up an ambitious plan to transform the energy relationship between rural and urban areas. Here, Nagano’s Enterprise Bureau sells hydropower to urban areas, thereby exporting renewable energy to cities outside the prefecture and bringing revenues into Nagano.

At the local level, Ina City is setting an example of good practice in implementing the Regional/Local CES. Ina City is pursuing a forest-based bioeconomy. The city released its Ina City Forest Vision for the next 50 years in 2016. The plan envisions a sustainable forest management system in which the forest supports economic development and contributes towards lowering GHG emissions. Within this plan, the citizens take a leading role in developing a circular economic model promoting the proper use of local wood in a myriad of products, from wood pellets to wooden houses, and also using biomass heating. An educational programme to teach children about the richness of forests and the importance of defending biodiversity complements this initiative.

These are just some highlights of Nagano’s current work on SDGs and the Regional/Local CES. They show that by integrating every stakeholder and thinking creatively on how to use regional and local resources, local areas can take the lead into envisaging sustainable development pathways. Nagano Prefecture is fully embracing the Regional/Local CES in its framing of an ambitious agenda towards a sustainable future.

(b) Water and Forest Management System in Kanagawa Prefecture

Kanagawa Prefecture is part of the Greater Tokyo Area. After Tokyo, it is the second most populated prefecture of Japan, with just under 10 million inhabitants. Kanagawa is highly urbanised, and includes large cities such as Yokohama and Kawasaki. However, dominated by the Tanzawa Mountain range, its western area can be considered rural, with an ageing and shrinking population. The Sakawa and Sagami rivers – originating in neighbouring Yamanashi and Shizuoka Prefectures respectively – run eastwards and are the source of 90% of the prefecture’s water (Kanagawa Prefecture, 2015). Most of the river’s catchment area falls outside the boundaries of the prefecture. Moreover, 70% is in privately owned forests, which have progressively been abandoned due to low profits. This has resulted in a progressive deterioration of the quality of prefectural water sources, which unfortunately does not meet the expectations of all prefectural citizens.

The “Basic Policy for Kanagawa Water Source Environment Conservation and Restoration” addresses this issue. Rather than looking for an immediate solution, the policy sets a long-term plan to preserve and restore the sources of water between 2005 and 2025. Subsequently, Kanagawa Prefecture formulated the third phase of this plan in its “Five Year Action Plan for Conservation and Restoration of Water” in 2018. To finance this plan, the prefectural government created a new annual tax that average JPY 890 per taxpayer; it consists of a fixed rate of JPY 300 and a progressive rate depending on the personal income. The tax rate is revised every five years to respond to the total needs of funding to implement the actions laid out by the plan. For example, the current 5-year phase requires JPY 20 billion. The money raised by this tax will be used for multiple purposes: sewage collection and treatment; water environment monitoring; awareness-raising; and river and groundwater conservation. According to public surveys, prefectural citizens in Kanagawa agree to spending part of the budget outside the strict political boundaries of the prefecture (77% of respondents). A total of 66% agreed with the taxation system for water conservation.

This case emphasises several characteristics of the Regional/Local CES. First, it shows the dangers of unmanaged natural resources – in this case, lower water quality due to abandoned forests. Second, it highlights the need to establish intra and inter regional urban-rural linkages to address socio-environmental challenges. Third, it emphasises the interrelation between the three dimensions of sustainable development.

(c) Achieving Good Quality of Life in Shimokawa Town

In 2017, Shimokawa Town won the First Prime Minister's Award for Japan SDGs awarded by the Japanese Government's Sustainable Development Goals Promotion Headquarters. Unknown to many, Shimokawa Town has advanced its own model for sustainable development. This small township located in Kamigawa-gun, in the northern part of Hokkaido, has extreme weather conditions with heavy snowfalls and winter temperatures going as low as minus 30 degrees Celsius. Agriculture, forestry, and mining – especially gold, silver, copper, and zinc – propelled growth up until 1960, when its population peaked at 15,555 inhabitants. Since then, the decay of the town's core industries and its distance from any major economic hub brought about population shrinkage. Its population was down by almost 80% to just 3,547 inhabitants in 2015. Shimokawa Town has embraced the SDGs to confront its long-term demographic and economic problems and find a new sustainable future.

Shimokawa's journey started in 1998, when the town's dire prospects led authorities to take action against economic stagnation and depopulation. The establishment of the Shimokawa Industrial Cluster Research Group brought together each and every stakeholder to explore alternative avenues for the town. Its work culminated in 2004 with the "Grand Design for Forestry Symbiosis" plan, setting off a new development path that integrates the three dimensions of sustainable development. Efforts did not stop there. After avoiding the merger with any nearby municipality during the Great Heisei Mergers of the early 2000s, the town reinforced its sense of autonomy with the publication in 2007 of the "Shimokawa Basic Ordinance of Autonomy". Underpinning all these efforts was a willingness to reinvigorate its economy based on the town's unique assets, to halt outmigration, and to reinforce a sense of place. Shimokawa's efforts paid off. The Government of Japan recognised its good work by selecting the town to be an Eco-Model City in 2008, a FutureCity in 2011, and a Model of Rural Revitalisation in 2014. Its recent designation as an SDGs Future City shows the town's commitment to achieving a sustainable future. Shimokawa's new "Shimokawa Vision 2030", dubbed "the Shimokawa Challenge: Connecting People and Nature with the Future" states that it aims to become "a sustainable town that is strong and resilient, where people can live happily and no one is left behind". The main goal was to achieve a good quality of life in the town.

In adopting the principles of the SDGs and putting forward its sustainability strategy, Shimokawa Town fully embraced the Regional/Local CES's philosophy. Shimokawa looked within itself to find solutions to its long-lasting problems. A total of 88% of the town's surface is covered by forests offering opportunities for new economic activities.



Figure 5: The Ishi no Hashi BioVillage

Shimokawa Town unleashed the potential of its forest to create a new sustainable community. The forestry industry is once again taking a leading role to support the town's economy. Shimokawa is not only bringing back traditional forestry activities, but the town is unleashing the potential of its forests with new forest products and with forest biomass – a new sustainable energy source putting forward energy independence and a low-carbon society. This new forestry renaissance has reduced CO₂ emissions by 18% and achieved thermal energy self-sufficiency of 49% in 2016. The new forestry comprehensive industries also include education programmes for the younger generations, bringing out the importance of living in harmony with nature.

Forestry industries are also generating additional social benefits by supporting the livelihood of a shrinking area of the town. The Ishi no Hachi BioVillage (Figure 5) is advancing a new way to tackle population ageing by building a place for everybody to live a comfortable life. It combines housing (22 units) with other social services in a compact form. Wood biomass provides heat for the community, minimising the BioVillage carbon emissions. There is a special forestry products nursery and research centre generating new economic activities. The Ishi no Hachi BioVillage exemplifies the practical implementation of the Regional/Local CES. Capitalising on the region's main assets, the BioVillage integrates the three dimensions of sustainable development to answer one of Japan's most urgent problems – a super-aged society.

(d) Building an Energy Self-sufficient City Utilising Local Resources in Partnership of Public-Private Sector in Hamamatsu City

Hamamatsu City is an ordinance-designated city, located almost in the centre between Metropolitan Tokyo and the Kansai region, the second largest market in Japan. With the merging of 12 municipalities in 2005, the city area increased to 1,558 km², making it the second largest municipality in Japan in terms of area. The population is about 800,000. Hamamatsu consists of “urban areas” where city functions and advanced technology industries are concentrated, a “suburban agriculture area” which consists of thriving plains, “coastal areas” blessed with abundant marine resources, and “hilly and mountainous areas” with vast forest resources. This regional structure is sometimes seen as the epitome of Japan.

Textiles, musical instruments, and transportation equipment are the major industries of Hamamatsu, including world-renowned companies such as Suzuki, Yamaha, Honda, and Kawai. In recent years, in collaboration with the private sector, academia and the public sector, advanced technologies such as next-generation vehicles, and optical and electronic technologies have been developed in the city. The primary industry ratio in the city is only 4% but this figure is higher than other ordinance-designated cities. This is one of the features of industry in Hamamatsu.

In light of its geographical and industrial structure, Hamamatsu has been taking various actions to pursue sustainable development by encouraging a “new solidarity” between urban and rural areas with full recognition of the differences between these areas. There is a history of welcoming people from other countries, and multicultural symbiosis has also become an important key word for the city. Hamamatsu was selected as a SDGs Future City by the Japanese Government in 2018. In its SDGs Future City Plan, Hamamatsu aims to create a virtuous circle model whereby economic, social and environmental aspects are managed by enhancing, taking advantage of, and accepting local resources². This concept is in line with that of a Circulating and Ecological Economy.

As one of its efforts, Hamamatsu has been promoting “local energy production for local consumption, utilising its rich potential of renewable energy (e.g. the city has the most hours of sunlight in the country). With the growing need for energy safety and security after the Great East Japan Earthquake in 2011, the city established its “New Energy Promotion Department”, a specialised department of the cross-sectoral section under the mayor in 2012 to get rid of “silo management” of energy sources. In the following year, the grand

²Hamamatsu City “Hamamatsu City SDGs Future City Plan” <https://www.city.hamamatsu.shizuoka.jp/kikaku/sdgs/documents/sdgsplan.pdf>

design of the energy policy of Hamamatsu, "Hamamatsu Energy Vision 3" was developed. This vision has four pillars, namely (a) introduction of renewable energy to increase the self-sufficiency rate of energy; (b) promotion of energy saving to realize a low-carbon society; (c) introduction of an energy management system that optimally uses energy; and (d) creation of environmental and energy industries to activate the regional economy. The vision sets targets such as the power self-sufficiency rate (from 4.3% in 2011 to 20.3% in 2030). The vision also included a plan for an area-specific smart community with a distributed power supply (Figure 6).

With its vision, the city began to consider establishing a local power company, and in 2015 "Hamamatsu Energy Co., Ltd" was established with investment from nine entities, including Hamamatsu City and six local companies. The company is the first local electricity company funded with investment from local government. The major energy sources are solar and biomass energy generated in the city (74% of total generation volume in 2017). This provides energy to the city's elementary and junior high schools and public facilities. To pursue the company's objectives including promotion of local energy production and consumption with local resources, and revitalisation of local economy, Hamamatsu Energy sets a cap of 50% for investment from outside of the region. This is to secure a private sector initiative with local funding. In addition, the company sets a target for the ratio of local energy production and local consumption at not less than 80%, meaning the electric power procurement from the grid should be less than 20%. This target could contribute to "economy circulation" within the region by preventing the payment to the entities outside of the city.

Hamamatsu Energy is one case where Hamamatsu is promoting regional/local CES. This case illustrates that use of local resources can promote local energy resilience and revitalisation of the local economy by creating



Figure 6: Diagram showing the Hamamatsu City Energy Vision 3. Source: Hamamatsu Energy Vision

³ Hamamatsu City 2015 "Hamamatsu Energy Vision" (in Japanese) https://www.city.hamamatsu.shizuoka.jp/shin-ene/new_ene/documents/energy_vision.pdf


a local energy production and consumption system. This also shows good collaboration between a local private company and local government to enhance local sustainability.

(e) Linking the Mitigation Actions and City Resilient Strategies in Semarang City, Indonesia

Semarang is the capital city of Central Java Province and the fifth largest city in Indonesia. As of 2015, the city had a population of close to 1.6 million and a total area of 373.70 square kilometers. Like many fast growing urban areas, the city is in the midst of a transition to a service economy with many industries moving outside the city borders. The build-up of Semarang and the surrounding areas has led to urban sprawl that has placed strains on transport services and infrastructure. The city also faces various physical challenges due to its coastal geography, such as tidal flooding, erosion, land subsidence and rising sea levels, which threaten the coastal areas of Semarang. These issues present continuous challenges for Semarang and it is necessary for the city to continue to adapt and mitigate the impact by developing an urban resilient strategy. In 2014, the city became the first city in Asia to join the Rockefeller Foundation's 100 Resilient Cities Program. Two years later, Semarang released its City Resilience Strategy (CRS) in line with its commitment to 100 Resilient Cities Program. The CRS was based on four dimensions, one of them being the environment and infrastructure, supported by six strategic pillars; one of them focused on integrated mobility. That pillar sought to improve the city's public transport system by enhancing its management and service quality (Semarang City Government 2016).

Transportation is a regional issue, and better connections to major economic nodes and tourism attractions can improve the overall connectivity and strengthen the productivity and activities of the citizens. The CRS shows a clear direct relationship between pillars on urban mobility (Pillar no. 4) and new economic opportunities (pillar no. 2), transparent public information and governance (pillar no. 5) and competitive human resources (pillar no. 6). Building a transportation system means allowing society access what they need: new economic opportunities (jobs, markets); competitive human resource (schools, social interaction), and more. The SDG target 11.2 clearly states the need to provide access to safe, affordable, accessible, integrated and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations in the society, women, children, persons with disabilities and elderly.

The Institute for Global Environmental Strategies (IGES) has collaborated with the city of Semarang and other key stakeholders to help achieve the goals in the integrated mobility pillar. This collaboration has moved



from policy research-oriented activities for improvement on urban transport system to concrete low-carbon transport projects on mitigation actions on climate change issues. The first stage focused on research on how improving the public transport system will provide possible benefits for climate change and air quality – also known as co-benefits. During the second stage, IGES, in collaboration with Diponegoro University (UNDIP) and the Institute for Transportation Development Policy (ITDP), concentrated on translating policy recommendations into policy actions by developing a set of guidelines to reform the city’s BRT system (IGES 2018). In addition, IGES also sought changes in behaviour and attitudes involving the Bus Rapid Transit (BRT). Among a myriad of activities, there was a special focus on finding ways to promote the participation of young people in the design of a future public transport system. Junior high school students were asked to develop a brief essay or illustration of what a sustainable transport system looked like for them. The students with the best work received a bicycle as a reward.

Transformative processes that have been done from policy-oriented research activities to practical actions to change younger generation’s behaviour and project developments on Low Carbon Transport system and have brought multiple benefits to the city. The proposed activities are needed by the city of Semarang since they are part of the city’s integrated mobility plan. The development of BRT system as well as improvement of pedestrian areas are first steps towards realising the city’s vision. The regional impacts of transportation services are not limited to the administrative city boundary but may also include neighbouring cities within Kedungsepur area (a group of neighbouring cities include Kendal Regency, Demak Regency, Ungaran City, Semarang Regency and Purwodadi Regency). Integration routes and public transport services with provincial governments and neighbouring cities will ensure the broader mobility of society and circulation of resources within the region.

Nevertheless, the city and its region need to keep moving forward. The regional transport masterplan for regional and integrated development has not yet been developed. There is also a need for better coordination and sharing responsibilities across cities within the region. Regional coordination will generate an effective transportation service plan and ensure the regional transport link. In addition, it will improve stakeholder capacity by preparing the plan. A good transportation performance, especially a regional one, will boost economic prosperity as distribution routes to and from the city will be smooth.

Throughout the process of the retrofit programme from diesel to hybrid diesel & CNG buses for Trans Semarang, Semarang City learned about how to create an enabling environment for innovation and productive partnership, as well as how to blend the available resources to overcome the limited city budget for infrastructure development (Figure 6).



Figure 7: Launching of the JCM Model Project of hybrid CNG buses in Semarang.

Through creative partnerships in the case of the retrofit programme, the

city is now on the path to a sustainable transportation system. The programme could be expanded to other transport operators/companies within the city such as taxi and freight operators. The case on transition to green energy in the transport sector could also be expanded to other sectors such as industry in order to convert from utilising coal to CNG for energy resources. Semarang's case could also offer other cities in Asia useful insights on the path to a more sustainable future.

(f) Wine Routes of Spain

Wine is not only an agricultural product. It is a cultural expression, a way of socialisation, and even a driver of technological innovation. Wine is also the economic engine of many rural communities worldwide, especially in Europe. Countless jobs rely on the wine industry, which have an important carry-over effect on other economic sectors as well as repercussions on the environment (Miranda Escolar and Fernández Morueco 2011). In recent years, there has been a major boost of enotourism – a kind of tourism centred on the discovery and cultural enjoyment of wine and its territories (Hall et al. 2000). The private and public sector alike has hastened to capitalise on this new trend to increase the economic activities supporting rural areas beyond mere agricultural production.

Spain is the world's third largest exporter of wine in terms of value, just behind France and Italy, and ranks number 2 globally among the most visited destinations by international tourists. Wine is a fundamental part of the country's agrarian economy and supports countless local communities, especially in depopulating, and ageing regions. It comes as no surprise that the country is trying to foster enotourism to expand the



economic activities of rural areas beyond traditional agricultural production (Millán Vázquez de la Torre and Melián Navarro 2010). Established in 1994, ACEVIN (Asociación Española de Ciudades del Vino) has a leading role in the creation and advancement of enotourism in Spain. ACEVIN is a network of small and medium-size winemaking cities seeking to boost viticulture as the catalyser of wider economic activities and rural revitalisation.

The Wine Routes of Spain (Rutas del Vino de España) is a tourism product put forward by ACEVIN and supported by the Spanish Ministries of Energy, Tourism, and Digital Agenda and Agriculture and Fishing, Food and the Environment. The Wine Routes of Spain is founded on an integral strategy covering socioeconomic and territorial sustainable development. It works by creating public-private cooperation between multiple stakeholders including local authorities, tourist companies, and other enterprises that are traditionally distant from tourism, such as wineries. Each wine route has its own managing body, which coordinates efforts to promote and commercialise the route; the managing bodies are also responsible for the quality control of the wine route (López-Guzmán, Rodríguez García, and Vieira Rodriguez 2013). Currently, there are 25 accredited wine routes in Spain.

The Wine Routes of Spain is an all-encompassing initiative that addresses the three dimensions of sustainable development – society, economy, and the environment. First, by combining two of the pillars of the Spanish economy, tourism and wine, this initiative brings additional economic activities to predominantly agrarian areas (Clemente-Ricolfe et al. 2012). It shifts the focus from coastal areas and major cities, such as Madrid and Barcelona, to other usually forgotten regions; moreover, enotourism is a non-seasonal economic activity extending throughout the year (Miranda Escolar and Fernández Morueco 2011). Each route is designed to offer a different touristic experience revolving around local traditions, heritage and gastronomy in combination with wine. In doing so, it reinforces the social realm and sense of place of shrinking areas through the preservation of local cultural traditions. The associated benefits of the wine industry and enotourism guarantee the survival of many towns and villages. Third, the wine industry fosters the sustainable territorial development of rural areas. Vineyards indirectly contribute to environmental sustainability by protecting against erosion and by working as firebreaks or wildlife refuges (González San José 2017).

The initiative Wine Routes of Spain shows how by taking advantage of the unique characteristics of a place, it is possible to pave the way for a sustainable future. Wine works here as the excuse to bring extended benefits to rural regions, highlighting their architectural, gastronomical, historical, cultural, and natural heritage. Viticulture is the structuring element of policies wider in scope aiming at a more sustainable development.

5. NEXT STEPS

This paper has deepened the current understanding regarding the Circulating and Ecological Economy and the Regional/Local CES concepts put forward by Japan's Fifth Basic Environment Plan. They rest upon the notions of regional circulation and harmony with nature to advance a new sustainability framework. The CEE takes some of the basic principles underlying other sustainability ideas, such as the Circular Economy or a decarbonised society, but expands them by focusing on mitigating the impact on carbon cycle by shifting to a renewable energy based economy, promoting regional revitalisation, integrating the three dimensions of sustainable development, and stressing space. The multiple case studies from inside and outside Japan have shown practical examples of implementation inspired by or sharing the principles of the Regional/Local CES. They illustrated how holistic and multi-scalar frameworks generate win-win situations for the economy, society and the environment.

As further steps, it is still necessary to develop assessment mechanisms to explore and maximise the potential of a place based on its unique social, economic and environmental characteristics. In seeking alignment with the SDGs, one way to do so is for cities and regions to conduct Local Voluntary Reviews. IGES has pioneered the elaboration of Local Voluntary Reviews for Toyama City, Kitakyushu City and Shimokawa Town (Nakano, Fujino, and Kataoka 2018; Ota et al. 2018; Kataoka, Asakawa, and Fujino 2018). These documents not only highlight the current standing of a place in relation to the SDGs but could also inform the drafting of a future Regional/Local CES strategy. Additionally, it would be beneficial to systematise how to apply the CEE and the Regional/Local CES concepts, providing guidelines to aid successful implementation.

In relation to the above point, researchers should also devise analytical tools for the assessment of regions and localities based on the principles of the CEE. First of all, this will establish a systematic framework to study places in their transition to a Regional/Local CES. Second, it will help develop a set of indicators to quantify the state of a place and measure its progress. These will also assist in identifying concrete transition pathways.

Undoubtedly, the CEE has the potential to inspire regional and local governments worldwide to think outside the box when outlining their own sustainability plans. Furthermore, the Regional/Local CES can serve as a model to localise the SGDs. By moving towards a CEE, it will be possible to achieve a sustainable future for all. This report intends to inspire other localities and regions to rethink their tactics for sustainable development and to embrace the principles of the Regional/Local CES.

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