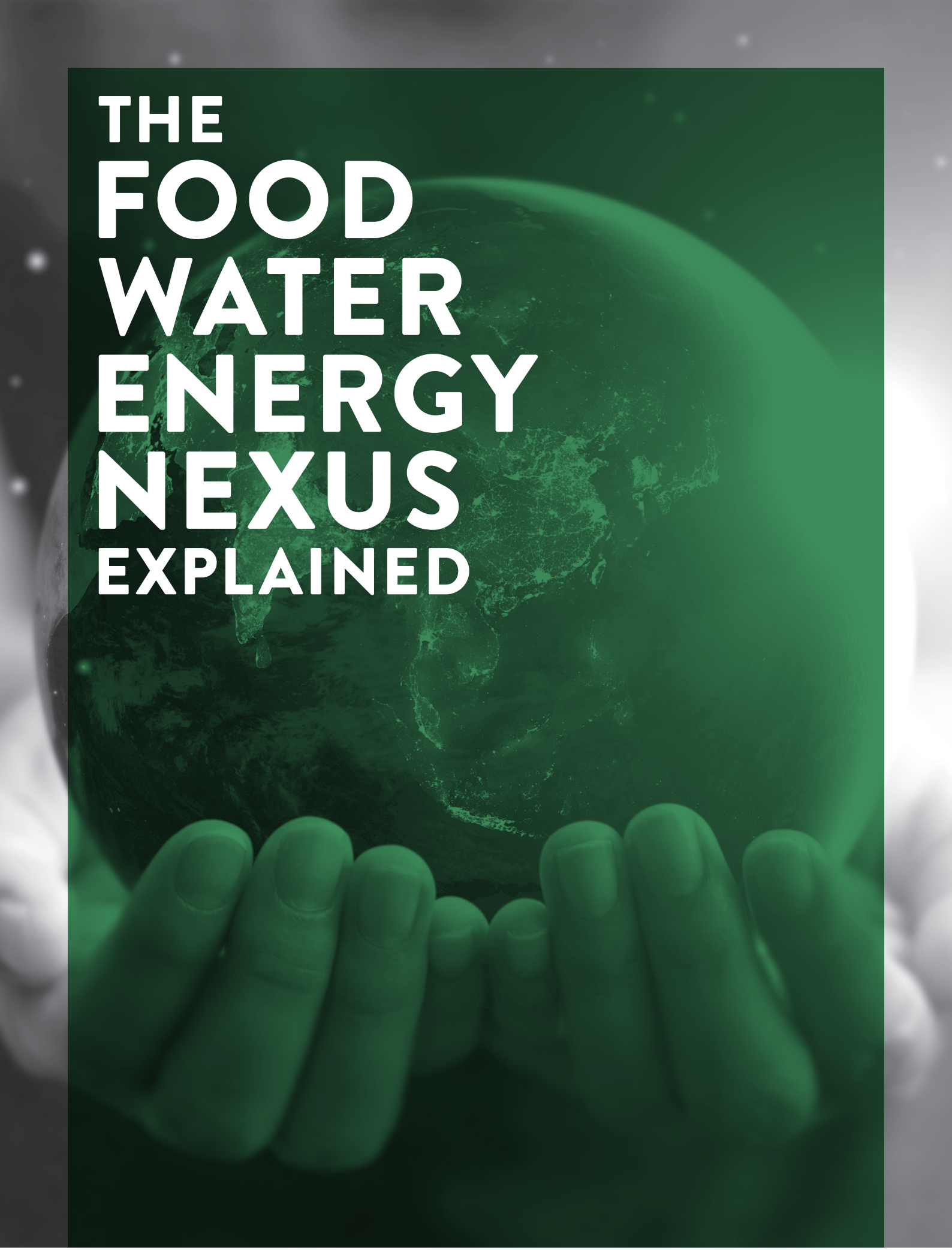
THE FOOD WATER ENERGY NEXUS EXPLAINED

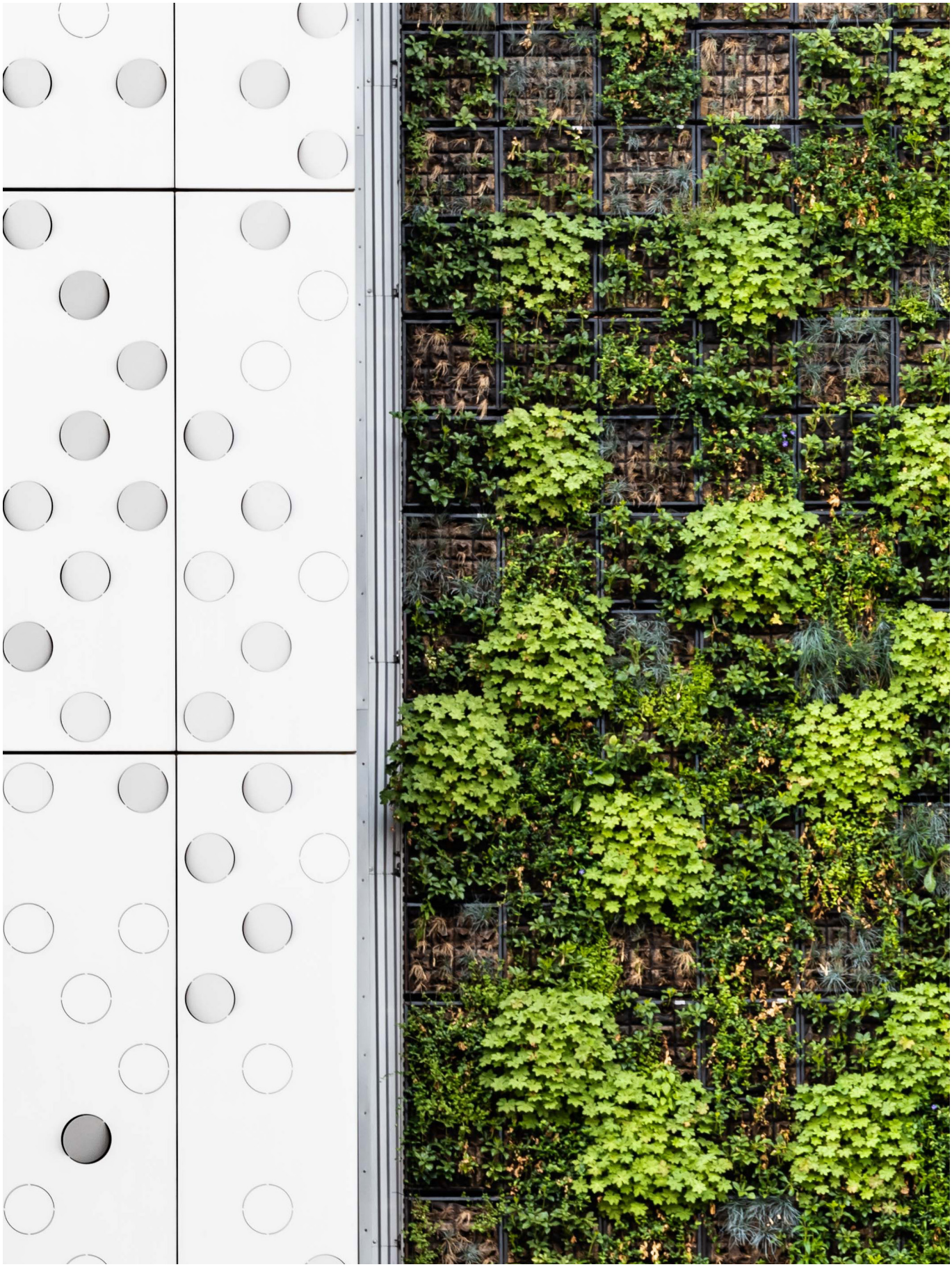


BELMONT FORUM

URBAN EUROPE

European Commission

Sustainable Urbanisation Global Initiative (SUGI)
FOOD-WATER-ENERGY NEXUS



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 730254.

KEY FACTS

WHAT IT IS

Water, food, energy: in terms of creating sustainable cities, they are virtually impossible to separate. Optimising outputs for one relies on efficient resource management for all three, intrinsically locked as they are in a nexus.

It's necessary to think of water, energy, and food together – this is at the core of the food-water-energy nexus (FWE nexus). Cities are the main vantage point, as most people live in urban areas and are projected to do so even more in the future. The nexus demands cities stop thinking in silos and start acting interconnectedly, in terms of visions, goals, targets, and measures.

WHY IT MATTERS

- **Resource optimisation:** resources are finite, and we need to use them more efficiently to cover basic needs for all.
- **Waste reduction:** avoiding unnecessary waste saves resources and money.
- **Ecosystem protection:** the FWE nexus helps us reach our climate goals, sustaining life on Earth.
- **Agricultural efficiency:** the world's population is growing and we need to feed them, but don't necessarily have more space to do so.
- **Building resilience:** connecting the dots and producing and re-using water, energy, and food more locally makes a city more resilient.

HOW TO GET STARTED

This article series will help you understand the main challenges, benefits, and discussion points in an urban context. Targeted stakeholder groups are listed for each. Each article is also designed to engage a general audience interested in the topic of the nexus.

- **"What Is the Food-Water-Energy Nexus?"** breaks down the topic for all stakeholder groups. Read it for an overview of what the topic means and why it matters.

- **"Challenges of the Food-Water-Energy Nexus"** gives an overview of the most pressing challenges when implementing the nexus in your city. Target audiences include urban planners, decision-makers, researchers, and stakeholders.

- **"The Case for the Food-Water-Energy Nexus"** highlights the manyfold benefits of implementing the nexus in a city. It's directed at stakeholders, urban planners, decision-makers, and educational professionals.

- **"Food-Water-Energy Nexus Facts & Figures"** provides readers with numbers, comparisons, and important quantitative information to start conversations and grasp the importance of the topic.

- **"How to Involve Stakeholders in the Food-Water-Energy Nexus"** focuses on the various ways of engaging stakeholders in the process of understanding and strengthening a local nexus, specifically looking at the "how to". The article is aimed at city authorities, policymakers, designers, politicians, and decision-makers.

- **"Data & Policy: Interpreting the Food-Water-Energy Nexus**" carves out how digital interfaces can help us communicate the FWE nexus and inform policy for better resource management. It targets city authorities, decision-makers, urban planners, engineers, and decision-makers.

- **"How to Make Cities Resilient With the FWE Nexus"** describes how the implementation of the nexus can make cities more resilient. It's for stakeholders, city authorities, designers, and decision-makers.

THE SUGI CALL

The Sustainable Urbanisation Global Initiative (SUGI)/Food-Water-Energy Nexus is a joint call of the Belmont Forum and JPI Urban Europe established to bring together actors to find innovative new solutions to the food-water-energy nexus challenge.

There are 15 SUGI projects, involving a total of 134 researchers and project partners from businesses, public authorities, and civil society in 20 countries. The call opened in December 2016, with projects starting at the end of 2017 and ending in mid-2022.

More info on the SUGI call:
https://jpi-urbaneurope.eu/calls/sugi/

Connect with the project coordinators:
https://jpi-urbaneurope.eu/calls/sugi/sugi-connect-project-nodes/

OVERVIEW OF SUGI PROJECTS

IN ALPHABETICAL ORDER

CITYFOOD

Smart integrated multitrophic city food production systems – a water and energy saving approach for global urbanisation

Website:
https://www.h-klimek.de/cityfood/

JPI Project Overview:
https://jpi-urbaneurope.eu/project/cityfood/

Cities Involved:
Arendal & Grimstad (Norway), Berlin (Germany), São Paulo (Brazil)

Focus:
CITYFOOD provides comprehensive knowledge about IAAC (integrated aqua-agriculture systems) technology to different stakeholders both for scientific and commercial application, and investigates how it can help address global food challenges.

CREATING INTERFACES

Building capacity for integrated governance at the food-water-energy nexus in cities on the water

Website:
https://creatinginterfaces.eifer.kit.edu/

JPI Project Overview:
https://jpi-urbaneurope.eu/project/creating-interfaces/

Cities Involved:
Slupsk (Poland), Tulcea (Romania), Wilmington (USA)

Focus:
Creating Interfaces addresses capacity building for the urban food-water-energy (FWE) nexus, making the FWE linkages understandable to different stakeholders (city government, science, business, and citizens), and facilitating cooperation and knowledge exchange among them through tools.

CRUNCH

Climate **R**esilient **U**rban **N**exus **CH**oices: operationalising the food-water-energy nexus

Website:
http://www.fwe-nexus.eu/

JPI Project Overview:
https://jpi-urbaneurope.eu/project/crunch/

Cities Involved:
Eindhoven (The Netherlands),
Gdansk (Poland),
Glasgow & Southend-on-Sea (UK),
Miami (USA), Taipei (Taiwan),
Uppsala (Sweden)

Focus:
CRUNCH demonstrates how the food-water-energy nexus can strengthen urban resilience and resource efficiency. It creates an interconnected knowledge platform with cross-sectorial indicators for a support tool and assessment framework (the Integrated Decision Support System - IDSS).

ENLARGE

ENabling **LARGE**-scale integration of technology hubs to enhance community resiliency via DDS (Data Distribution Services) in various urban FWE nexuses

Website:
https://enlarge-nexus.org/

JPI Project Overview:
https://jpi-urbaneurope.eu/project/enlarge/

Cities Involved:
Amsterdam (The Netherlands),
Marseille (France), Miami (USA)

Focus:
ENLARGE produces sustainable action plans to minimise water, carbon, and ecological footprints of communities/cities, seeking to increase community resilience and reduce operational risk under climate change impact. The project assesses how different technologies can be synergistically integrated with respect to cost-benefit and social-equity factors.

FEW-METER

FEW-meter is an integrative model designed to measure and improve urban agriculture towards circular urban metabolism

Website:
http://www.fewmeter.org/de/home-3/

JPI Project Overview:
https://jpi-urbaneurope.eu/project/few-meter/

Cities Involved:
Dortmund (Germany),
Gorzów Wielkopolski & Poznán (Poland),
London (UK), Nantes (France),
New York (USA)

Focus:
FEW-meter asks farmers to measure the efficiency of urban agriculture in case studies in five developed countries by quantifying usage of energy, water, and other resources as well as the production of foodstuff and compost.

FUSE

Food-water-energy for **U**rban **S**ustainable **E**nvironments

Website:
https://fuse.stanford.edu/

JPI Project Overview:
https://jpi-urbaneurope.eu/project/fuse/

Cities Involved:
Amman (Jordan), Pune (India)

Focus:
FUSE develops solutions that include changes in governance, regulations, and infrastructure, and develops and evaluates policy interventions.

GLOCULL

Globally and LOCally sustainable food-water-energy innovation in Urban Living Labs

Website:
https://glocull.boku.ac.at/

JPI Project Overview:
https://jpi-urbaneurope.eu/project/glocull/

Cities Involved:
Cape Town (South Africa),
Kerkrade (The Netherlands),
Lüneburg (Germany), São Paulo (Brazil),
Skåne Region (Sweden),
Tempe and Phoenix (USA),
Vienna (Austria)

Focus:
GLOCULL develops an extended co-creative Urban Living Lab approach for locally and globally sustainable innovations in the FWE nexus, also aiming to implement the approach in 7 Urban Living Labs in both the Global South and Global North.

IFWEN

Understanding innovative Initiatives for governing Food, Water and Energy Nexus in cities

Website:
http://ifwen.org/

JPI Project Overview:
https://jpi-urbaneurope.eu/project/ifwen/

Cities Involved:
Bonn (Germany),
Cape Town (South Africa),
New Haven & New York (USA),
São Paulo (Brazil), Stockholm (Sweden),
Taipei (Taiwan)

Focus:
IFWEN works on improving governance of the interactions between food, water, and energy (FWE) in cities, e.g., through developing a framework and tools to manage the green and blue infrastructure (GBI) at an urban level.

IN-SOURCE

INtegrated analysis and modelling for the management of sustainable urban FWE re**SOURCE**s

Website:
https://sites.google.com/nyit.edu/insource-fwe/home

JPI Project Overview:
https://jpi-urbaneurope.eu/project/in-source/

Cities Involved:
Ludwigsburg Region (Germany), New York (USA), Vienna (Austria)

Focus:
IN-SOURCE develops a shared urban data and modeling framework to help cities analyse and characterise FWE systems and nexus interrelationships, utilising a common urban 3D data model applicable to regions and cities in Europe and the United States.

METABOLIC

Intelligent urban metabolic systems for green cities of tomorrow: an FWE nexus-based approach

Website:
N/A

JPI Project Overview:
https://jpi-urbaneurope.eu/project/metabolic/

Cities Involved:
Chicago (USA), São Paulo (Brazil), Taipei (Taiwan), Tokyo (Japan)

Focus:
METABOLIC investigates the urban metabolism from the FWE nexus aspect to develop an international capacity building system and propose governance strategies.

M-NEX

The Moveable **NEX**US: design-led urban food, water and energy management innovation in new boundary conditions of change

Website:
http://m-nex.net/

JPI Project Overview:
https://jpi-urbaneurope.eu/project/m-nex/

Cities Involved:
Amsterdam (The Netherlands), Belfast (Northern Ireland), Detroit (USA), Doha (Qatar), Sydney (Australia), Tokyo-Yokohama (Japan)

Focus:
M-NEX designs a measurement system that allows urban policymakers to pinpoint and quantify exactly which neighbourhoods produce the most CO_2. The system provides a nine-step methodology to reduce carbon emissions.

SUNEX

Formulating sustainable urban FWE strategy by optimising the synergies between food, water and energy systems

Website:
https://sunex-project.eu/wp/

JPI Project Overview:
https://jpi-urbaneurope.eu/project/sunex/

Cities Involved:
Berlin (Germany), Bristol (UK), Doha (Qatar), Vienna (Austria)

Focus:
SUNEX offers an integrated approach to support the decision-making process. It does so by providing a modelling framework (addressing the demand and supply side of the FWE system), developing efficient solutions, and creating policy guidelines.

URBANISING IN PLACE

Building the food-water-energy nexus from below

Website:
http://urbanisinginplace.org/

JPI Project Overview:
https://jpi-urbaneurope.eu/project/urbanising-in-place/

Cities Involved:
Brussels (Belgium), London (UK), Riga (Latvia), Rosario (Argentina)

Focus:
Urbanising in Place explores how farming and food growing practices on the metropolitan fringe, threatened by ever-expanding urbanisation, may be reimagined and reconfigured within what we call 'agroecological urbanism': a model of urbanisation which places food, urban metabolic cycles, and ethics of land stewardship, equality, and solidarity at its core.

VERTICAL GREEN 2.0

Vertical greening for liveable cities – innovation to facilitate the breakthrough of an old concept

Website:
https://www.urbangreen.tu-berlin.de/menue/urban_vertical_green_20/

JPI Project Overview:
https://jpi-urbaneurope.eu/project/vertical-green-2-0/

Cities Involved:
Berlin (Germany), Ljubljana (Slovenia), Taipei (Taiwan), Vienna (Austria)

Focus:
Vertical Green 2.0 develops tools to predict the cooling potentials of vertical greening and its water demands to better understand and manage vertical greening as a viable source of food and energy. It seeks to find out why vertical greening has not been applied on a large scale before.

WASTE FEW ULL

WASTE Food-Energy-Water Urban Living Lab – **mapping and reducing waste in the food-energy-water nexus**

Website:
https://wastefewull.weebly.com/

JPI Project Overview:
https://jpi-urbaneurope.eu/project/waste-few-ull/

Cities Involved:
Bristol (UK), Cape Town (South Africa), Rotterdam (The Netherlands), São Paulo (Brazil)

Focus:
WASTE FEW ULL develops and tests internationally applicable methods of identifying inefficiencies in a city-region's food-energy-water nexus.

URBAN EUROPE

JPI Urban Europe is a transnational research and innovation programme on urban transitions. With the ambition to develop and validate new solutions for sustainable and liveable cities, a cooperation platform and programme is provided to connect urban stakeholders, researchers, cities, businesses, and society.

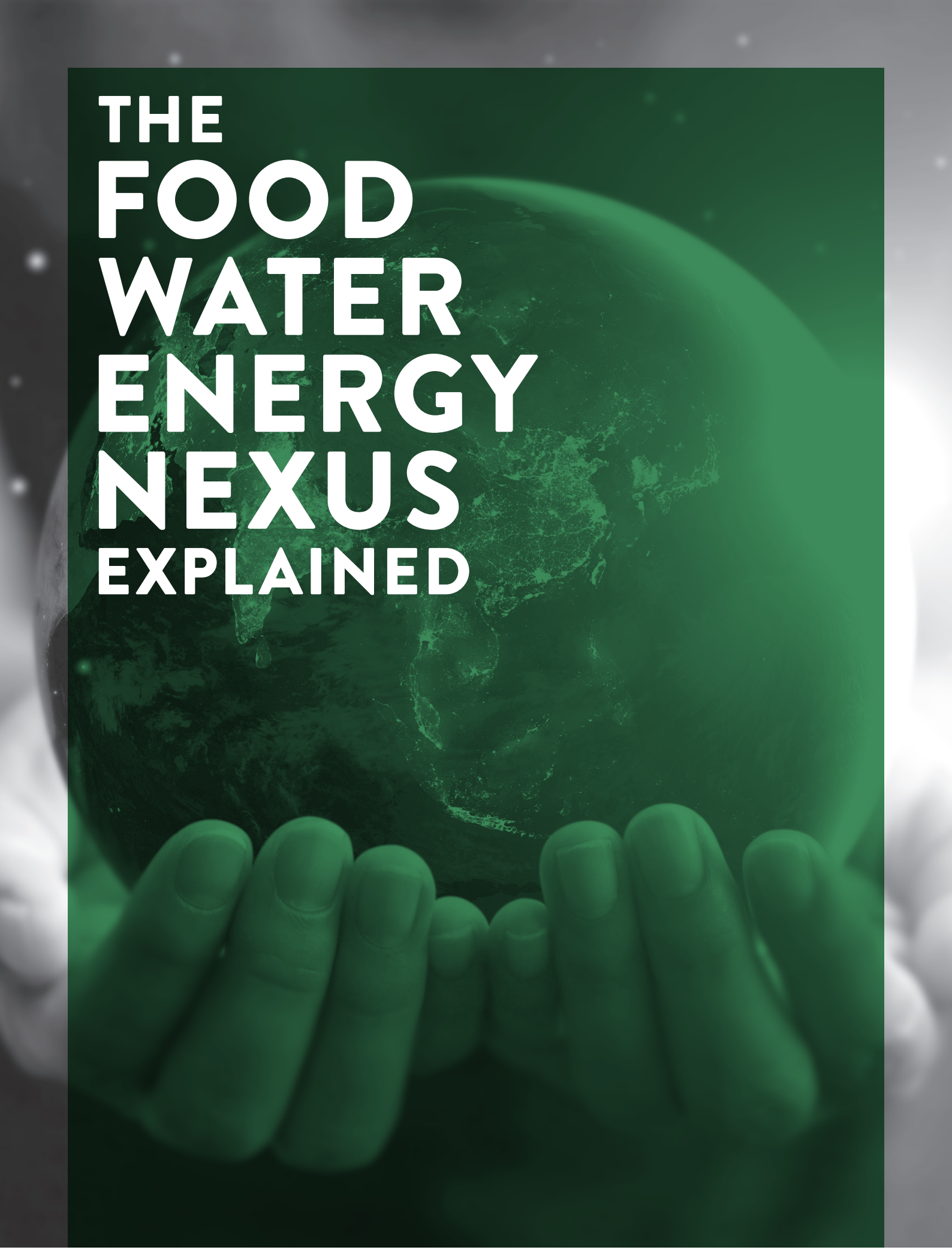
www.jpi-urbaneurope.eu
@jpiurbaneurope

BELMONT FORUM

The Belmont Forum is a group of the world's major and emerging funders of global environmental change research. It aims to accelerate delivery of the environmental research needed to remove critical barriers to sustainability by aligning and mobilizing international resources. The Belmont Forum pursues the goals set in the Belmont Challenge by adding value to existing national investments and supporting international partnerships in interdisciplinary and transdisciplinary scientific endeavours.

www.belmontforum.org

THE FOOD WATER ENERGY NEXUS EXPLAINED



BELMONT FORUM

URBAN EUROPE

European Commission

Sustainable Urbanisation Global Initiative (SUGI)
FOOD-WATER-ENERGY NEXUS