



REGENVILLAGES

The “Tesla of Ecovillages”

Tech-Integrated and Regenerative Neighborhood Development

ReGen Villages Holding, B.V.

Spin-off inspired by UN Sustainability Platform brief co-authored by Prof. Larry Leifer and Chris Ford (AIA) from the Center for Design Research at Stanford University and James Ehrlich Senior Technologist and EIR Stanford University, H-STAR Institute

A red pennant-shaped pin is stuck into a map. The pin has the words "Silicon Valley" written on it in black, sans-serif font. The map in the background is out of focus, showing a network of roads in various colors (blue, orange, yellow) and some geographical features. The name "San Jose" is visible in the lower right portion of the map, and "Milpitas" is partially visible above it. The overall scene suggests a geographical reference to the Silicon Valley region.

Silicon
Valley

San Jose



Stanford
University



ipcc

INTERGOVERNMENTAL PANEL ON
climate change



"Nobody on this planet will be untouched
by the impacts of climate change"





“Global industrial civilization
could collapse
due to resource exploitation”



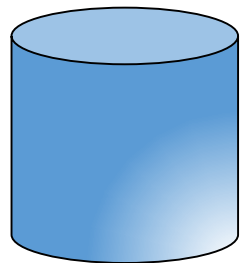
UNITED NATIONS
UNCTAD

"Time to wake up!"



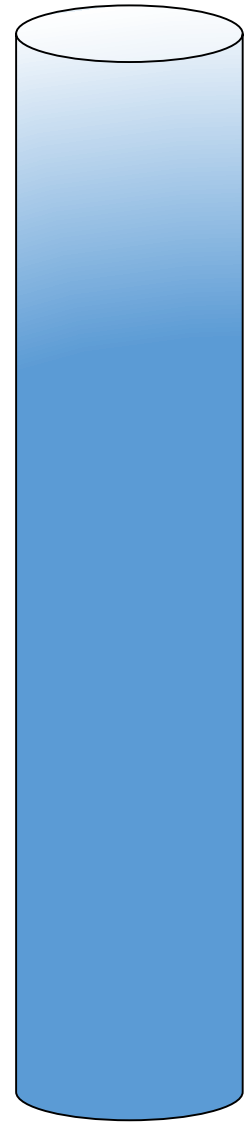
POPULATION

1950

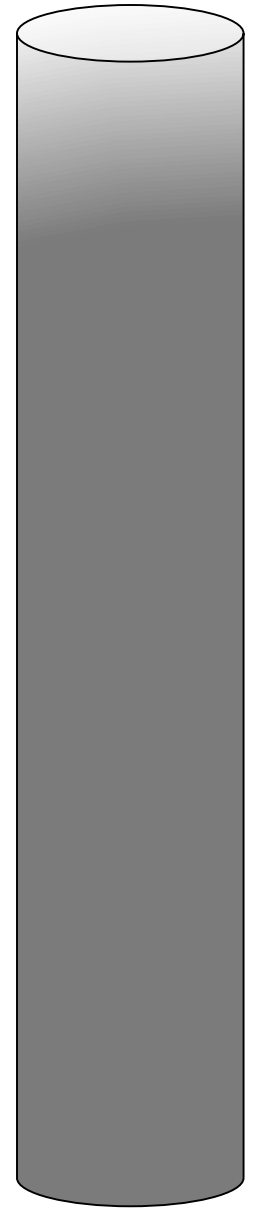


2,556,000,053

Potable Water



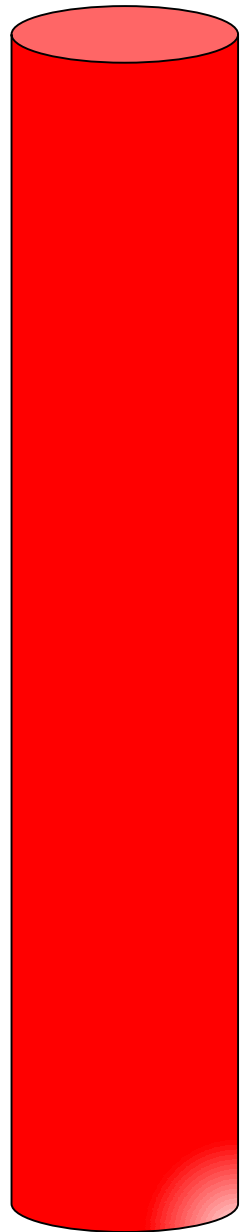
Arable Land



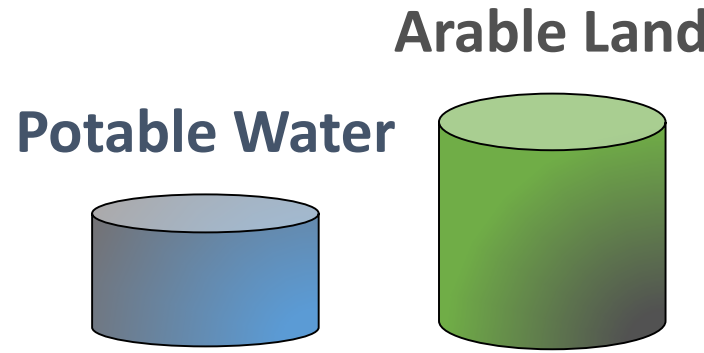
WATER/FOOD SECURITY

POPULATION

2050



9,346,399,468



WATER/FOOD SECURITY















Aquatic garden



Forest garden



Orchard



Seasonal & berry garden



TECHNOLOGY PLATFORM PARTNERS

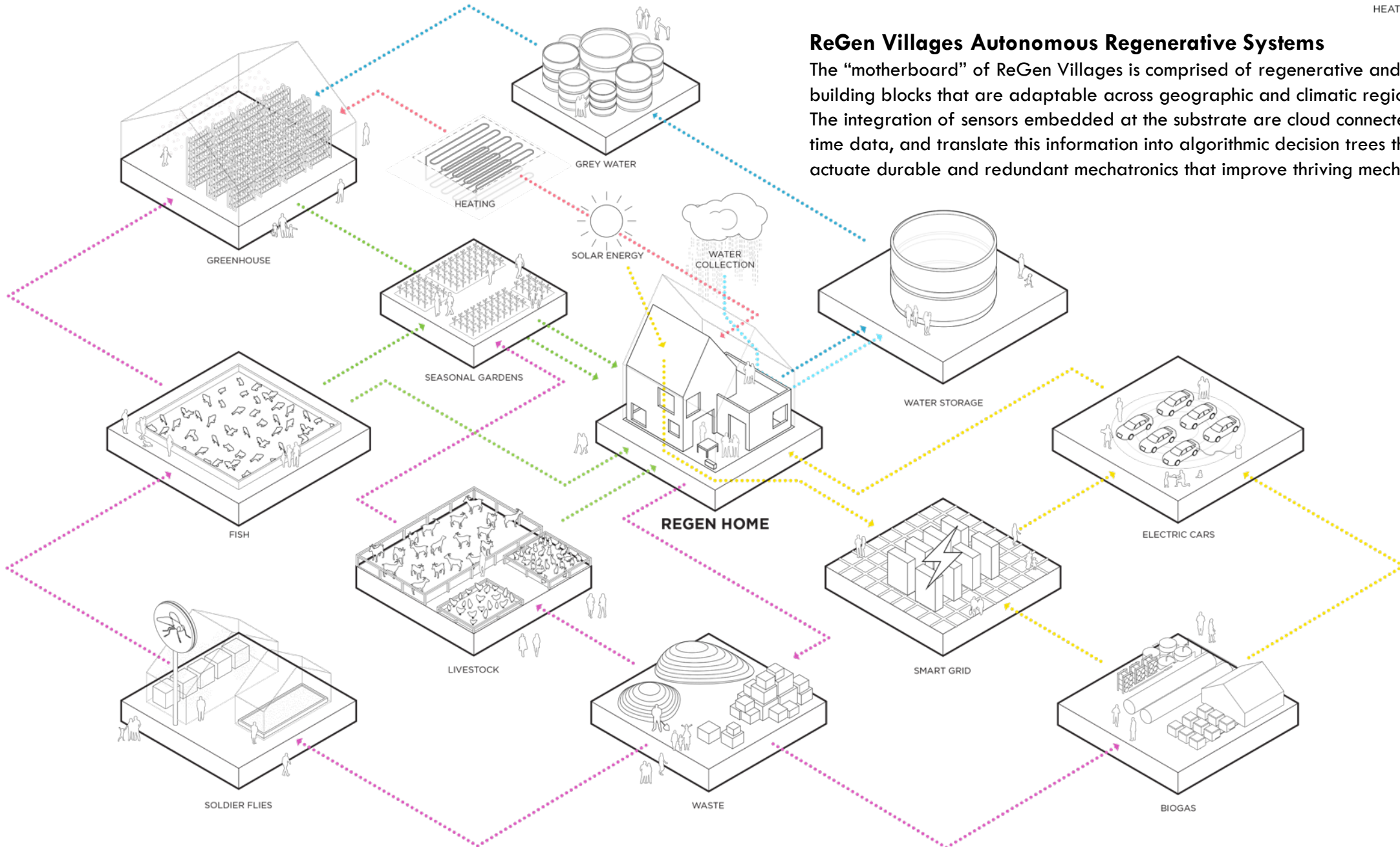


UNIVERSITY RESEARCH IN RESILIENCY & REGENERATIVE SYSTEMS



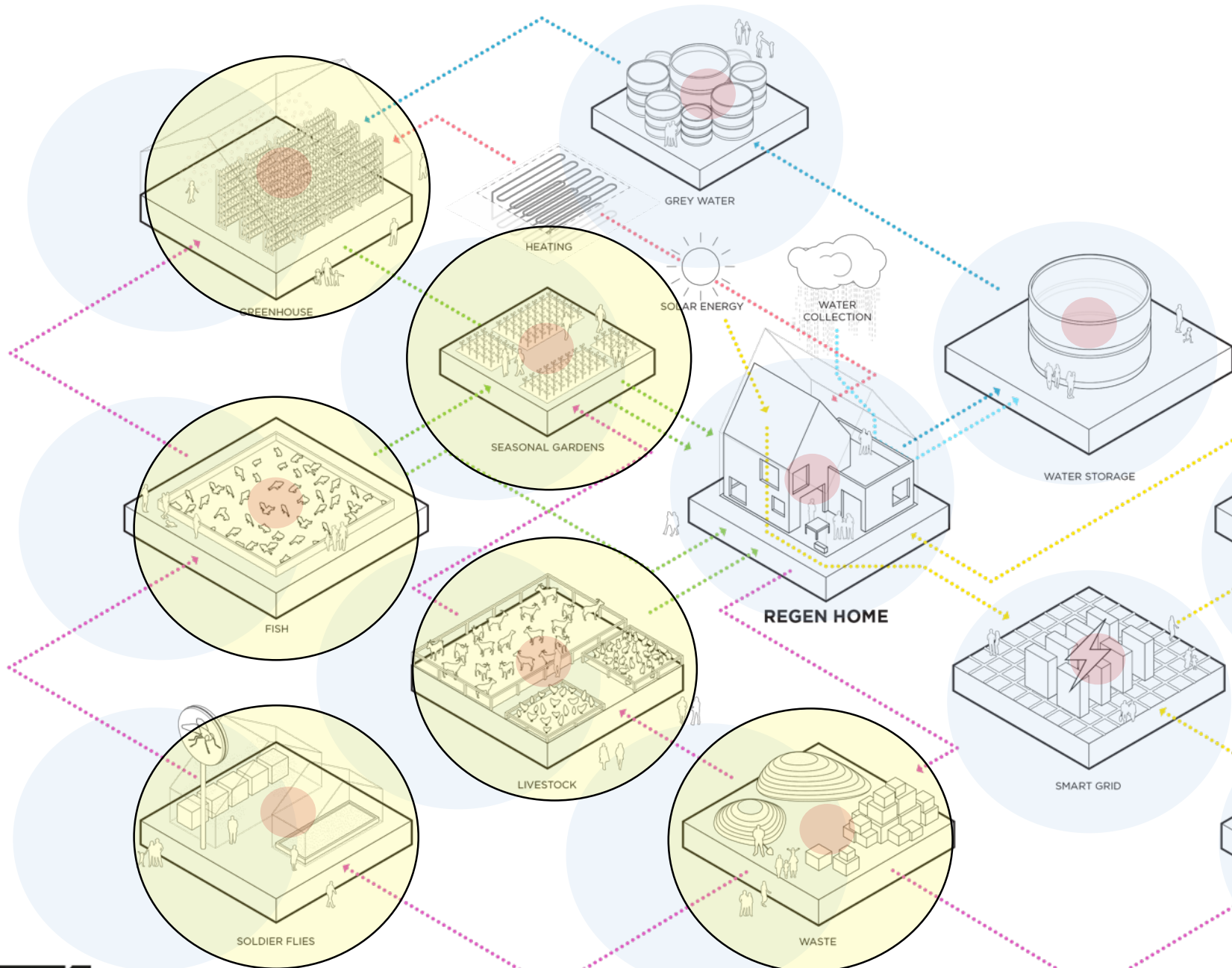
REGEN SYMBIOSIS

- ENERGY
- FOOD
- WASTE
- COLLECTED WATER
- GREY WATER
- HEATING



ReGen Villages Autonomous Regenerative Systems

The “motherboard” of ReGen Villages is comprised of regenerative and resilient infrastructure building blocks that are adaptable across geographic and climatic regions around the world. The integration of sensors embedded at the substrate are cloud connected to aggregate real-time data, and translate this information into algorithmic decision trees that autonomously actuate durable and redundant mechatronics that improve thriving mechanisms.



REGEN VILLAGES

PHASE I – IP

ReGen Villages PHASE I IP is based on the closed-loop organic food and small animal waste digestion platforms, with proven research and development of increased breeding and harvesting of bio-generators at the neighborhood scale

PHASE II – IP

ReGen Villages PHASE II IP is based on machine learning and autonomous improvement algorithms of shared system platforms based in part on internal village data and then subsequently on cloud-connected villages around the world in similar climate zones. developed in cooperation with Stanford Foresight Innovation Lab on the Microsoft Azure cloud platform.

PHASE III – IP

ReGen Villages PHASE III IP will focus on robotic actuation via mechatronic devices triggered by sensor inputs embedded at the substrate of village shared platforms, as the mechanism for mitigating risk in highly variable systems, and moreover improving thriving outcomes for improved yields.

PLAN

Replicating the nexus globally

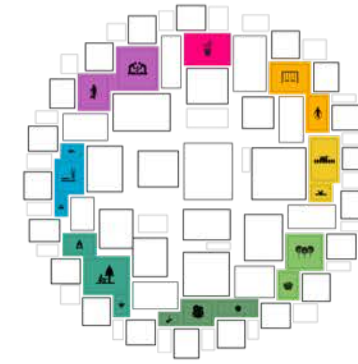
Customizing the regenerative platforms substrate
To match each climate zone and region



PROGRAM LAYOUT



SOCIAL SPACE

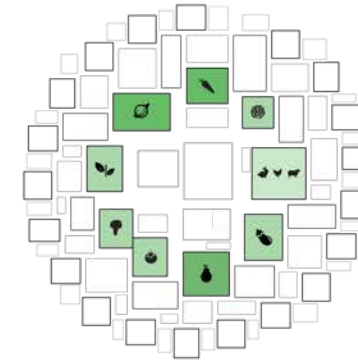


- Zen zone
- Social dining
- Animal fold
- Community learning
- Edible grove
- Garden
- Waterpark
- Playground

GREEN SPACE

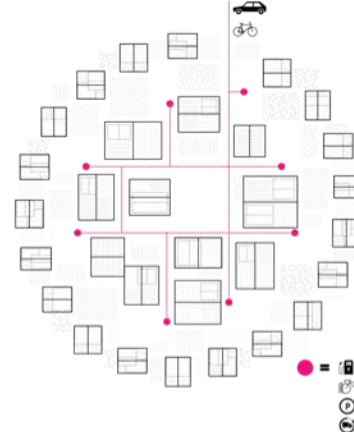


FOOD PRODUCTION

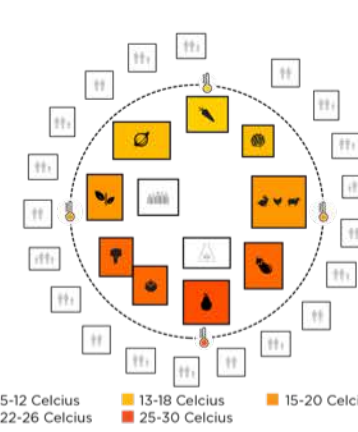


- Greenhouse
- Livestock
- Aquaponics
- Heated greenhouse

INFRASTRUCTURE

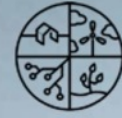


CLIMATE ZONES



- 5-12 Celcius
- 13-18 Celcius
- 15-20 Celcius
- 22-26 Celcius
- 25-30 Celcius

REGEN VILLAGES



EFFEKT

Updated January, 2017

DRAFT DESIGN

FIRST PILOT COMMUNITY
300 Integrated Homes
Almere, Netherlands
Breaking ground – Summer 2017

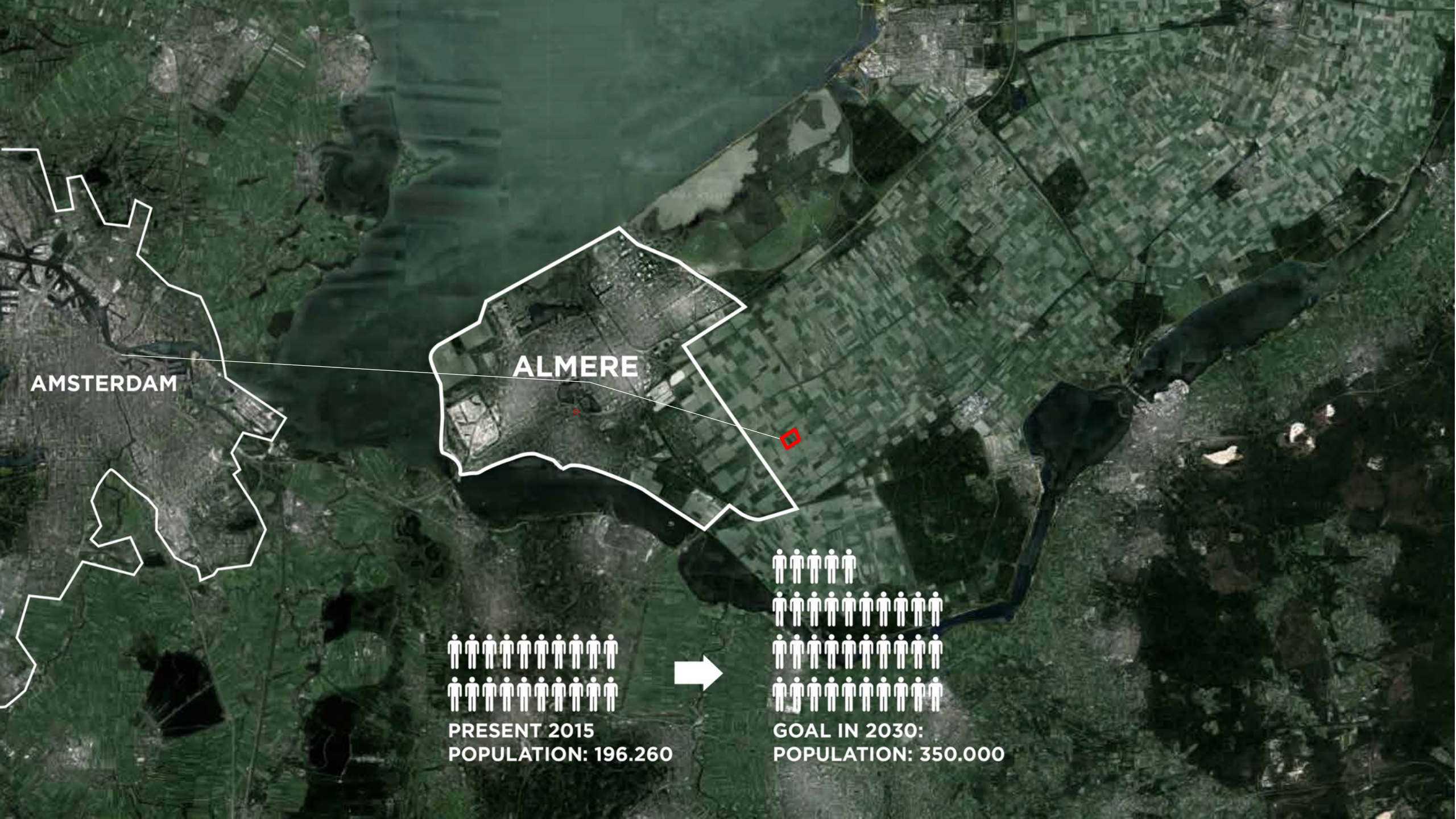


The Netherlands was selected as the initial pilot of ReGen Villages



A satellite-style map of the Netherlands, showing the coastline on the left and a dense green landscape inland. Two locations are marked: Amsterdam, indicated by a white circle with a black outline, and Almere, indicated by a red circle with a white outline. A dashed line connects the two circles, and a scale bar below it is labeled '20 km'.

Amsterdam ○ - - ● Almere
20 km



AMSTERDAM

ALMERE



PRESENT 2015
POPULATION: 196.260



GOAL IN 2030:
POPULATION: 350.000



ALMERE CENTRE

8 km

10 Km

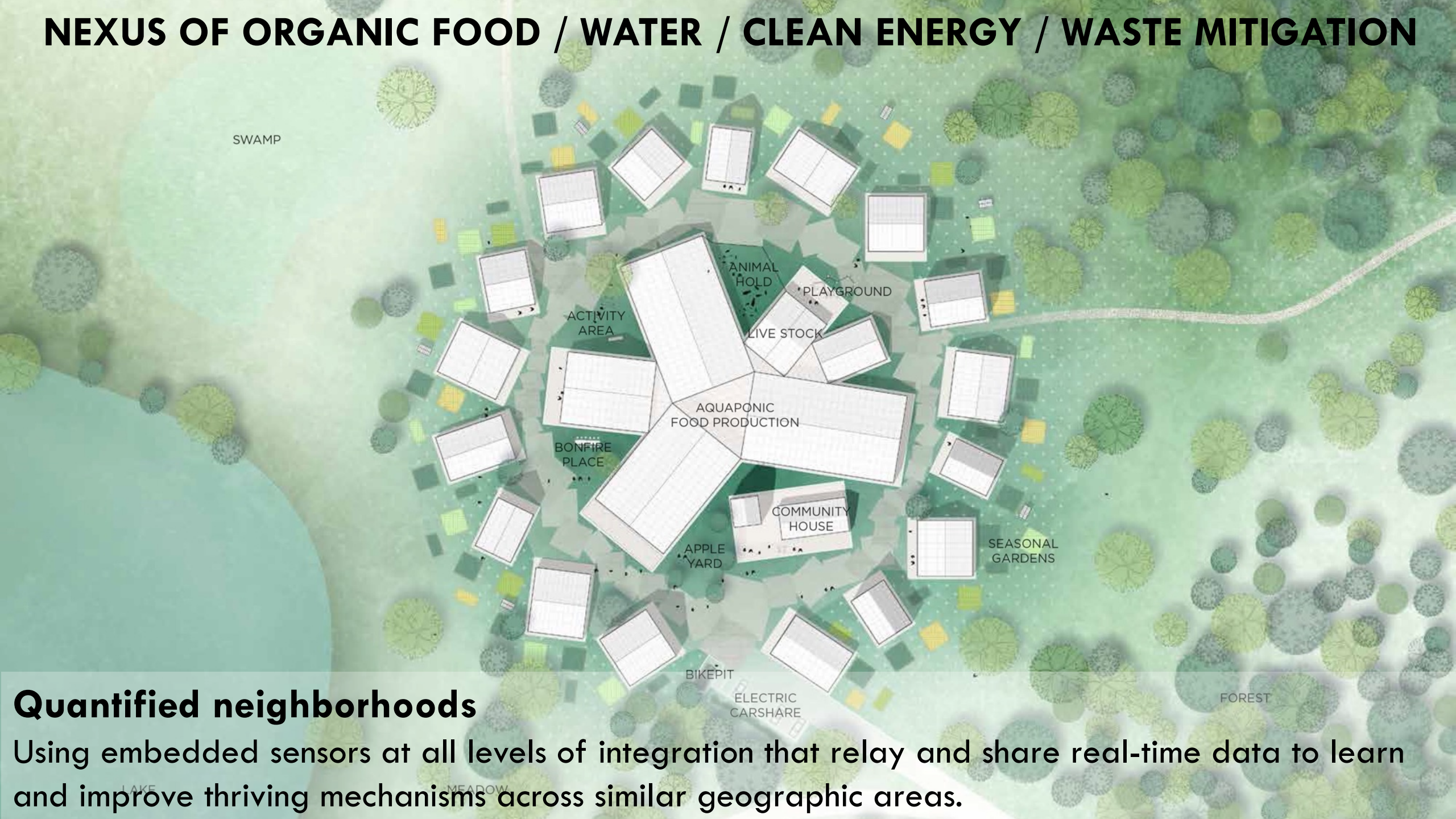
OOSTERWOLD

First pilot village, Oosterwold
on certified organic farmland



Building regenerative, off-grid communities that produce more organic food, clean water, renewable energy and mitigated waste at the neighborhood scale

NEXUS OF ORGANIC FOOD / WATER / CLEAN ENERGY / WASTE MITIGATION



SWAMP

ACTIVITY AREA

ANIMAL HOLD

PLAYGROUND

LIVE STOCK

AQUAPONIC FOOD PRODUCTION

BONFIRE PLACE

COMMUNITY HOUSE

APPLE YARD

SEASONAL GARDENS

BIKEPIT

ELECTRIC CARSHARE

FOREST

Quantified neighborhoods

Using embedded sensors at all levels of integration that relay and share real-time data to learn and improve thriving mechanisms across similar geographic areas.

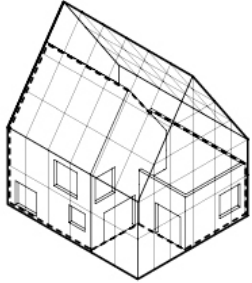
LAKE

MEADOW

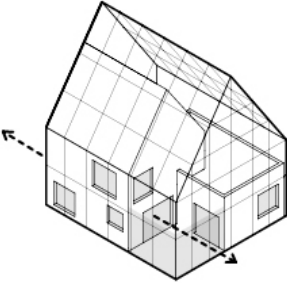
ENERGY+ POSITIVE HOMES

Built Environment Homes

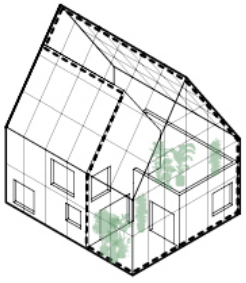
Utilizing a combination and passive and active energy conserving and generating materials (phase change), and employing built environment methodologies, energy positive, zero-carbon homes can be erected rapidly and at a lower construction cost with less waste.



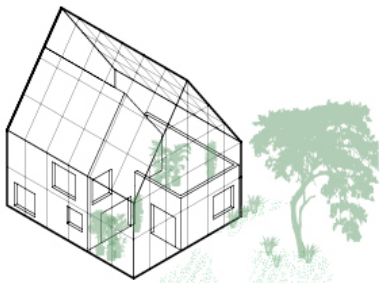
PREFABRICATED AND DEMOUNTABLE LIVING BOX



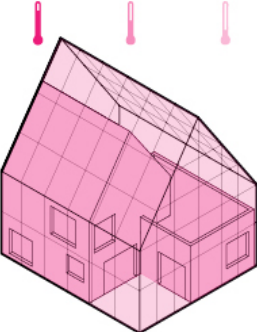
OPENABLE



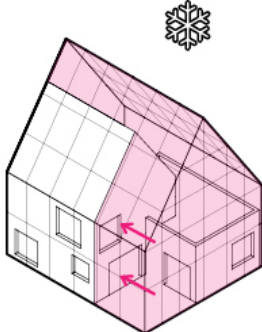
EXTENDED LIVING ZONE



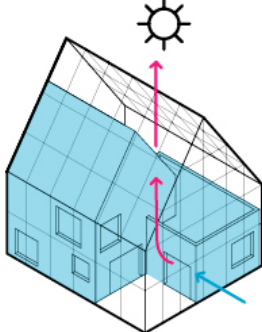
INSIDE & OUTSIDE BLENDS



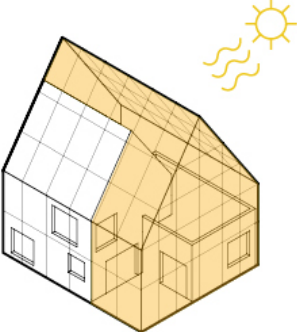
PASSIVE HEAT + HEATED SPACE



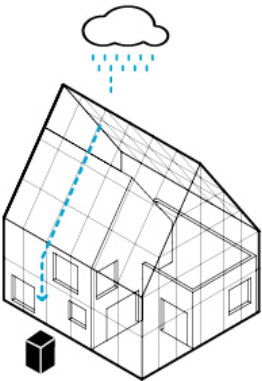
PREHEATED AIR IN WINTER



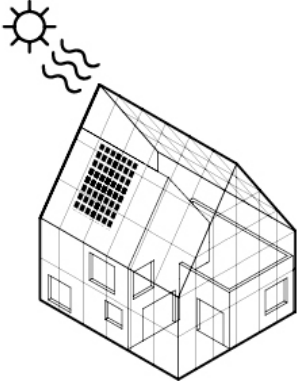
NATURAL VENTILATION



EXTENDING SUMMER SEASON



BUILT IN WATER COLLECTION

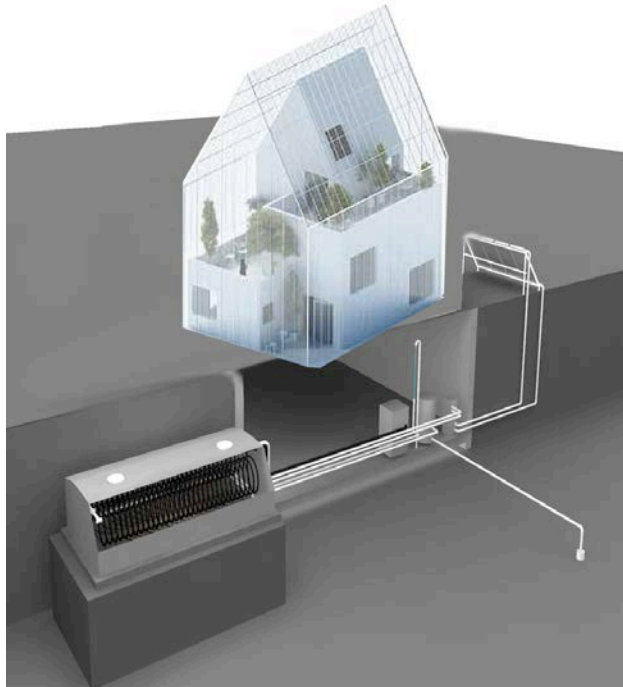
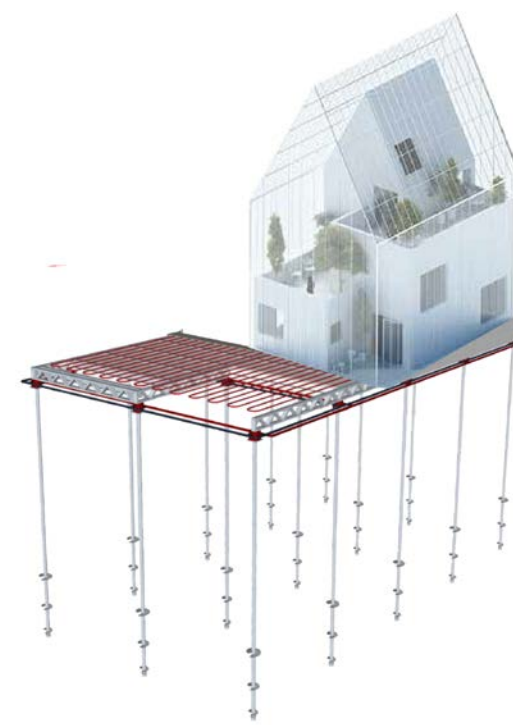


BUILT-IN SOLAR ENERGY

WATER ENERGY CYCLE

Geothermal bore holes

Provide year-round temperate heating and cooling that circulate water down into the earth, as a means to regulate low-energy climate control in homes and buildings above. Geothermal Heat Pumps transfer heat from and to the ground. They do that through closed loops of plastic pipes buried either horizontally or vertically in the ground below the frost line where the temperature is consistently between 40° to 80° F depending on where you live. (Enviga Geothermal 2015)



Thermal Batteries

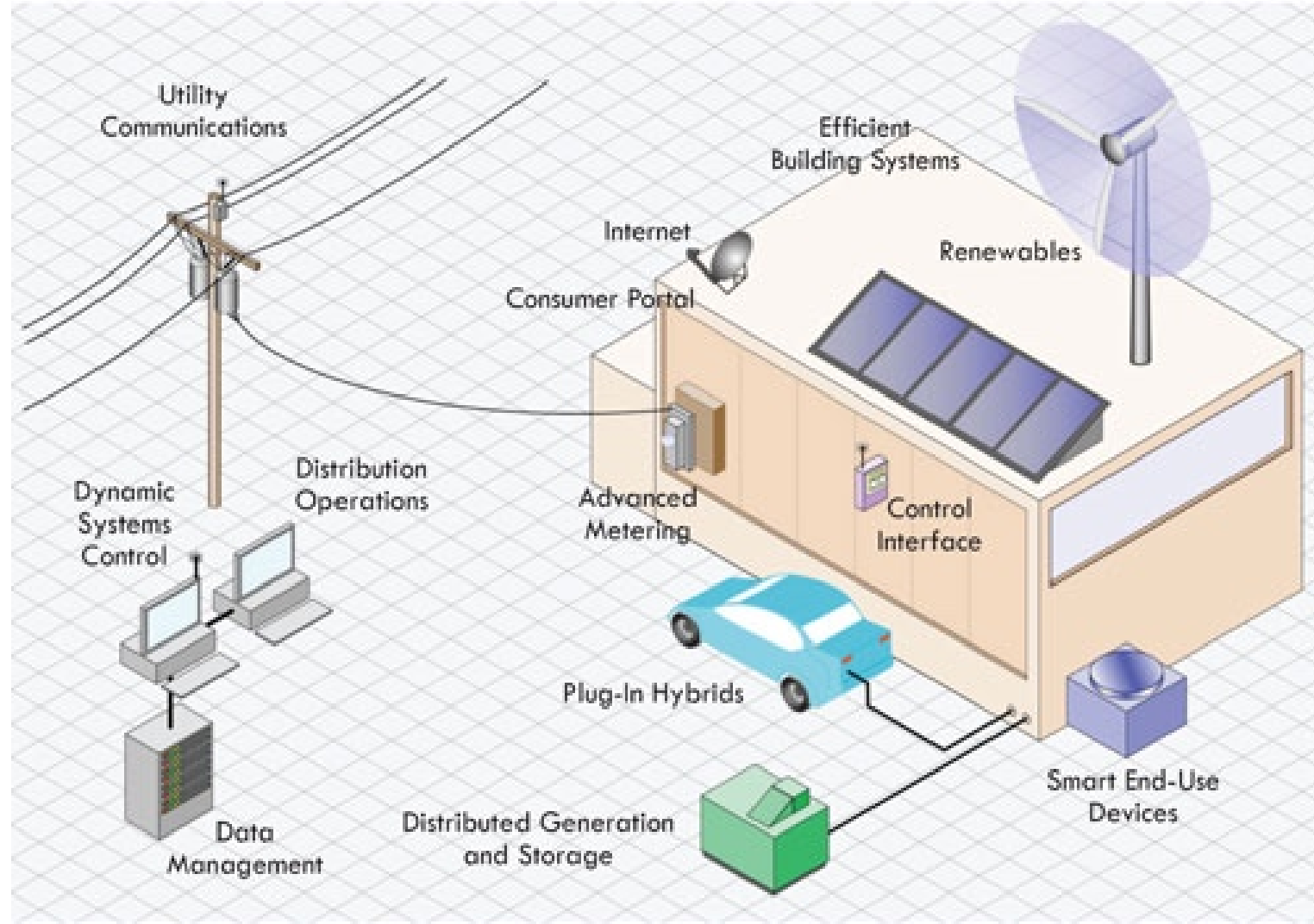
A Thermal Battery System is an innovative renewable energy mechanical system for homes. By combining solar thermal collectors, a water source heat pump, and a latent-capable Thermal Battery, site-derived renewable energy can heat and cool buildings. Poly cistern tanks with an internal heat exchanger are filled with phase change material of water. This tank is buried in the earth outside a home and readily collects and stores energy that have been integrated with the system. (Woolpert, 2013)

MICROGRID GENERATION/STORAGE/LOAD-BALANCING

A microgrid is an approach to electrical distribution that allows local users more control over the optimization of power sources and uses. Technically, it is a grouping of small, independent power-generating equipment connected to computer systems that monitor, control and balance energy demand, supply and storage in response to changing energy needs.

Microgrids produce electricity locally, have discrete electrical boundaries and provide a single point of connection to the larger utility grid. One of the distinguishing features of a microgrid is the ability to disconnect from the utility grid (called “islanding”) to provide autonomous power in response to demand needs or external events, such as power outages or other emergencies.

Typically, one or more conventional generation assets comprise the core of the microgrid, such as a diesel generator, and other distributed power systems may produce electricity from renewable or nonrenewable sources, such as solar photovoltaic or fuel cell systems. By balancing local energy demand with electricity generated and stored on-site, a microgrid can produce secure, reliable and affordable energy for entire communities or for commercial, industrial and government facilities.



HIGH-YIELD ORGANIC FOOD PRODUCTION

Vertical Growing Systems

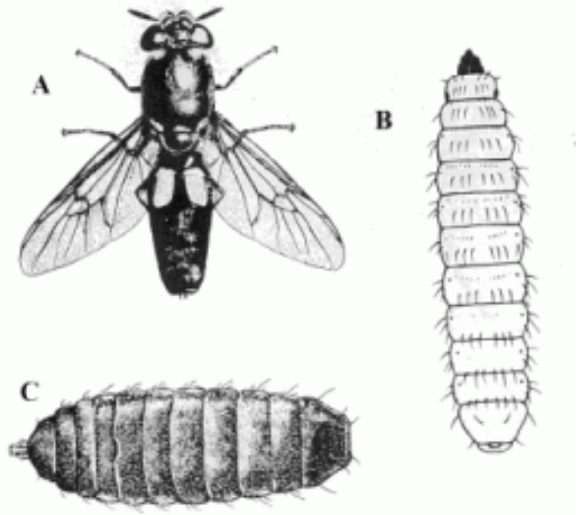
High-yield organic food production in controlled greenhouse environments provides over 33% increase in yield (9+ harvests over 6), with nearly 65% less labor, and using low-energy LED lighting, geothermal heating and cooling, vertical farming can produce over 110,000 pounds of food per hector per year. In combination with seasonal gardens, food forests and permaculture practices it is estimated that 100 families could supplement their nutritional inputs by 60% in developed countries, and more than likely 100% in developing areas. (Ehrlich, 2014)



Aquaponics Ecosystem Integration

Cultivating several species of fresh water fish, shrimp and crawfish in embedded and adjacent high-volume tanks is an integral part of the closed-loop organic food nexus. Fish waste is converted from ammonia to nitrite and then nitrates through biological interaction, where the effluent from the fish tanks is used as fertilizer for the soil-free grow beds, providing the edible vegetation all they need to thrive. The nitrate rich water then flows back to the fish tanks saving nearly 85% water that would otherwise be lost due to drainage or evaporation. (Ehrlich, 2013)

CLOSED-LOOP ORGANIC BIOGENERATORS



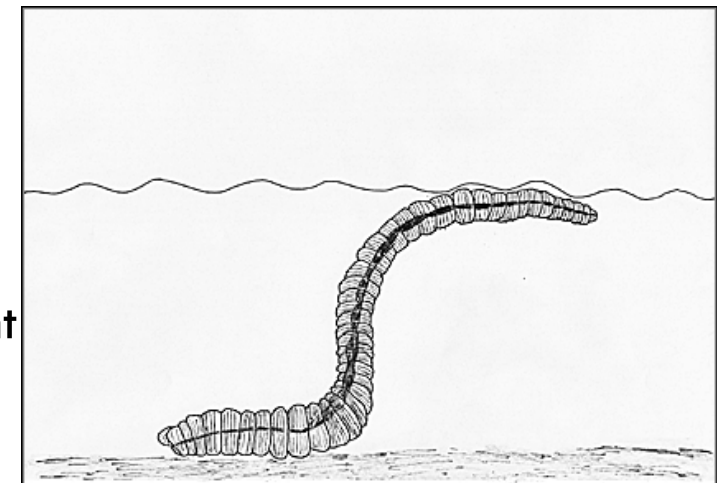
Black soldier fly. A, Adult female. B, Larva. C, Pupa.

Hermetia illucens – Black Soldier Fly Larvae

The system comprises several zones for culturing different organisms, like black soldier fly larvae (*Hermetia illucens*), the freshwater worm (*Lumbriculus variegatus*), the aquatic fern *Azolla* sp, a high content of omega-3 plant purslane (*Portulaca orelacea*), vegetables, fish and chicken in the same loop. The connections and interactions between different zones of this system are crucial; also the unique methods for culturing some of those organisms are described. (Alfredo Llecha, August 2016)

Lumbriculus variegatus – Aquatic Red Worms

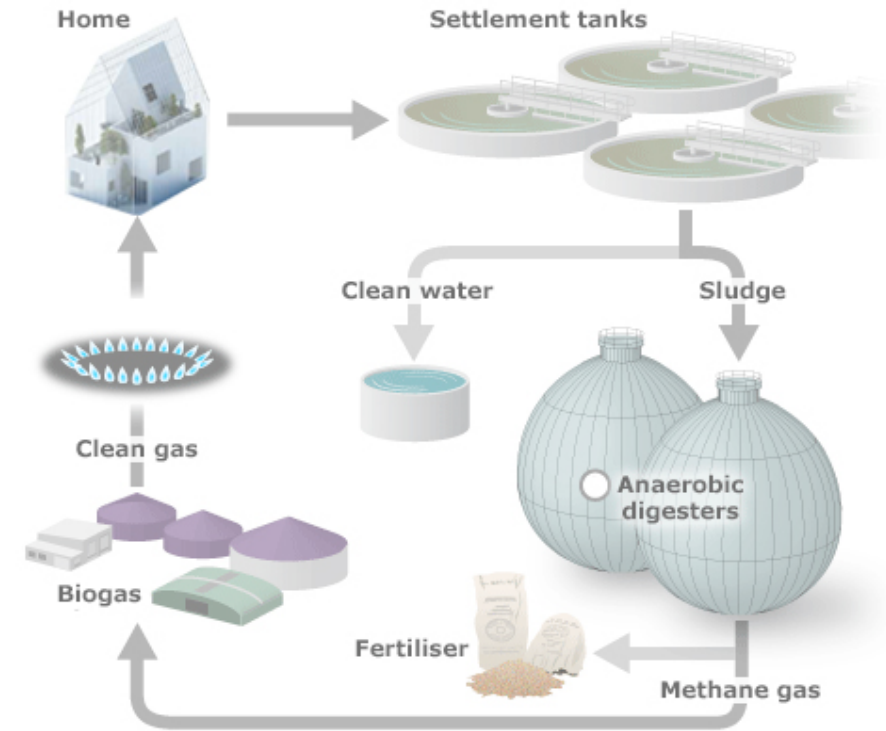
Freshwater worms of the species *Lumbriculus variegatus* (Oligochaeta, Lumbriculidae, common name blackworms) grown on safe low-grade organic waste may be a suitable replacement for fishmeal. Analysis of FA and amino acid composition of *L. variegatus* grown on fish feed concluded that the FA and amino acid composition render this worm species an excellent fish feed, that is equivalent to, or better for fish growth and health than regular fish feeds, such as *Artemia* (brine shrimps) or dry feeds. (Mount et al. (2006)



WATER WASTE CYCLE

Anaerobic Digestion Process

Anaerobic Digestion occurs in *biodigesters* and produces biogas. It removes *Biochemical Oxygen Demand (BOD)* from sewage, conserves nutrients (especially nitrogen compounds) and most importantly reduces pathogens. After each flush, it will take 23 days for the waste to go through the treatment process and reenter the homes as biogas. The sludge-y “leftovers,” effluent, from the anaerobic digestion will be used as fertilizer. (Jerger, D. & Tsao, G. 2006)



Hydroponic Living Machine

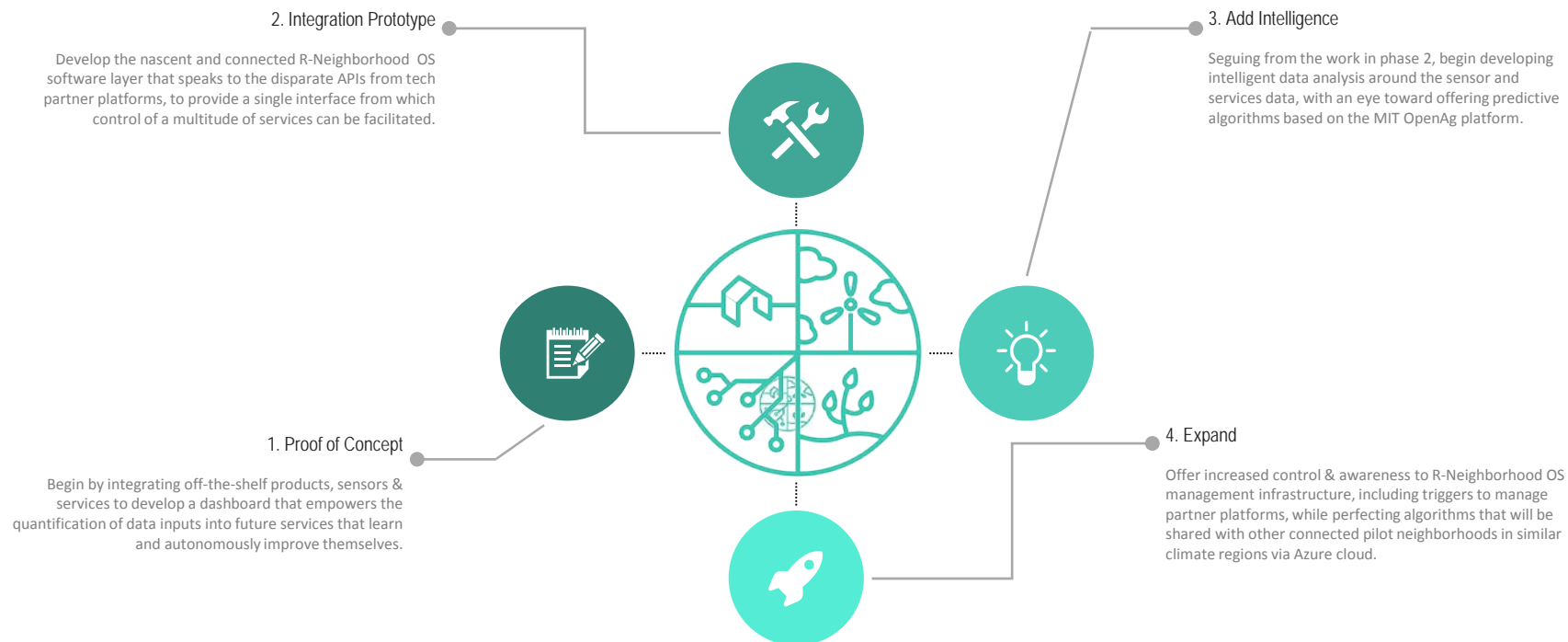
Water enters a series of Hydroponic Reactors which are filled with a textile material and covered with vegetation supported on racks and aerated with bubble diffusers, providing the oxygen required for treatment, while keeping the tank contents mixed. The roots of the vegetation provide surfaces for attached microbial populations' growth, while vegetation itself serves as habitat for beneficial insects and organisms that graze on microbial biomass. A light-weight aggregate is placed on top of the racks, creating a natural biofilter that remove any residual odor. (Dr. Jon Todd 2014)

Integrating Microsoft Azure to support Tech-Integrated and Regenerative Neighborhood OS Research

Submitted by James Ehrlich Jamese@stanford.edu, Professor Larry Leifer leifer@stanford.edu & William Cockayne, Ph.D., cockayne@stanford.edu — Stanford University

Stanford University's Center for Design Research proposes to integrate the emerging Regenerative Neighborhood OS (R-Neighborhood OS) with Microsoft Azure. Our goals with the Azure platform are to, first and foremost, tie into the Azure IoT Hub, and later leverage the Intelligence + Analytics tools during later phases of "quantified neighborhood" development, for tech-integrated residential design thinking. Using Azure should speed the deployment of the Regenerative Neighborhood OS to tie together the wealth of smart (and not so smart) devices, systems, and real-world services being deployed in real-world applications.

The initial R-Neighborhood OS prototype will be piloted in Eden, Utah at the Summit at Powder Mountain development with support of state and local governments and Utah State University research partners, as well as industrial "smart product and service" suppliers. With the expectation that the integration of partners' smart services, sensors, and the application UX best practices will facilitate resiliency via regenerative platforms at the neighborhood scale.







inhabitat

FAST COMPANY

bâtir

Emirates 

POLITIKEN



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theguardian

rtl **nieuws**

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PIPELINE

Venice Biennale
Global press release

JUNE, 2016 – INTRODUCED AT VENICE BIENNALE AND WENT VIRAL GLOBALLY

Powder Mt. Utah USA

PHASE I 2017 - USA POWDER MOUNTAIN UTAH

Oosterwold/Floriade
Almere, Netherlands

PHASE I (α) 2017/2018 – ALMERE, NETHERLANDS

Lund, Sweden
Near to the IKEA HQ

Oslo, Norway

Munich, Germany

Frederikssund,
Denmark

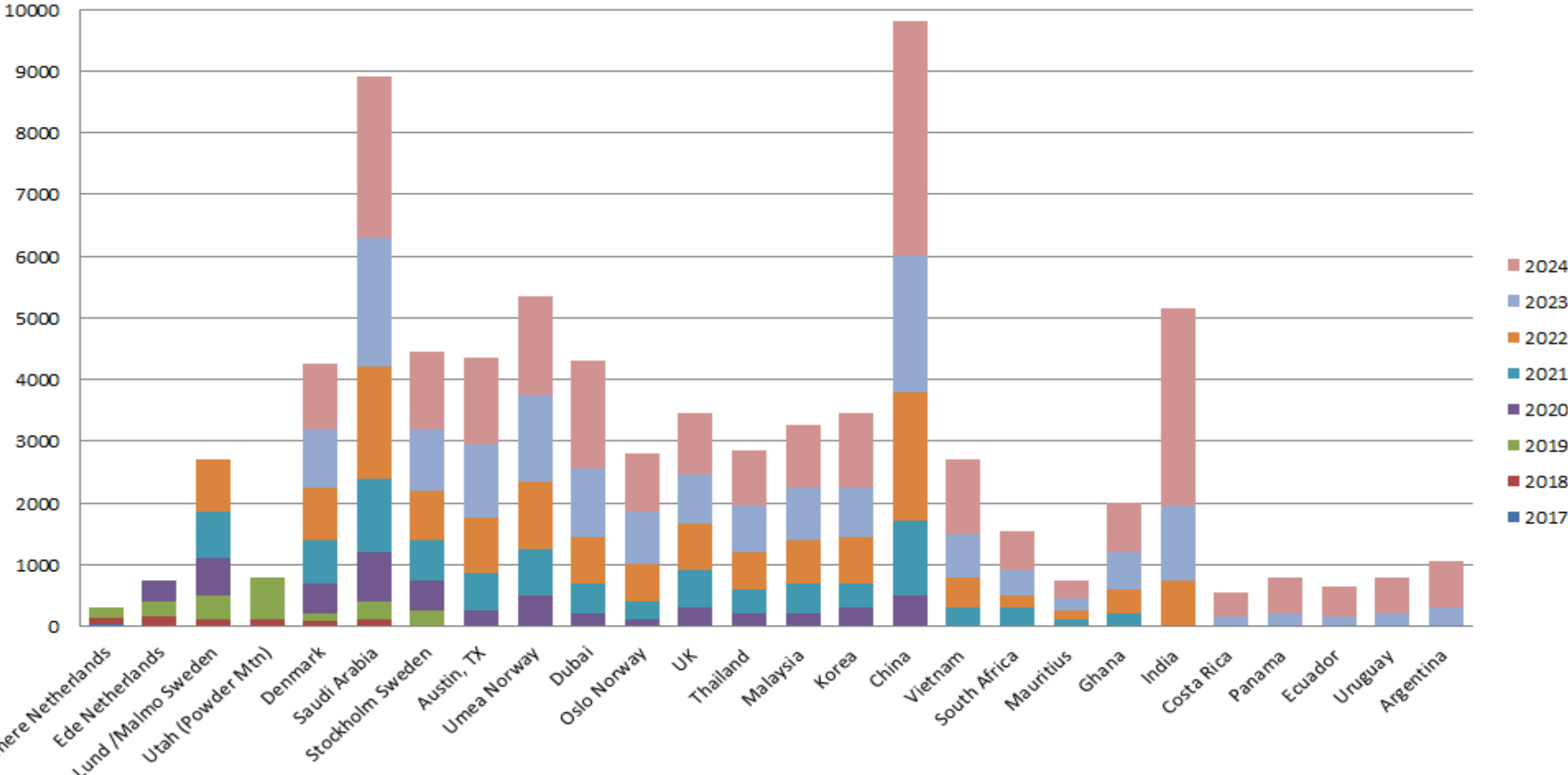
PHASE III 2018/2022 - NORTH EUROPE

Malaysia, Saudi
Arabia, India, Africa,
Asia, and U.S.

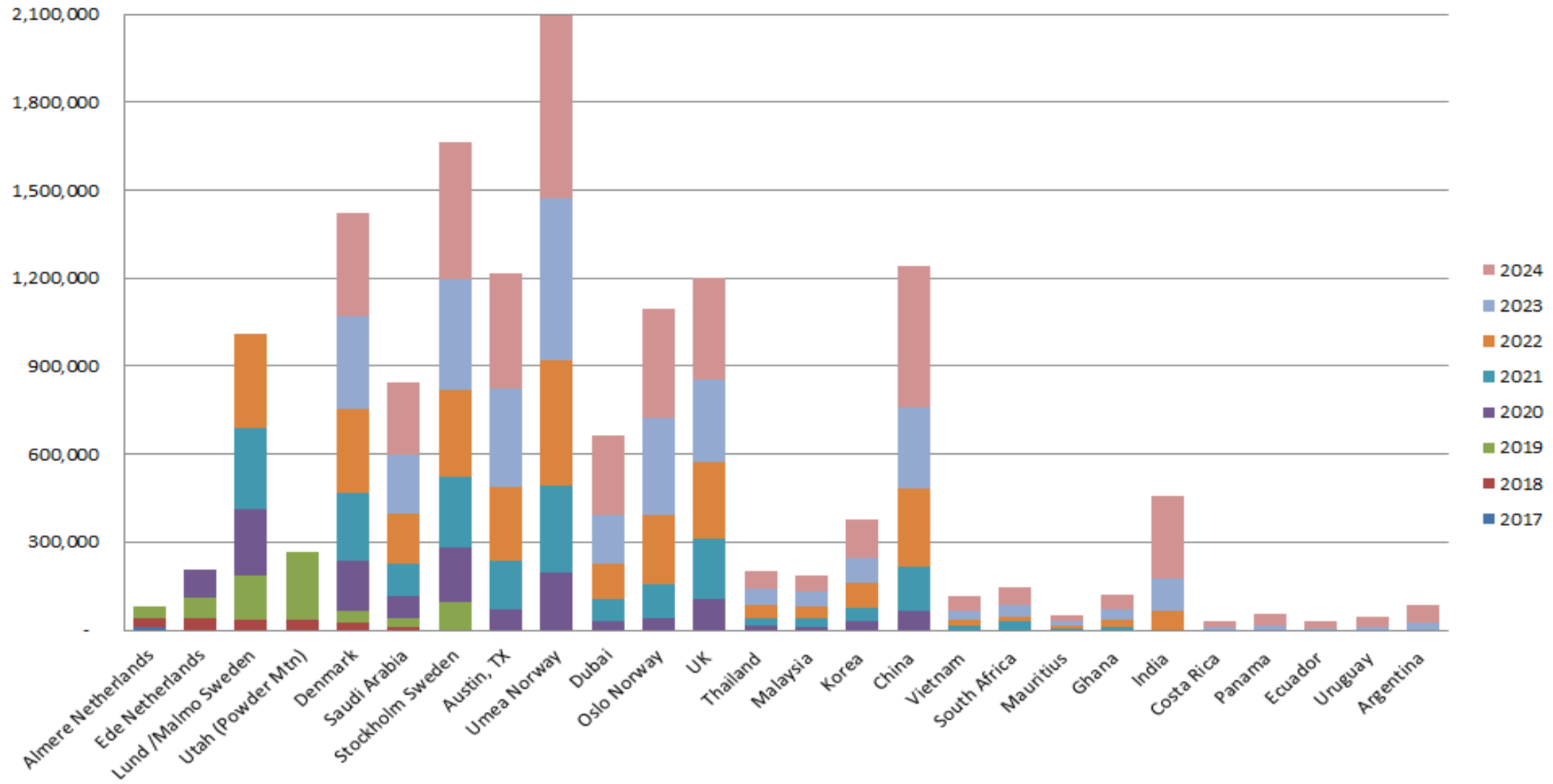
PHASE IV – 2023 -2030 GLOBAL SCALE



ReGen Villages Unit Sales by Region by Year

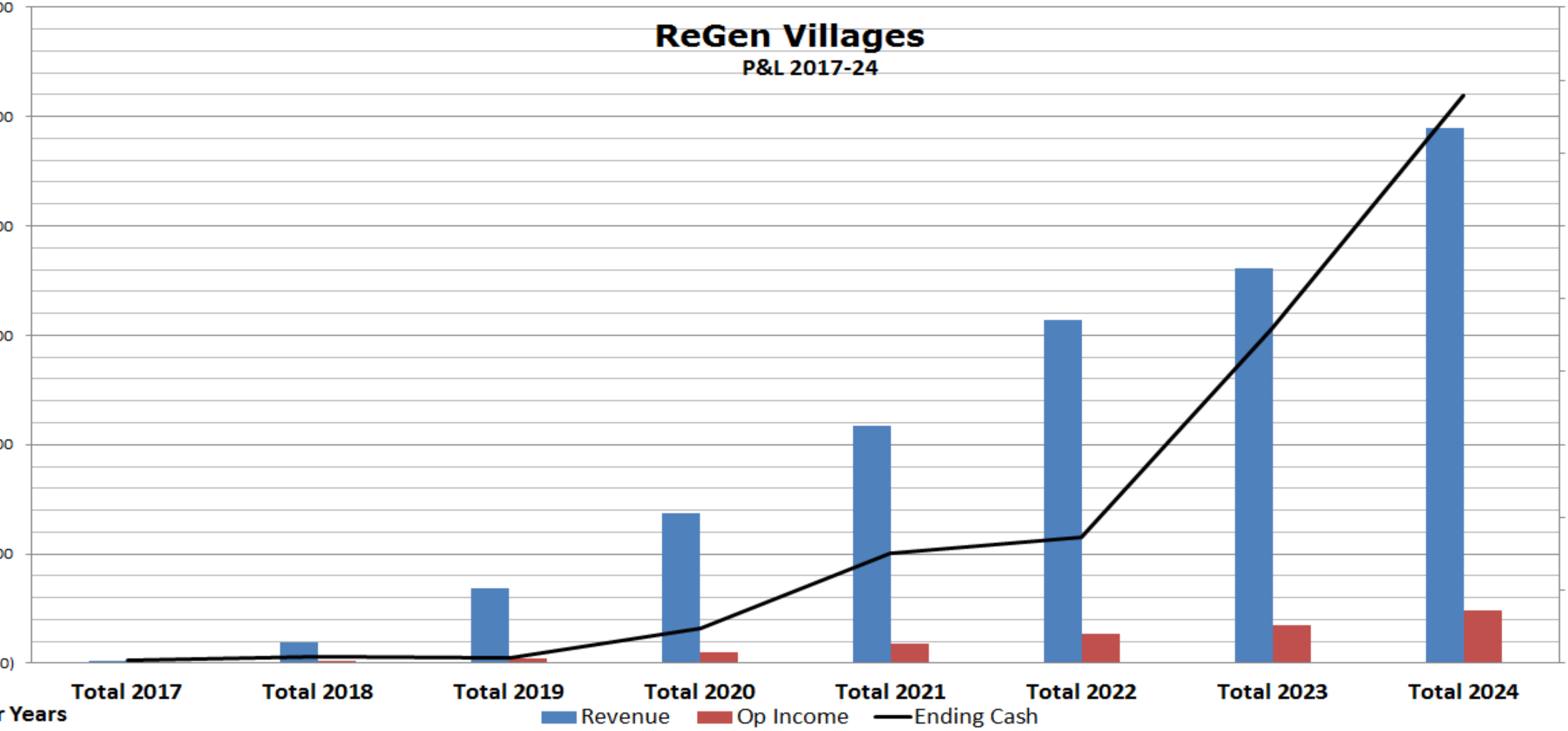


ReGen Villages Unit Revenue by Region by Year (Euro 000)



ReGen Villages

P&L 2017-24









REGENVILLAGES

Tech-Integrated and Regenerative Neighborhood Development



James Ehrlich

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Stanford, California