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Summary of Case Studies:

EU Policies on ICT Utilisation & Trends in Green Recovery

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Summary of Case Studies: EU Policies on ICT Utilisation and Trends in Green Recovery

1.1. Purpose of the Study

This report summarises case studies conducted by the United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS) as part of the "FY2020 Research Project on Partnership Facilitation and Civil Society Participation towards Realization of Regional Circular and Ecological Sphere (Local SDGs)." The project is supported by the Ministry of the Environment of Japan, and it is part of a wider project led by IDEA Consultants Inc. to analyse best practices in realising a "Regional Circular and Ecological Sphere (Local SDGs)" through ICT applications and multi-stakeholder partnerships.

The study aims to contribute to discussion on mainstreaming a Regional Circular and Ecological Sphere (Local SDGs) through ICT and multi-stakeholder partnerships. It summarises ICT strategies and policies concerning localisation of the SDGs and examines specific local approaches in detail.

1.2. Study Overview & Summary of Key Findings

The first part of this chapter summarises the policy framework of Horizon 2020, the EU Framework Programme for Research and Innovation for the period 2014–2020. As a case study, the section analyses a smart city project, "GrowSmarter," which was conducted under the Horizon 2020 framework.

The latter part of the chapter provides a summary of trends on green recovery — a concept that is widely deployed by many countries aiming to recover from COVID-19 in a greener way. The study finds that employment will be an important aspect to achieving a green recovery. In the short term, it is important to address unemployment caused by COVID-19, while in the long term society needs to consider achieving a "just transition" by making maximum use of ICT. Securing green jobs with the use of ICT is one of the key approaches to achieving green recovery with the ultimate aim of creating a resilient and sustainable economy.

Major fields of green recovery include introduction of renewable energy, promotion of low-carbon mobility, increasing high-efficiency building systems, and restoring ecosystems. These are not exactly new areas, but nature-based approaches and the creation of compact cities that aim at reducing travel distances ("15-minute city") could be considered somewhat novel approaches in the context of the COVID-19 pandemic.

Application of ICT is another important aspect. Response measures in the above-mentioned fields can

be enhanced in building sustainable cities through application of ICT. Therefore, in future studies, it would be highly useful to continue to investigate other Horizon 2020 projects through desk research and interviews. Additionally, analysis of Horizon Europe 2021–2027, the EU's new research and innovation funding programme, would be valuable for future studies to consider ICT applications to realise local SDGs.

1.3. Policies that Support Application of ICT under Horizon 2020

A. Overview of Horizon 2020

Horizon 2020 is the framework program (FP) conducted across Europe to promote research, technological development, and innovation.¹ The program is implemented with public funds, totalling an estimated EUR 80 billion of funding for 7 years, from 2014 to 2020.

Smart Cities and Communities is a project under Horizon 2020 that aims to bring ICT solutions to cities. **This project aims to demonstrate solutions in 46 “lighthouse cities” through 17 Lighthouse Projects (Table 1), and scale them up to 70 “fellow cities”** (fellow cities are where projects will be implemented at an early stage after pilot projects).

Table 1: Overview³ of Smart Cities & Communities²

No.	Lighthouse Project	Pilot Cities (lighthouse cities)	Early Adopter Cities (fellow cities)
1	<p>ATELIER AmsTErdam and BiLbao citizen drivEn smaRt cities; https://smartcity-atelier.eu/</p> <p>The project aims to create PEDs in eight cities in Europe and replicate the approach. At the same time, it aims to introduce innovative solution through integration of buildings, smart mobility, and technology</p>	<p>Amsterdam (Netherlands) Bilbao (Spain)</p>	<p>Bratislava (Slovakia) Budapest (Hungary) Copenhagen (Denmark) Krakow (Poland) Matosinhos (Portugal) Riga (Latvia)</p>
2	<p>+CityxChange Positive City ExChange https://cityxchange.eu/</p> <p>The project aims to develop a framework and supporting tools enabling sharable energy markets supported by connected communities.</p>	<p>Limerick (Ireland) Trondheim (Norway)</p>	<p>Alba Iulia (Romania) Písek (Czech) Sestao (Spain) Smolyan (Bulgaria) Võru (Estonia)</p>
3	<p>GrowSmarter Transforming Cities for a Smart, Sustainable Europe https://grow-smarter.eu/home/</p> <p>The project brought together cities and industry to integrate and demonstrate 12 smart city solutions in energy, infrastructure, and transport, to provide</p>	<p>Barcelona (Spain) Köln (Germany) Stockholm (Sweden)</p>	<p>Cork (Ireland) Graz (Austria) Porto (Portugal) Suceava (Romania) Valletta (Malta)</p>

¹ Horizon 2020 is a framework plan to promote EU studies and innovative development conducted all over Europe. The entire work programme of Horizon 2020 is available at: <https://ec.europa.eu/programmes/horizon2020/h2020-sections>

² <https://smartcities-infosystem.eu/>

	valuable insights on practical methods for replication.		
4	<p>IRIS Integrated and Replicable Solutions for Co-Creation in Sustainable Cities https://irissmartcities.eu/</p> <p>Each city will draw upon a mix of universities and research organizations, local authorities, innovation agencies and private expertise to accelerate entire communities to adopt ambitious energy, mobility, and ICT initiatives</p>	Göteborg (Sweden) Nice (France) Utrecht (Netherlands)	Alexandroupolis (Greece) Focsani (Romania) Santa Cruz De Tenerife (Spain) Vaasa (Finland)
5	<p>MAKING-CITY Energy efficient pathway for the city transformation: enabling a positive future https://makingcity.eu/</p> <p>MAKING-CITY is a large-scale project to address and demonstrate urban energy system innovation towards smart and low-carbon cities. The purpose is developing a new integrated strategy, adopting the Positive Energy District (PED) approach to the transition of urban energy.</p>	Groninge (Netherlands) Oulu (Finland)	Bassano Del Grappa (Italy) Kadikoy (Turkey) León (Spain) Lublin (Poland) Trenčín (Slovakia) Vidin (Bulgaria)
6	<p>MAchUP MAXimizing the UPscaling and replication potential of higher level urban transformation strategies https://www.matchup-project.eu/</p> <p>The project aims to renovate cities through innovative solutions and technology providing services to communities.</p>	Antalya (Turkey) Dresden (Germany) Valencia (Spain)	Herzliya (Israel) Kerava (Finland) Ostend (Belgium) Skopje (North Macedonia)
7	<p>mySMARTLife Smart Transition of EU cities towards a new concept of smart Life and Economy https://www.mysmartlife.eu/mysmartlife/</p> <p>The project aims to create more inclusive cities that enable higher quality of life by involving citizens to develop an integrated urban transformation strategy and share the experience with other cities.</p>	Hamburg (Germany) Helsinki (Finland) Nantes (France)	Bydgoszcz (Poland) Palencia (Spain) Rijeka (Croatia)
8	<p>POCITYF A POSitive Energy CITY Transformation Framework; https://pocityf.eu/</p> <p>The project aims to deploy positive energy districts (PED) in the urban areas of cities with heritage sites.</p>	Alkmaar (Netherlands) Evora (Portugal)	Bari (Italy) Celje (Slovenia) Granada (Spain) Hvidovre (Denmark) Ioannina (Greece) Ujpest (Hungary)
9	<p>REMOURBAN REgeneration MOdel for accelerating the smart URBAN transformation http://www.remourban.eu/</p> <p>The project aims to validate the European sustainable urban city model through technical integration of energy, mobility, and ICTs.</p>	Nottingham (UK) Tepebasi (Turkey) Valladolid (Spain)	Miskolc (Hungary) Seraing (Belgium)
10	<p>REPLICATE REnaissance of Places with Innovative Citizenship and Technology https://www.connectingbristol.org/projects/replicate/</p>	Bristol (UK) Firenze (Italy) San Sebastian (Spain)	Essen (Germany) Lausanne (Switzerland) Nilüfer (Turkey)

	The project aims to deploy higher energy efficiency and mobility and ICT solutions in urban areas.		
11	<p>RUGGEDISED Designing Smart and Resilient Cities for All https://ruggedised.eu/home/</p> <p>Three lighthouse cities and three fellow cities cooperate with companies and research centers to demonstrate how to combine IC, e-mobility and energy solutions to design smart and resilient cities for all.</p>	Glasgow (UK) Rotterdam (Netherlands) Umeå (Sweden)	Brno (Czech) Gdansk (Poland) Parma (Italy)
12	<p>Sharing Cities https://www.sharingcities.eu/</p> <p>The project aims to address today's urgent urban issues including energy utilisation, low-carbon transportation and buildings, and data applications for urban cities.</p>	Lisbon (Portugal) London (UK) Milano (Italy)	Bordeaux (France) Bourgas (Bulgar) Warsaw (Poland)
13	<p>SmartEnCity Towards Smart Zero CO2 Cities across Europe https://www.smarter-together.eu/</p> <p>The project aims to create smart zero-carbon cities that are more sustainable and inclusive, improving citizens' quality of life, creating jobs and wealth, and offering equal growth opportunities.</p>	Sonderborg (Denmark) Tartu (Estonia) Vitoria-Gasteiz (Spain)	Asenovgrad (Bulgaria) Lecce (Italy)
14	<p>SMARTER TOGETHER Smart and Inclusive Solutions for a Better Life in Urban Districts SMARTER TOGETHER</p> <p>The project aims to prepare the ground for large-scale replication and to transfer detailed knowledge and know-how on sustainable smart city business models and user-centric innovation for positive social dynamics.</p>	Lyon (France) München (Germany) Vienna (Austria)	Kiev (Ukraine) Santiago De Compostela (Spain) Sofia (Bulgaria) Venezia (Italy) Yokohama (Japan)
15	<p>SPARCS Sustainable energy Positive & zero cARbon Communities https://www.sparcs.info/</p> <p>The project aims to create a network of sustainable energy and positive and zero carbon communities through integrated energy systems through multi-stakeholder partnerships.</p>	Espoo (Finland) Leipzig (Germany)	Kifissia (Greece) Kladno (Czech) Lviv (Ukraine) Maia (Portugal) Reykjavik (Iceland)
16	<p>STARDUST Holistic and Integrated Urban Model For Smart Cities https://stardustproject.eu/</p> <p>The project aims to develop an integrated approach towards the transformation of carbon supplier cities into smart, highly efficient, intelligent and citizen-centred cities through a holistic replication model.</p>	Pamplona (Spain) Tampere (Finland) Trento (Italy)	Cluj-Napoca (Romania) Derry (UK) Kozani (Greece) Litoměřice (Czech)
17	<p>Triangulum The Three Point Project / Demonstrate.</p>	Eindhoven (Netherlands) Manchester (UK)	Leipzig (Germany) Praha (Czech)

	<p>Disseminate. Replicate.</p> <p>The project demonstrates solutions and frameworks implemented in three lighthouse cities, disseminating the design to facilitate wider replication in future smart cities.</p>	<p>Stavanger (Norway)</p>	<p>Sabadell (Spain) Tianjin (China)</p>
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B. Programme for ICT Promotion, Funded by Horizon 2020

GrowSmarter³ was a research and innovation programme conducted from January 2015 to December 2019, funded by the European Commission’s Smart Cities and Communities project under Horizon 2020. The programme was conducted in the cities of Stockholm, Köln and Barcelona, with a total budget of EUR 25 million. It suggested that clear goals should be set, and necessary equipment should be provided by the governments of local communities including solar power systems, charging stations and data platforms. It also recommended that local governments develop plans for citizen involvement. Recommendations for Policymakers and Practitioner⁴ may be useful for implementation of similar projects in Japan.

1.4. Relevant Efforts on Green Recovery by Countries & Cities (Sustainable Economic Recovery)

The aim of green recovery is not to return to the previous economy and society by rebuilding after the damage of COVID-19, but rather to create a resilient, sustainable, and environmentally sensitive economy and society with improved economic indices including revenue and employment.

A. International Trends in Green Recovery

Governments have already announced fiscal stimulus packages amounting to \$11.8 trillion in response to the COVID-19 health and economic crisis, which is more than three times the amount spent in response to the Great Recession of 2008–2009. While most of it prioritises healthcare and direct support to the unemployed, about 30% of these stimulus packages are being spent in sectors that impact the environment.⁵ According to OECD members and Key Partner countries as of August 2020, the green measures included the energy sector, transportation, building efficiency, and agriculture as targets of recovery.

³ <https://grow-smarter.eu/home/>

⁴ https://grow-smarter.eu/fileadmin/editor-upload/Reports/recommendations_for_Policy_makers_and_practitioners.pdf

⁵ <https://www.wri.org/blog/2020/09/coronavirus-green-economic-recovery>

Table 2: Number of Recovery Measures with Positive Environmental Implications, by Sector & Type⁶

	Energy	Aviation	Ground transport	Maritime transport	Heavy industry	Buildings	Agriculture	Forestry	Waste management	Other
Tax reduction / other subsidy	Dark Green		Dark Green			Light Green				Dark Green
Grant/Loan (including interest-free loans)	Dark Green		Dark Green		Light Green	Dark Green	Dark Green	Light Green	Light Green	Dark Green
R&D subsidies	Dark Green	Light Green	Dark Green		Light Green			Light Green		Light Green
Regulatory change	Light Green		Light Green				Light Green			Light Green
Skills training	Light Green							Light Green		
Other	Light Green		Dark Green	Light Green		Light Green			Light Green	

Note: Colour shading represents the total number of measures with a clear expected positive environmental impact, tracked across OECD and Key Partner countries in August 2020.

Energy Policy Tracker⁷, a platform that analyses data on energy-relevant expenses from different countries from the perspective of green recovery, has found three policies all of which are in the United Kingdom. By sector, "multiple sectors" has the highest number of cases (11), followed by "mobility" with 8 cases.

Table 3: Target Fields of Green Recovery Policy

Buildings	Mobility	Multiple sectors	Power generation	Resources	Other sector
2	8	11	4	1	1

Although clear green recovery packages by specific countries are still under development, there are a few examples, mainly in Europe. The following is a summary of the packages that have been announced.

(i) EU

The EU announced a proposed recovery fund, "NextGenerationEU" as part of a comprehensive Recovery plan for Europe⁸ to commit EUR 750 billion in the budget over 7 years, from 2021 to 2027. About 37% is supposed to be spent on "green recovery" policy as the top priority.

(ii) United Kingdom

In November 2020, the Government of the United Kingdom unveiled the 10-Point Plan for a Green Industrial Revolution,⁹ as a policy for green recovery. It is estimated that a GBP 12 billion economic

⁶ https://read.oecd-ilibrary.org/view/?ref=136_136201-ctwt8p7qs5&title=Making-the-Green-Recovery-Work-for-Jobs-Income-and-Growth

⁷ <https://www.energypolicytracker.org/>

⁸ https://ec.europa.eu/info/strategy/recovery-plan-europe_en

⁹ <https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution>

stimulus would create 250,000 new jobs, which is expected to mobilise significant private sector investment in support of the United Kingdom’s 2050 goal of net-zero carbon. The plan also covers carbon capture, hydrogen, nuclear energy, electric vehicles, renewable energy, green protection and recovery, and promotion of low-carbon mobility, aiming to place London at the centre of the green financial industry.

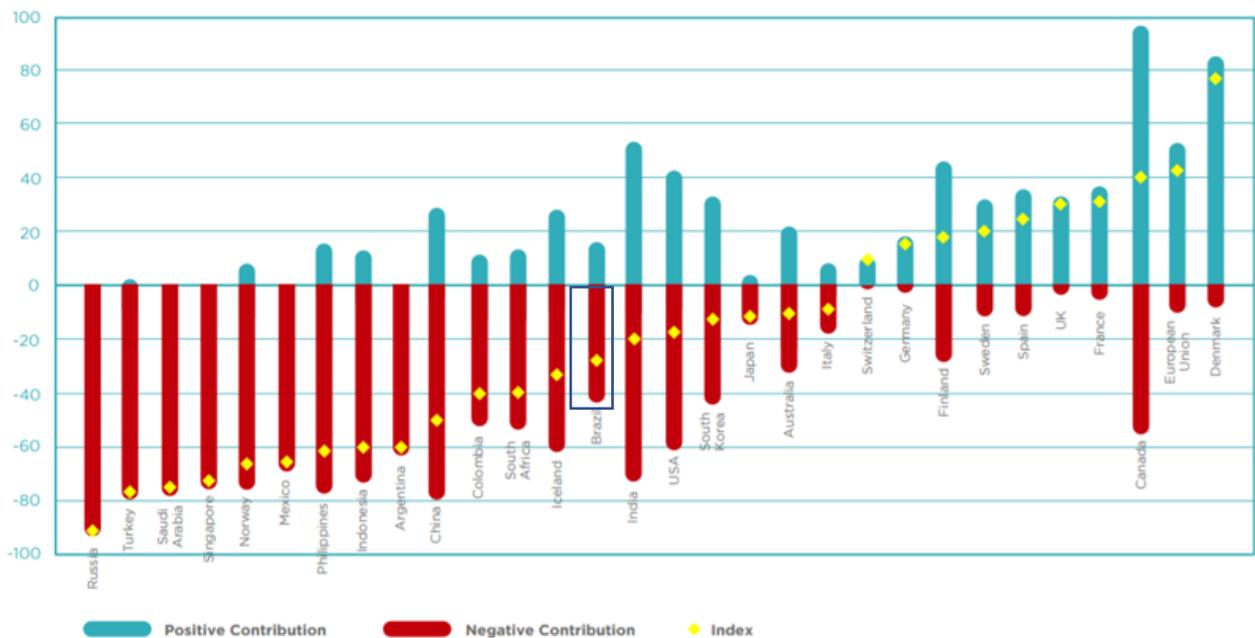
(iii) France

In September 2020, the Government of France unveiled a EUR 100 billion Recovery Plan¹⁰ for 2020–2022 (EUR 40 billion of direct subsidies from the EU), and EUR 30 billion of the plan is supposed to be dedicated to policy for transitioning to a green economy.

B. Country Comparisons — Greenness of Stimulus Index

Vivid Economics and Finance for Biodiversity Initiative evaluated responses to COVID-19 of G20 members and other major countries by using various indices. The report, released in February 2021, reveals that Japan is one of the countries having negative impacts on the environment rather than positive ones (Figure 1). It mentions as one of the reasons that there are some systems of subsidies and lower taxes in place for products that have high environmental impacts in the transport sector.

Figure 1: Greenness of Stimulus Index



Source: Vivid Economics using a variety of sources, consult Annex II for the entire list of sources
 Note: Updated on 1 February 2021

¹⁰ <https://www.tresor.economie.gouv.fr/Articles/6d1ad9be-1ac4-4088-9b02-c1ce0ccef988/files/5c419c24-a340-47ea-b47a-e8cd63ecf977>

	CHN	IDN	USA	RUS	IND	MEX	ZAF	BRA	AUS	CAN	ITA	JAP	SPA	KOR	GER	GBR	FRA	EU	SGP	PHL	ARG	CHE	COL	FIN	NOR	DEN	ISL	SWE	
Agriculture	✓		✓		✓				✓	✓			✓		✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
Energy	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓
Industry	✓				✓			✓	✓	✓			✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓
Transport	✓	✓	✓		✓	✓			✓	✓	✓		✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓	✓	✓
Waste										✓				✓			✓	✓											
Agriculture			✓					✓	✓	✓						✓			✓	✓			✓						✓
Energy	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓										✓			✓				
Industry	✓	✓	✓	✓	✓		✓	✓	✓	✓				✓			✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Transport	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓				✓	✓	✓	✓	✓	✓
Waste			✓													✓													

Source: Vivid Economics using a variety of sources. Consult Annex II for the entire list of sources.
Note: Updated on 1 February 2021.

C. Considerations for Green Recovery Policy

The COVID-19 pandemic delivered a serious blow to employment. In the short term, labour-intensive and green measures are required. On the other hand, recovery programmes with environmental considerations can also be expected to create jobs. For instance, the IEA reported that every US dollar invested in the solar power sector will create double the number of jobs compared to investment in fossil fuels and gas.¹¹ According to IRENA, the renewable energy industry is expected to create over 40 million jobs by 2050. In the energy industry as a whole, there is potential for an increase in employment from the current number of 58 million jobs to 100 million by 2050.¹² The IEA also estimates that there is a potential for about 2.5 million jobs per year to be created in the field of high energy efficiency.¹³ Protection of nature and organic farming also have high potential as a source of employment. Additionally, it is critical to ensure a "just transition" in enabling employment to realise a resilient and sustainable economy.

ICT has a key role in the transition to a green economy and society. Promoting digital transformation in sectors that have high environmental impact — including transportation, energy, construction, and agriculture — enables an increase in both economic and ecological benefits. The World Economic Forum reports that there is potential to avoid an estimated 26 billion metric tons of net CO2 emissions from just three sectors of electricity, logistics and automotive by 2025. Furthermore, if smart asset planning and management and energy storage integration were universal in the electric power industry, it is estimated that up to 8.8 billion metric tons of CO2 emissions could be reduced by 2025 and USD 418 billion of value for the economy will be created.¹⁴

¹¹ <https://www.wri.org/blog/2020/09/coronavirus-green-economic-recovery>

¹² <https://www.oecd.org/coronavirus/policy-responses/making-the-green-recovery-work-for-jobs-income-and-growth-a505f3e7/>

¹³ <https://www.oecd.org/coronavirus/policy-responses/making-the-green-recovery-work-for-jobs-income-and-growth-a505f3e7/>

¹⁴ <https://reports.weforum.org/digital-transformation/enabling-the-transition-to-a-sustainable-world/>

D. Advanced Initiatives by Cities on Green recovery — Selected Cases

(i) Report by C40 on Green Recovery

In July 2020, the city network group C40, consisting of large cities addressing climate control measures, released the C40 Mayors' Agenda for a Green and Just Recovery¹⁵. The report specifies what actions cities commit to take and presents nine principles to realise a green and just recovery.

(ii) Approaches Led by Local Governments

Canada (Province of Québec)

In November 2020, the government of Québec announced the 2030 Plan for a Green Economy¹⁶, which indicates eight articles as specific goals including reduction of greenhouse gas emissions by 37.5% from 1990 levels and achievement of carbon neutrality by 2050.

United Kingdom (Glasgow)

An analysis in the Glasgow City Region (GCR; Scotland, UK) on opportunities and priorities for green recovery after the COVID-19 pandemic¹⁷ illustrates the prioritisation in response to needs at the regional level (Table 4).

Table 4: Rating of Illustrative “Green” Recovery Interventions for Glasgow City Region

Measure	Criteria rating and level of benefits			
	Economic recovery (job creation (employment), economic multiplier, addressing inequality (just)	Mitigation benefits	Climate Resilience benefits	Reduced pandemic risk/other civil emergencies and disaster risks
Building retrofit (energy efficiency, reduced heating, cooling/shading)	High – Large-scale labour-intensive programme, job creation potential, lower energy bills (long term pay back) economic benefit	High – Reduced heating demand	Med - Reduced overheating risk, health/productivity gains	Low - Increased tolerance for lockdowns as required (lower costs, higher thermal comfort)
Heat health warning systems	Low - Minor economic stimulus	Low	Med - Steering public behaviour during times of heat risk	Med - Heat affects similar groups to COVID (older and vulnerable), so reduce extra stress on shielded population. Reduced health system demand.
Property flood resilience (undertaken inside a property to reduce damage)	Med - Large-scale (labour-intensive) installation programme (job creation). Economic benefits (loss reduction). Low acceptability	Med – avoided embedded carbon in flood repair	Med - Reduced flood damage	Low - Reduced water-borne diseases or transmission risk during climate events, or risk of displacement
Property level flood resistance (stop water entering property)	High - Broad macroeconomic benefit for (1:200+ yr. return periods), job creation potential	Med – avoided embedded carbon in flood repair	High - Reduction of flood risk	Low - Low systemic risk potential - only very specific households
Flood risk management schemes	Med - Loss avoidance / uplift in rateable values / broad economic stimulus / some job creation	Med – avoided carbon in flood recovery	High - Reduction of flood risk	Medium - Reduction of systemic risk (e.g. health impacts if combined with climate impacts)
Upgrading existing green spaces/ecosystem-based adaptation	High - Labour intensive (job creation). Uplifts in rateable values / GVA	Medium – small-scale sequestration / Potential micro renewables	Med – Reduced surface water flood risk, cooling of wider environment	High - Increased recreational and amenity benefits (physical and mental health benefits) Positive for social distancing. Reduced dependency on global food supply chains
New green space (e.g. derelict and vacant land, green spaces, roofs and walls, SUDS, growing spaces)	High - Labour intensive (job creation). Uplifts in rateable values / GVA	High – large-scale sequestration potential (dependent on design), reduced food miles	High - Reduced heat island effect, surface water risk. Reduced global supply chain dependency	

¹⁵ <https://c40.my.salesforce.com/sfc/p/#36000001Enhz/a/1Q000000kVoY/kuR1PLHMGR2K9eEbo8aivV.xPegZVTqwt.EjX.4a.hk>

¹⁶ <https://www.quebec.ca/en/government/policies-orientations/plan-green-economy/#:~:text=The%202030%20Plan%20for%20a,climate%20change%20and%20more%20prosperous>

¹⁷ <http://climatereadyclide.org.uk/wp-content/uploads/2020/09/Climate-Ready-Clyde-Delivering-a-Green-New-Deal-for-Glasgow-City-Region-Final-.pdf>