

Business Opportunities of Geothermal Industrial Parks in East Africa

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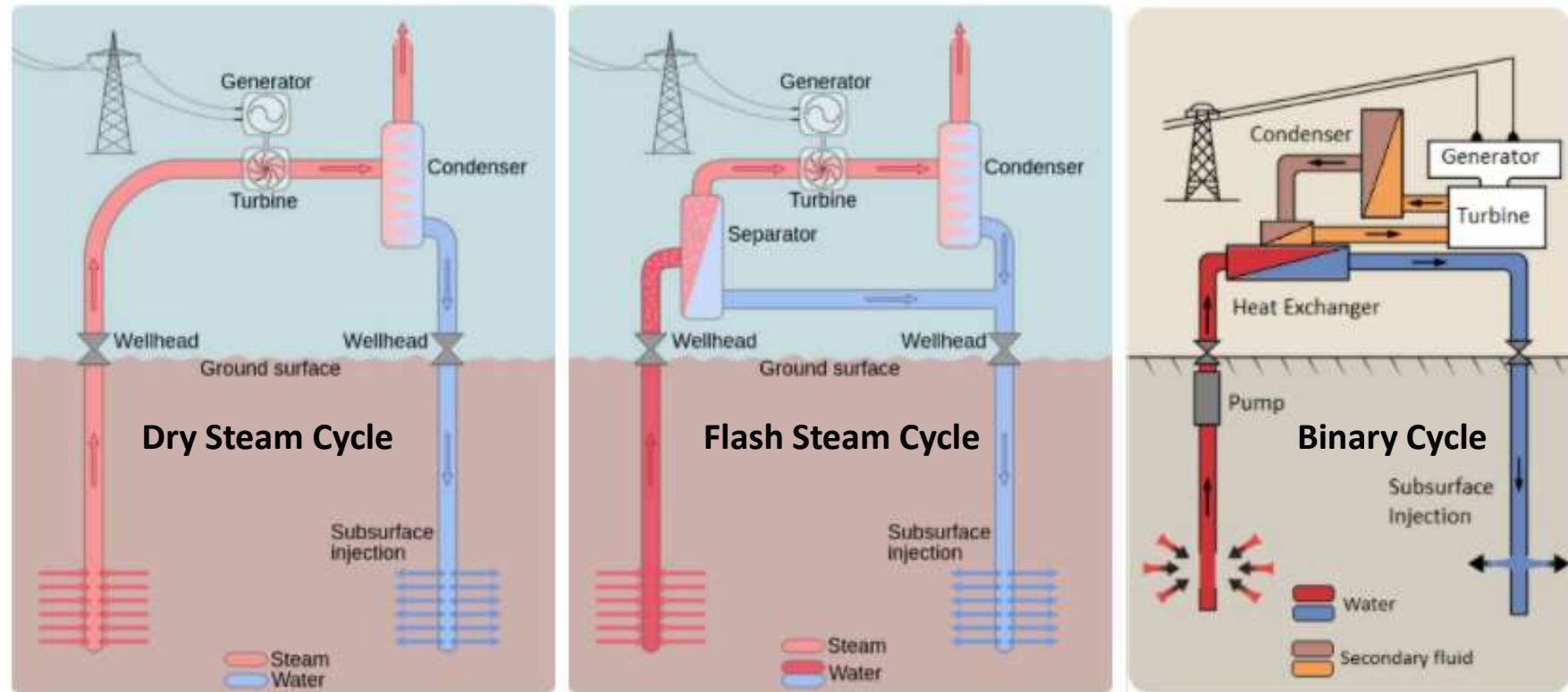
From Geothermal Power Plants to Geothermal Eco Industrial Parks

Geothermal vs other renewables

<i>Renewable Energy Challenges</i>		<i>Geothermal Advantages</i>	
<i>High Costs</i>	◊	<i>Low Cost</i>	Cost-competitive with coal, natural gas, and hydro, and cost-advantaged to other renewable sources
<i>Unstable Yield</i>	◊	<i>Base-Load Power</i>	The resource allows often for more than 90%+ CF and dispatchable generation.
<i>Large-Scale Land Needs</i>	◊	<i>Small Geographic Footprint</i>	Lowest land use per MW of any renewable energy source, and minimal environmental impact.
<i>Single revenue stream</i>	◊	<i>Multiple revenue streams</i>	Geothermal power plants can produce electricity, heat, CO ₂ , potable hot and cold water and various minerals.
<i>Limited Off-Shoot Industry Potential</i>	◊	<i>High Off-Shoot Industry Potential</i>	Around geothermal various off-shoot industries have developed, e.g. spas & tourism, food processing, district cooling and industrial heating



How most geothermal plants are today

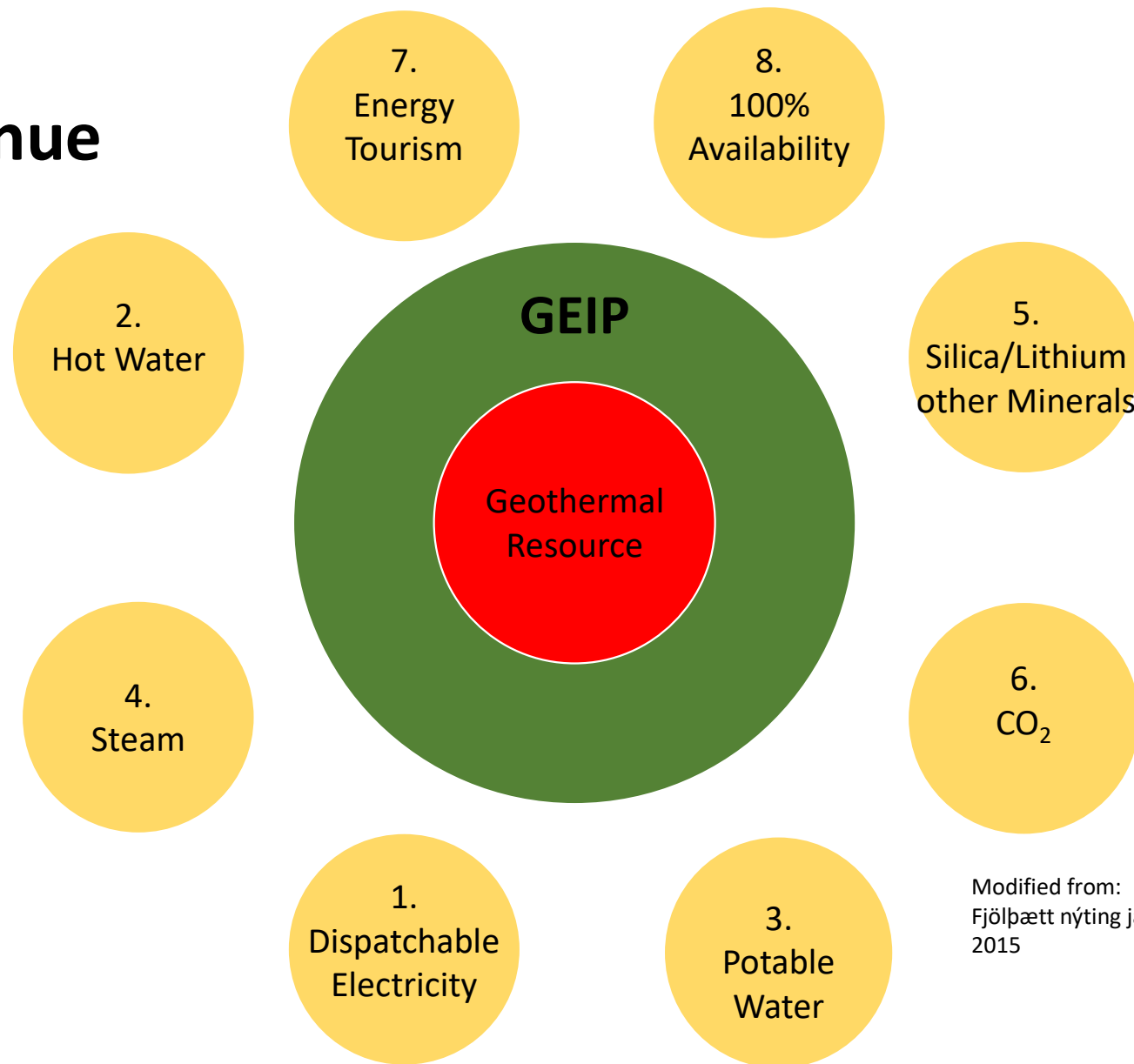


Source: https://en.wikipedia.org/wiki/Geothermal_power

One revenue stream = Sale of electricity

GEIP Revenue Model

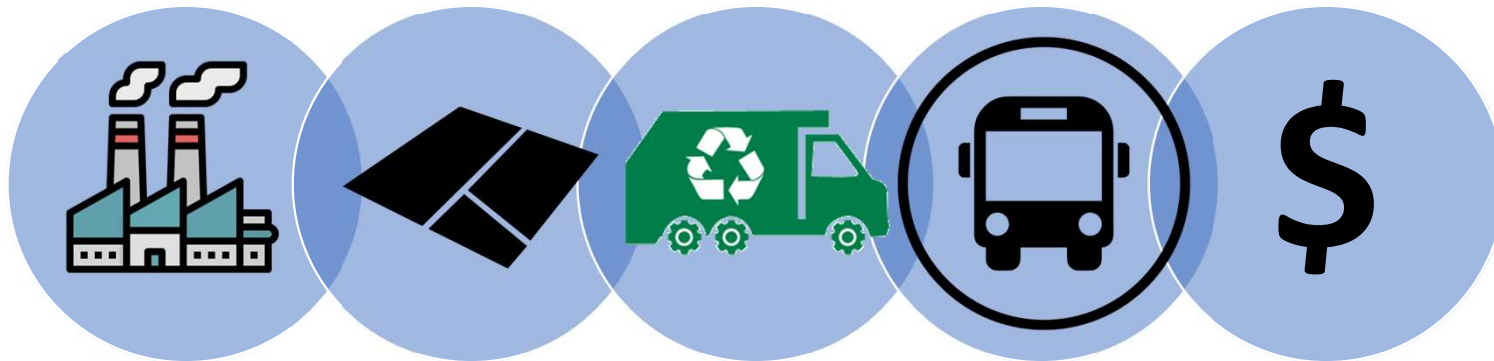
Efficient use of the Resource

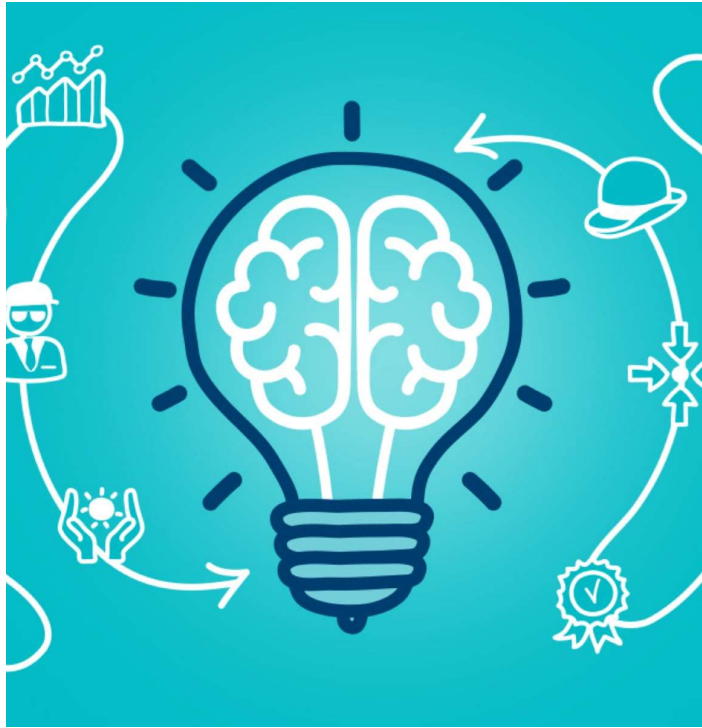


Modified from:
Fjölþætt nýting jarðvarma á Reykjanesskaga, GAMMA 2015

REVENUE STREAMS	SOCIAL VALUE	COMMERCIAL VALUE
Dispatchable Electricity	Access to electricity	70 USD/MWh
Hot Water	Heating, bathing and Tourism	1 USD/M ³
Potable Water	Consumption, irrigation	1 USD/M ³
Steam	Drives industrial process, drying, Pasteurization	Replacement of fossil fuel-based steam
Silica/Lithium, other	Sale of minerals, Production, Innovation	'00 - '000 USD per tonne
CO ₂	Increased crop production, Industry, Food Production	140 USD per/tonne
Energy Tourism	Creating Jobs and awareness	5-50 USD per visitor
100% Availability	Data centers, Food storage, High tech.	20-30% (reserve power generation)
RECs	Green Branding	5 – 10 USD/MWh

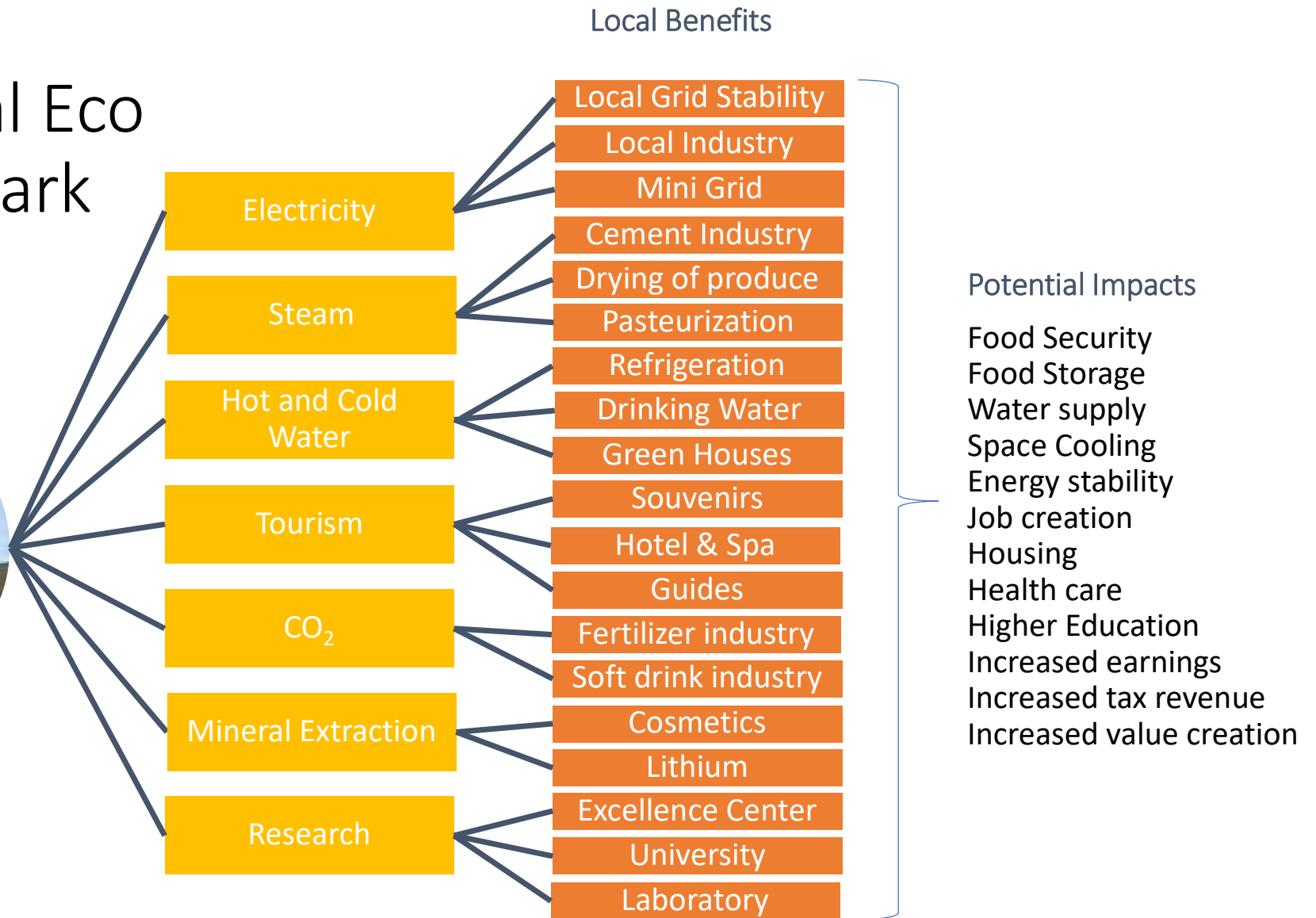
Possible additional revenues

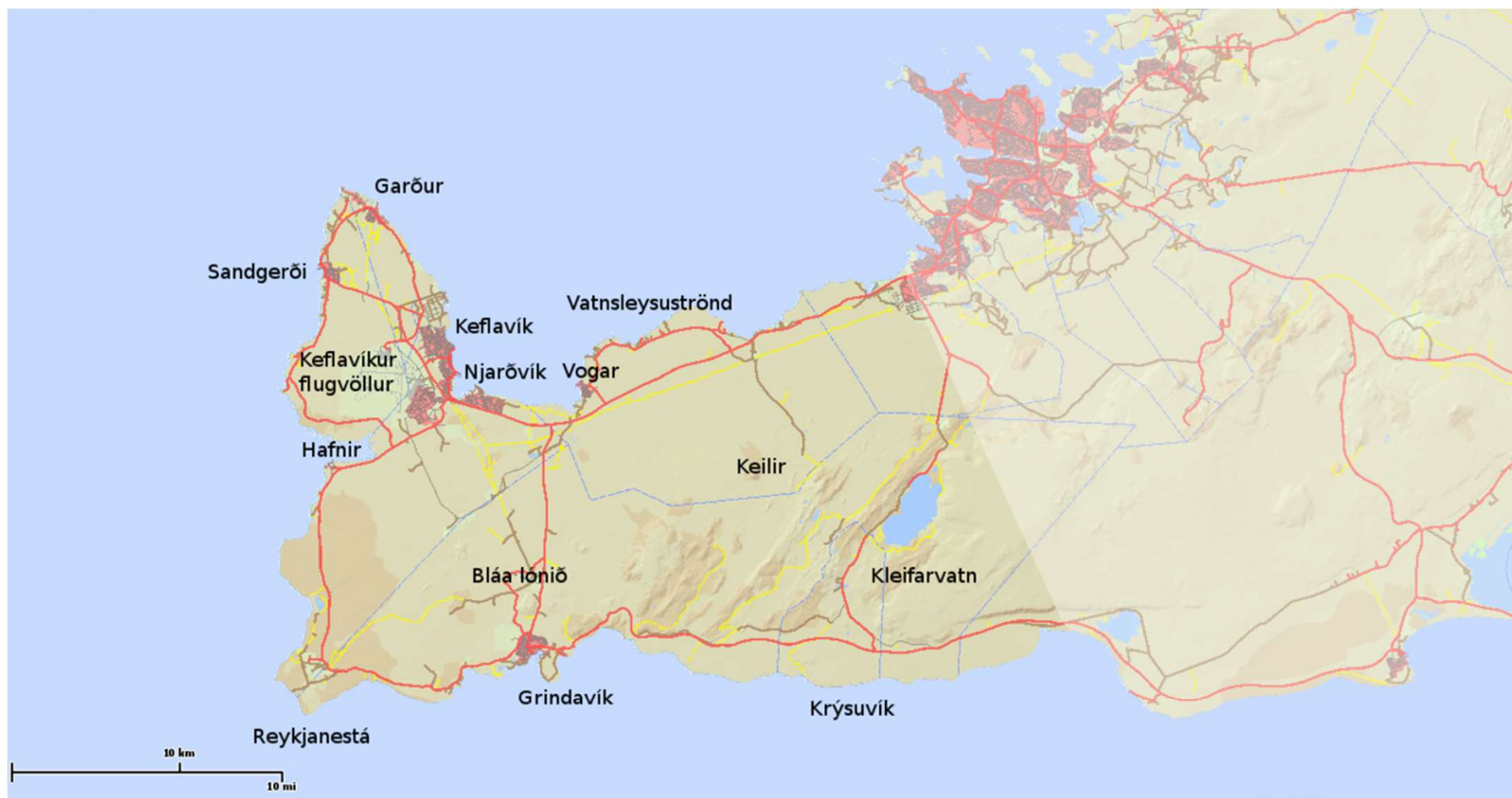




Building blocks of a GEIP

East Africa Geothermal Eco Industrial Park





What regional impacts happened in Reykjanes

Social

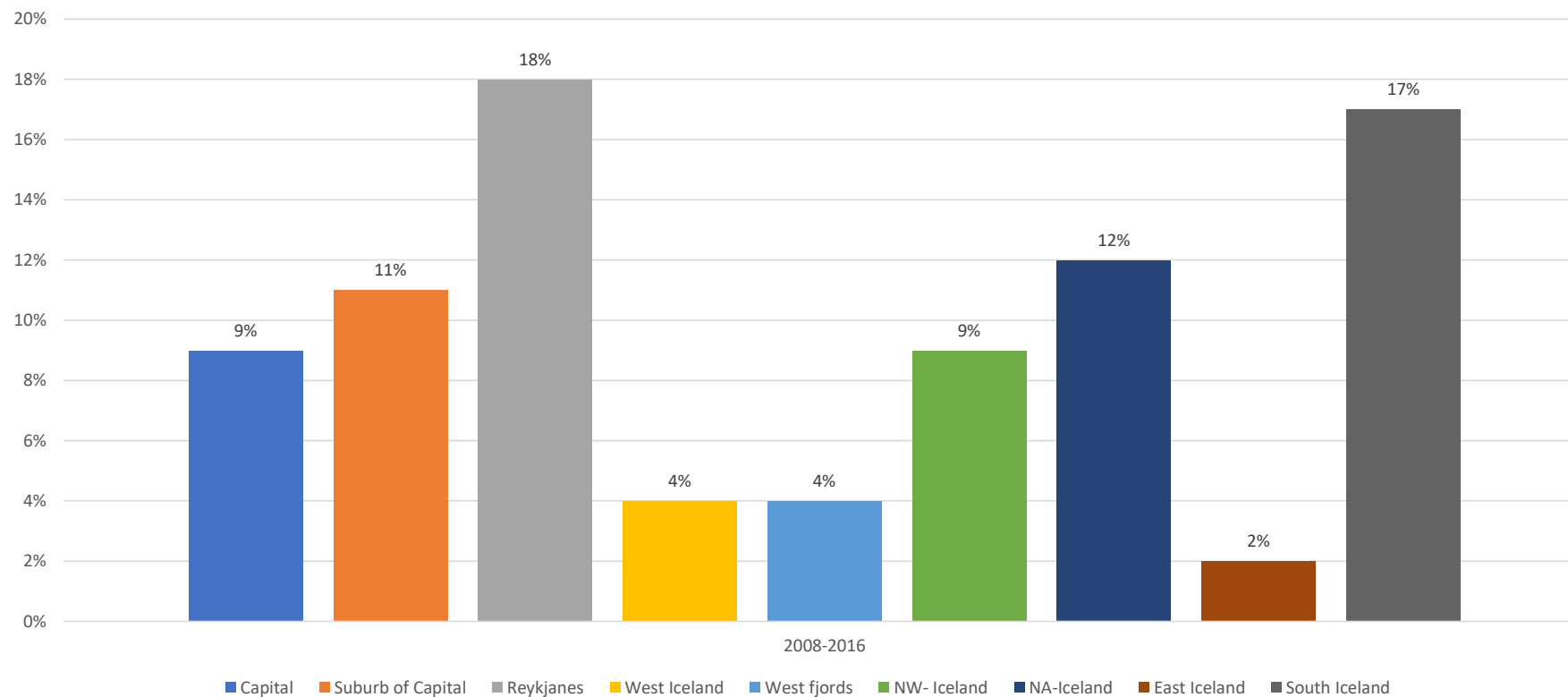
- More jobs
- Higher paid jobs
- New housing
- Healthcare improvements
- Infrastructure improvements
- Education and training

Commercial

- New investments
- Start-ups and innovation
- Generation of export
- Generation of foreign Currency
- Increased tax revenues
- Environmental consciousness

Even though Iceland has gone through recessions periods the impact of the recession is much less in and around the Geothermal Resource Park.

Regional Cumulative GDP 2008 - 2016



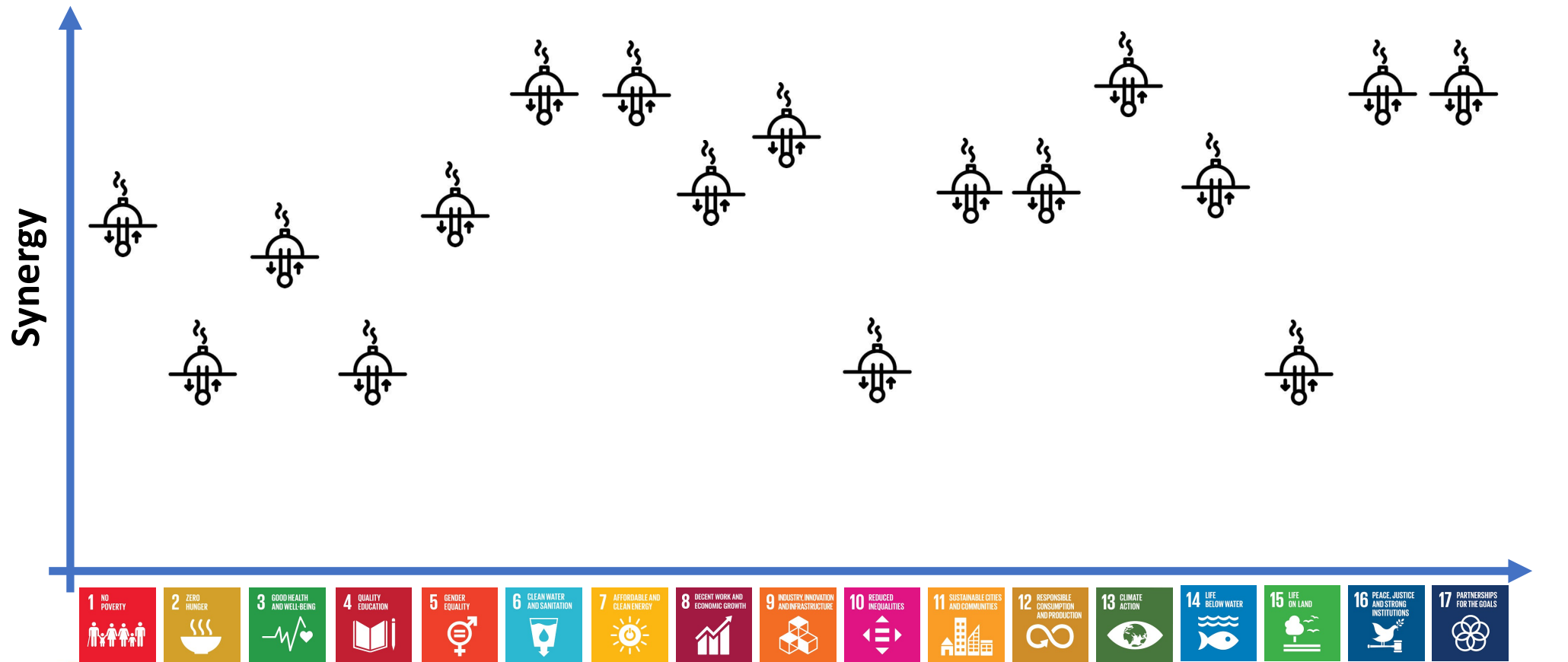
Source: Icelandic Regional Development Institute

GEIP as the main Sustainability Driver

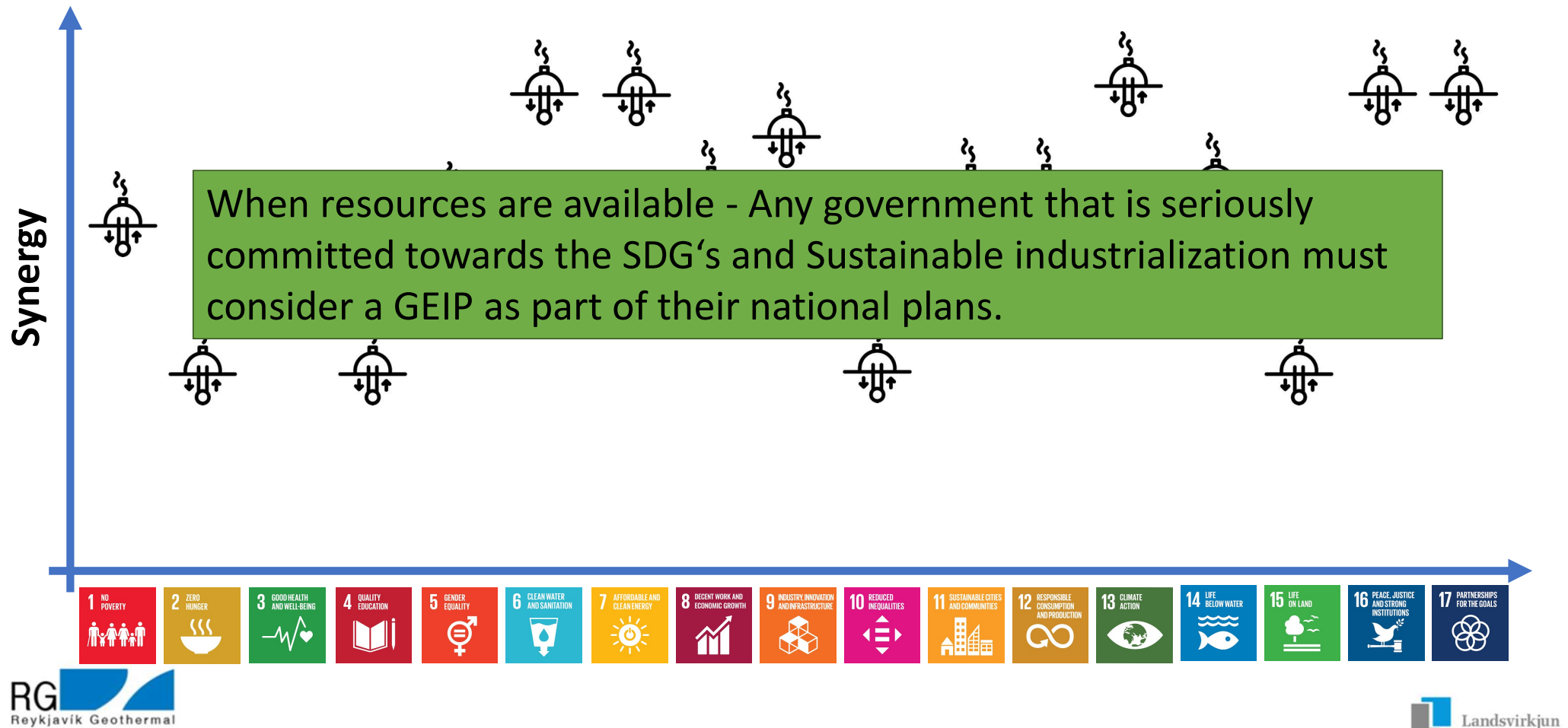
- The future opportunity of geothermal energy is at the heart of our common challenges
 - Decrease atmospheric CO2 release by increasing the use of renewable energy
 - Create infrastructure that promotes sustainable production and increases quality of life
 - Create diverse jobs and support local communities
 - Shift of focus from individual power project to geothermal as the backbone of an industrial ecosystems
 - Strong focus on local innovation, engagement with stakeholders and community
 - Cooperation with research institutions, universities and entrepreneurs
 - Legal environment that promotes systems thinking and encourages circular thinking



How does a Geothermal Eco Industrial Park compare with the SDG's



How does a Geothermal Eco Industrial Park compare with the SDG's





System Thinking

“A system is a set of related components that work together in a particular environment to perform whatever functions are required to achieve the system's objective.”

Donella Meadows

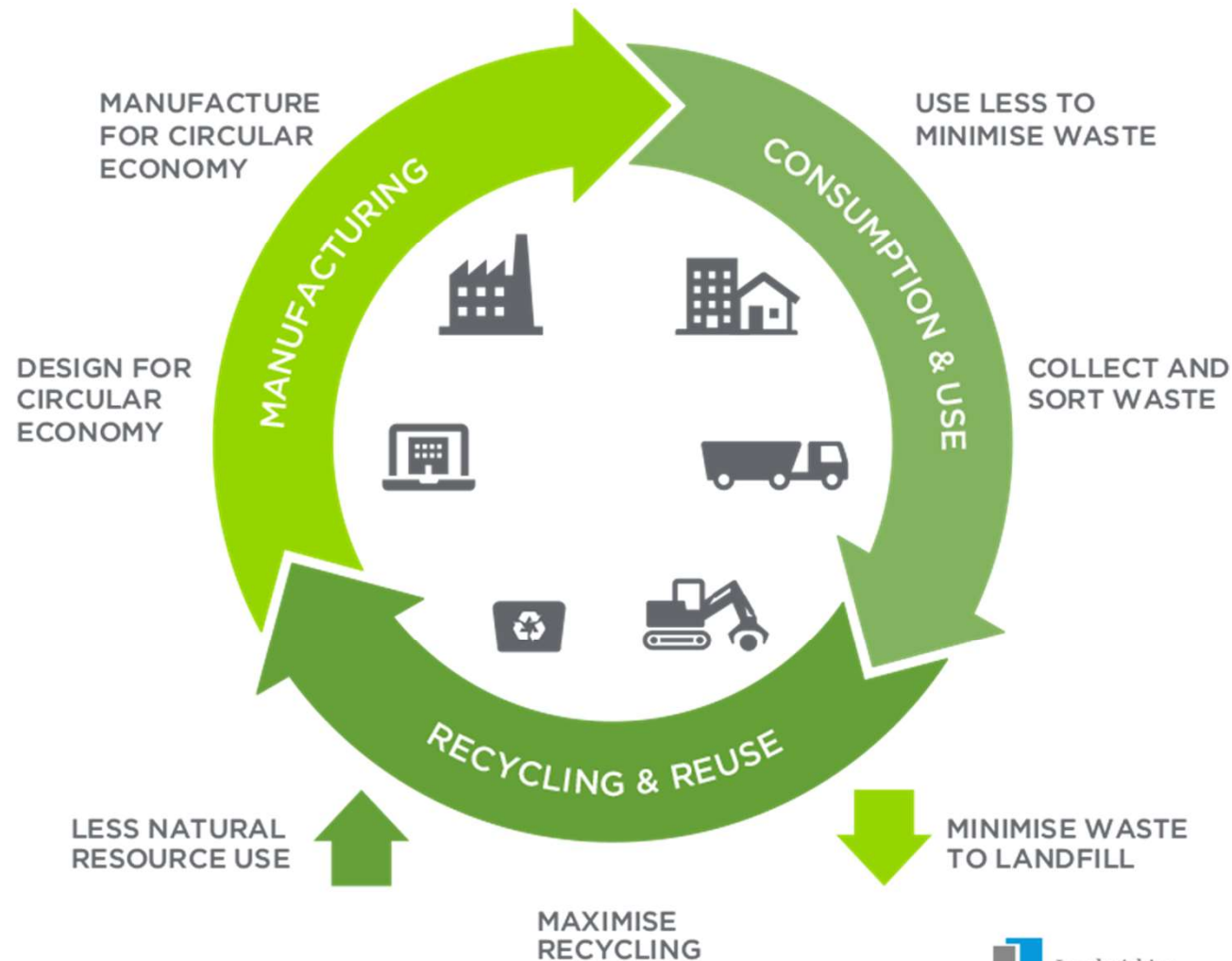


A GEIP works towards a circular economy and a society without waste.

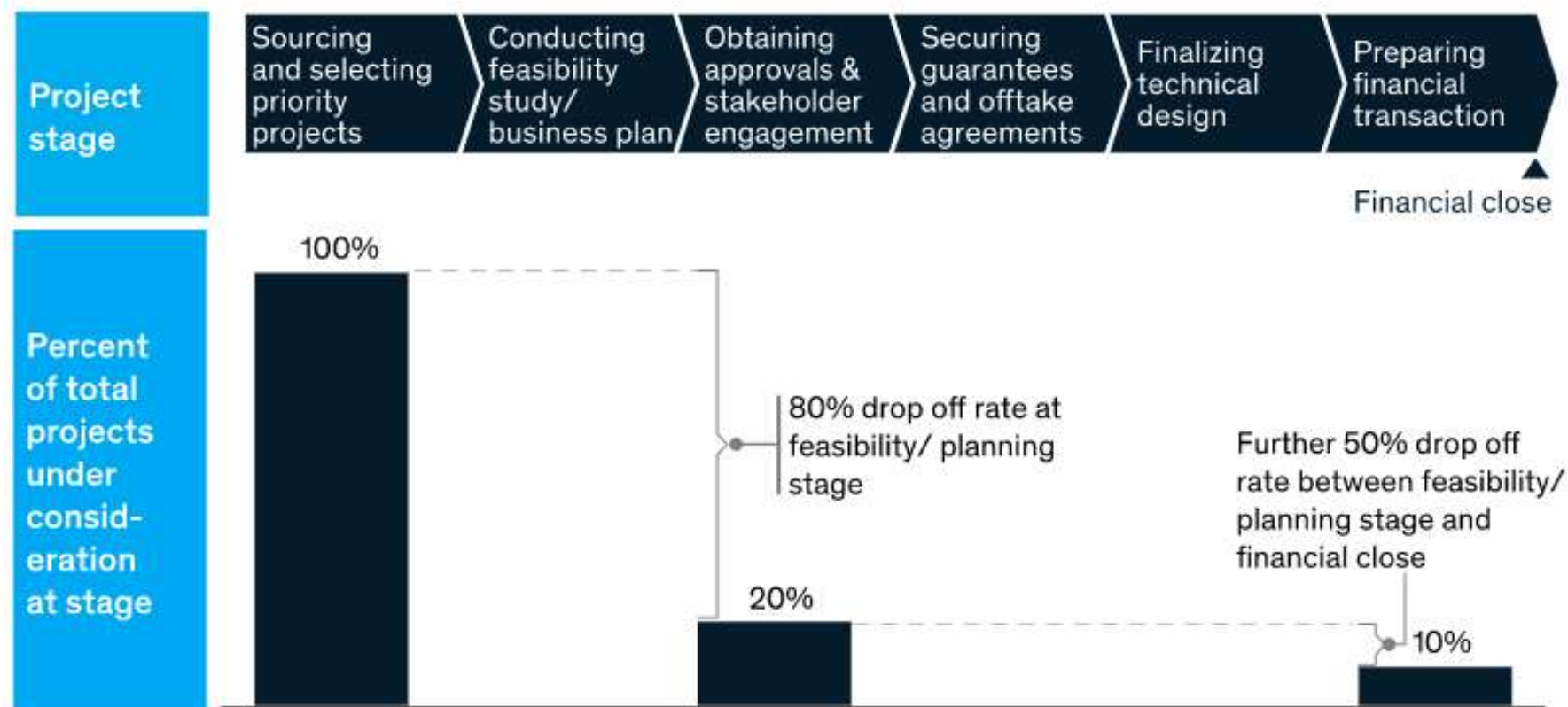
This is done through System thinking where the joint participation creates a greater good for the companies within the GEIP then if they would stand alone.

The cumulative knowledge and the interactions within the GEIP benefit all companies.

CIRCULAR ECONOMY



‘Africa’s infrastructure paradox’: Despite available funds, large pipeline, and clear need, few projects reach financial close.



Source: McKinsey & Co., Solving Africa's infrastructure paradox

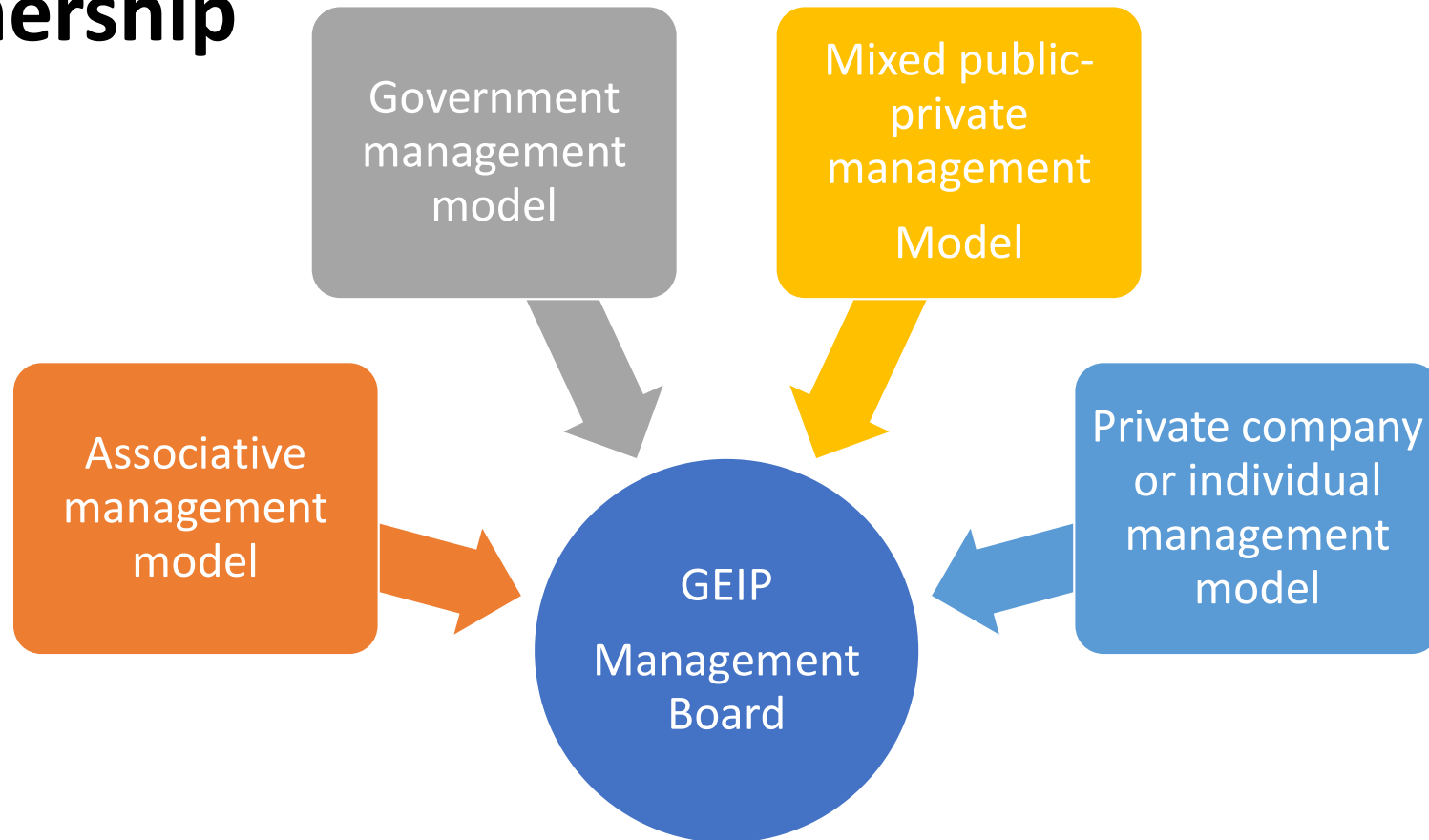
Comments from Stakeholders

- Farmer - male age 49. ***"We hope our locality could be tourist destination, farther widening off farming business opportunities to our women"***
- Elder – male age 67. ***"Our key problem is that the youth who have graduated from universities and college are now jobless" ... "industry that will contribute for the development in one or the other way."***
- Farmer – male age 55. ***"We are deprived of road, water supply, electricity, health service and almost everything." ... "Teachers are leaving schools because there is no drinking water"***
- Farmer (former Soldier)– male age 40. ***"If you are telling that we will get light for our households that is ok, but everyone will get that light. I mean what will be a special benefit to this community due to this project?"***
- Farmer – Female age 28. ***"As you have seen we have no potable water. We are using running water, which is dirty and causing a lot of disease to our children".... "I hope your project will assist us improving our road so that we will bet better transportation services. In that way we can easily move our products to the market and can sale for better price than we do here for local merchants."***



Ownership & Funding

Ownership



Possible shared tenant management cost of GEIP



Operated by park management



Landsvirkjun signs a new USD 150m Sustainability Linked Revolving Credit Facility

July 11, 2019



Historic \$890 million Sustainable Development Goals Bond issued by Mexico

Mexico launches innovative finance tool linked to the Sustainable Development Goals with the participation of UNDP



UNDP has a long relationship with the Government of Mexico, supporting its development efforts and progress towards sustainable development. Photo: UNDP Mexico



Marketing & Branding



The new Sustainable business model

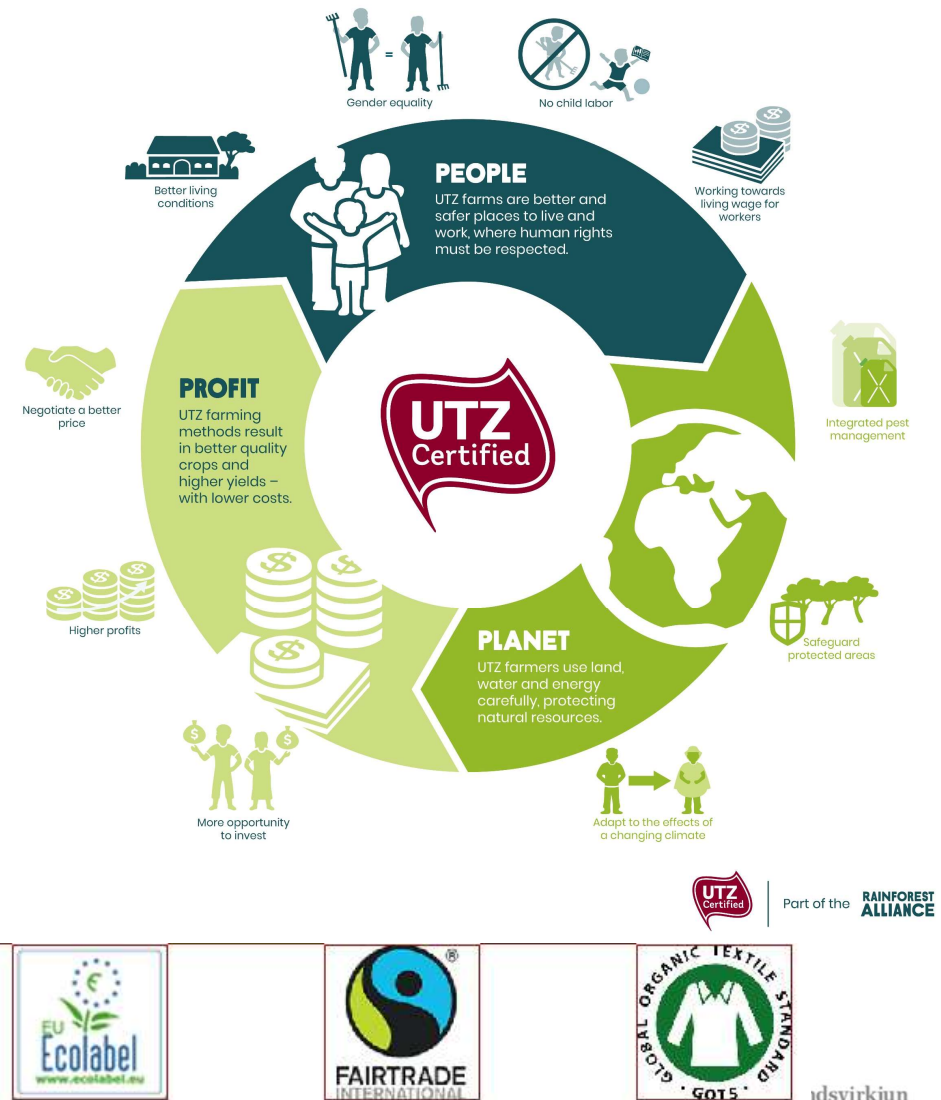


In the new business model, the industries are called to action against climate change, as the customer grows more and more environmentally selective.

PEOPLE, PLANET, PROFIT- HOW TO SUMMARIZE THE IMPACT OF UTZ CERTIFICATION

The joint co-operation of the companies within the GEIP is not only related to the resource and cost optimization but also through the creation of marketing and brand awareness.

The focus on the sustainable use of the resource as well as the sustainable production of produce provide opportunity for a sustainable certification and thus a higher value of product.

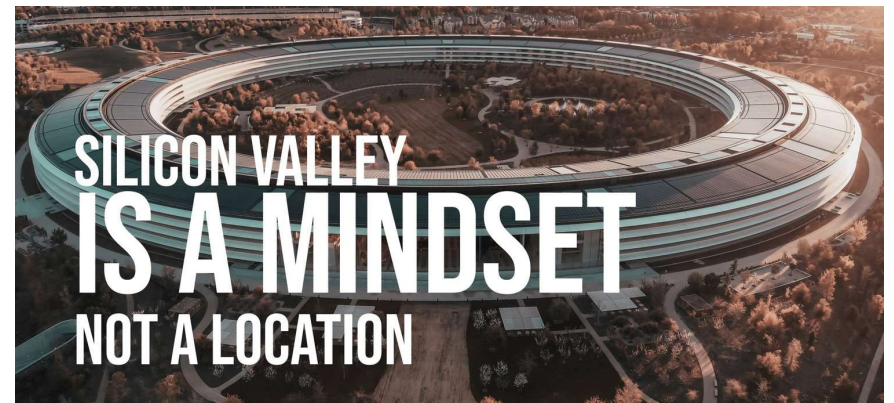




How to attract tenants?

Michael Porter Cluster theory

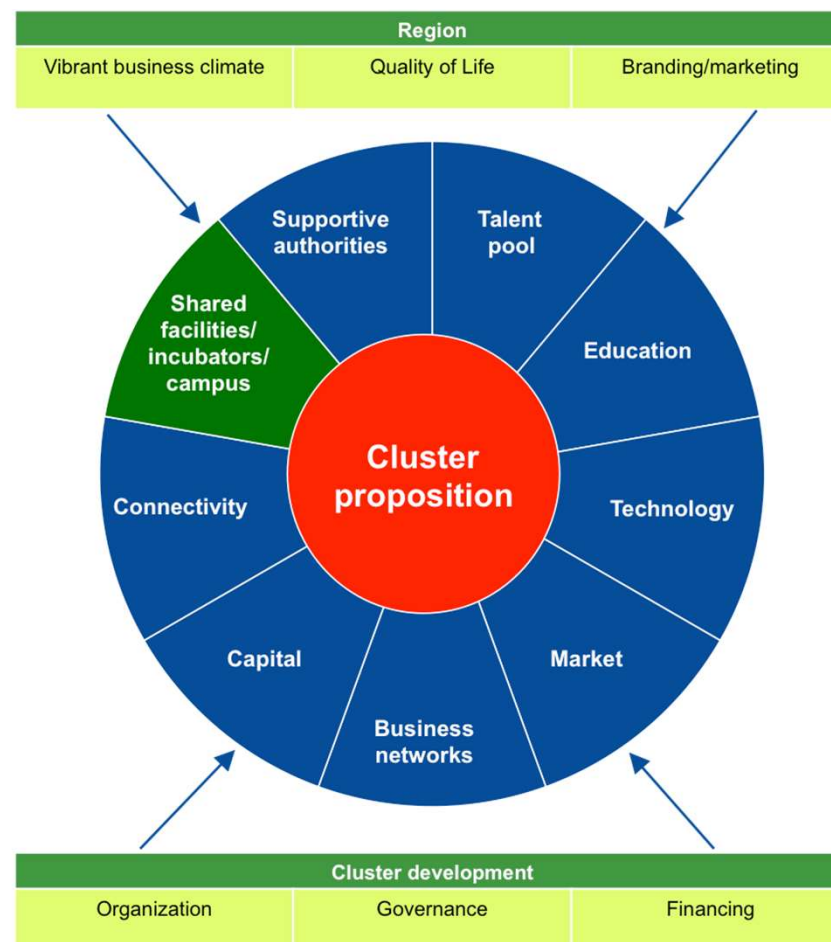
- Tenants should join because it will increase the productivity of the companies in the cluster,
- Tenant should join because the shared management will allow companies to focus on what they do best.
- Tenants should join because the share mass of collaboration will drive innovation in the field, and
- Because is stimulates new businesses in the field.



Michael Porter Cluster theory

Economics of scale in a GEIP provides the companies with shared infrastructure cost.

Economics of scope is provided through the diverse production, the diversity of education, innovation a wider range of skilled labor.



Source: BCI

**„GEIP business opportunities should
build on the local strength and trades.”**

