



# **Water in the circular economy: opportunities and challenges**

**Stockholm World Water Week 2017**

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**Deputy Director General (DDG )**

**International Water Management Institute**

# Our 19th century approaches have not worked well in many countries



~780 million without access to improved water

**Linear, energy intensive, single quality, use once and throw away systems**

**'All or nothing proposition'  
Unaffordable to 2/3 of the planet**

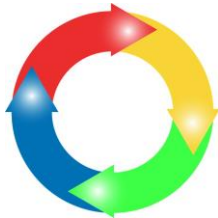
~2.5 Billion without access to improved sanitation



# Major trends also play important role 4<sup>th</sup> Industrial Revolution



Low Carbon Economy: **20-20-20**

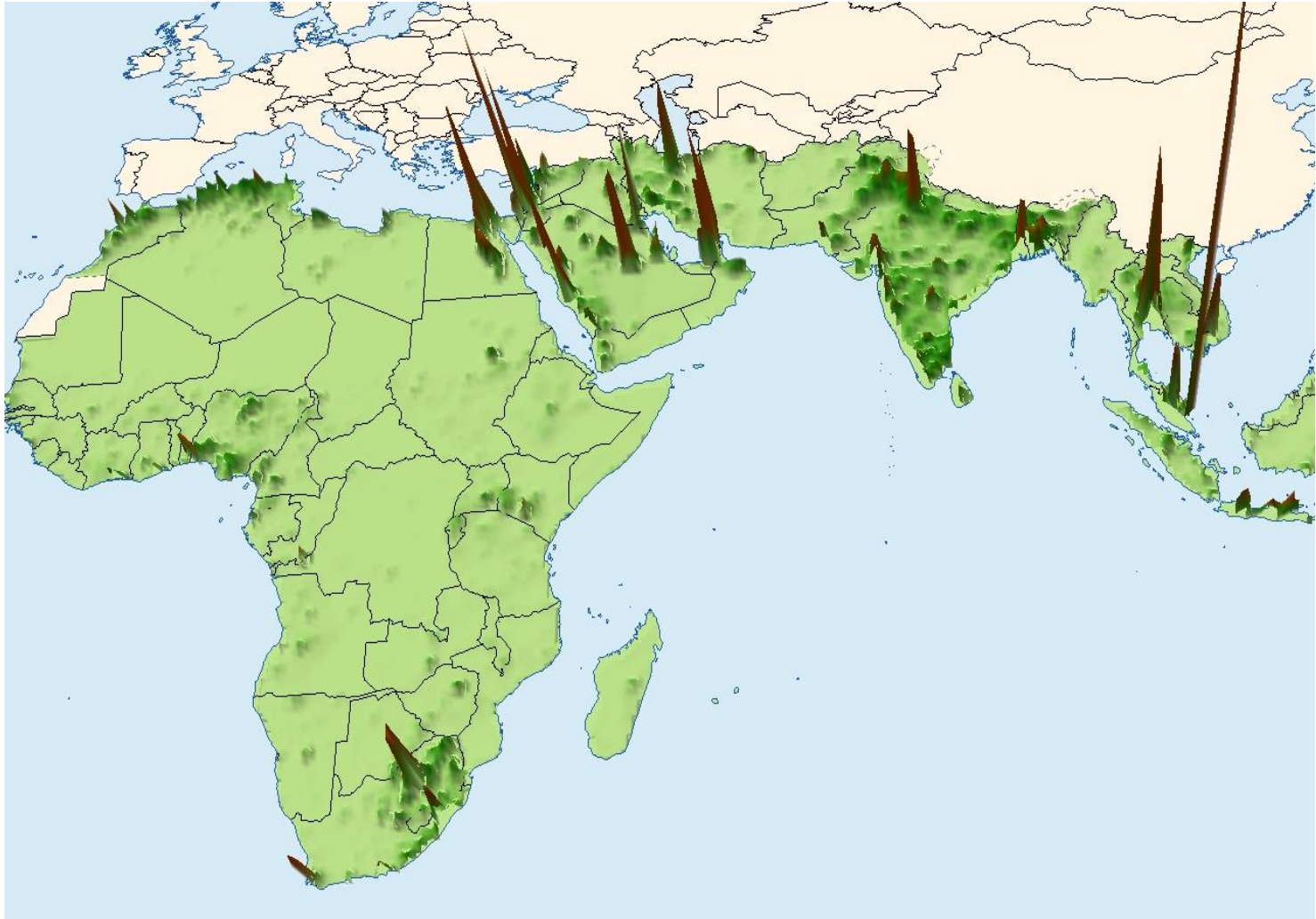


Circular Economy: **Resource miners**



Digital Economy: **IoT and automation**

# Opportunity to do things differently



Source: World Bank (2010) *World Development Report 2009 Reshaping Economic Geography*, second edition, pp. 35



**major change in perspective**

**productive use of water**

# Changing our perspective creates opportunity to do things differently



Quality A

Quality B

Quality C

**Durban Water Recycling**



**Mondi**

**SAPREF**



Tertiary: **Irrigation**



2nd+RO+MF: **AAR**



Nitrified: **Cooling**



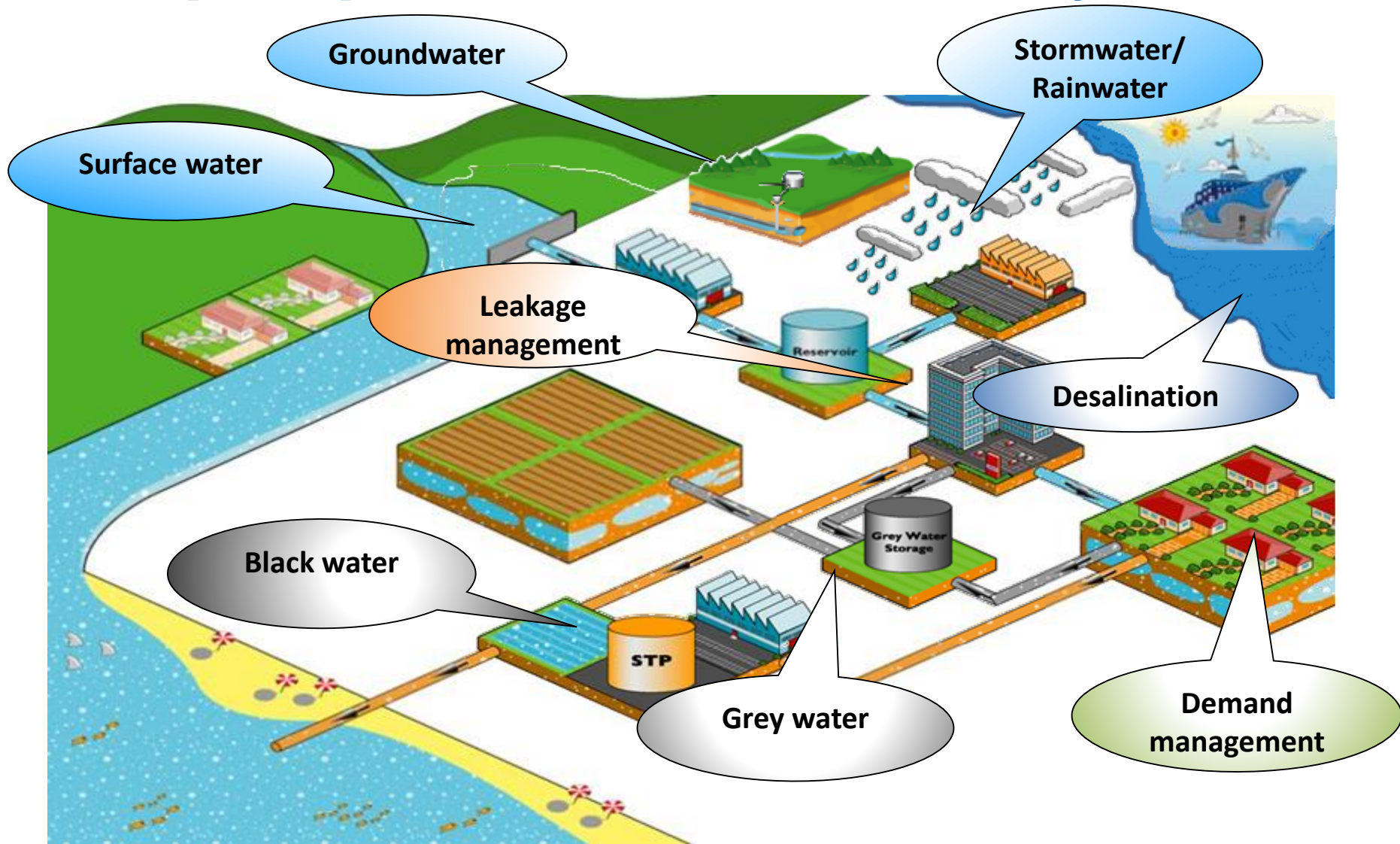
RO: **Refinery**



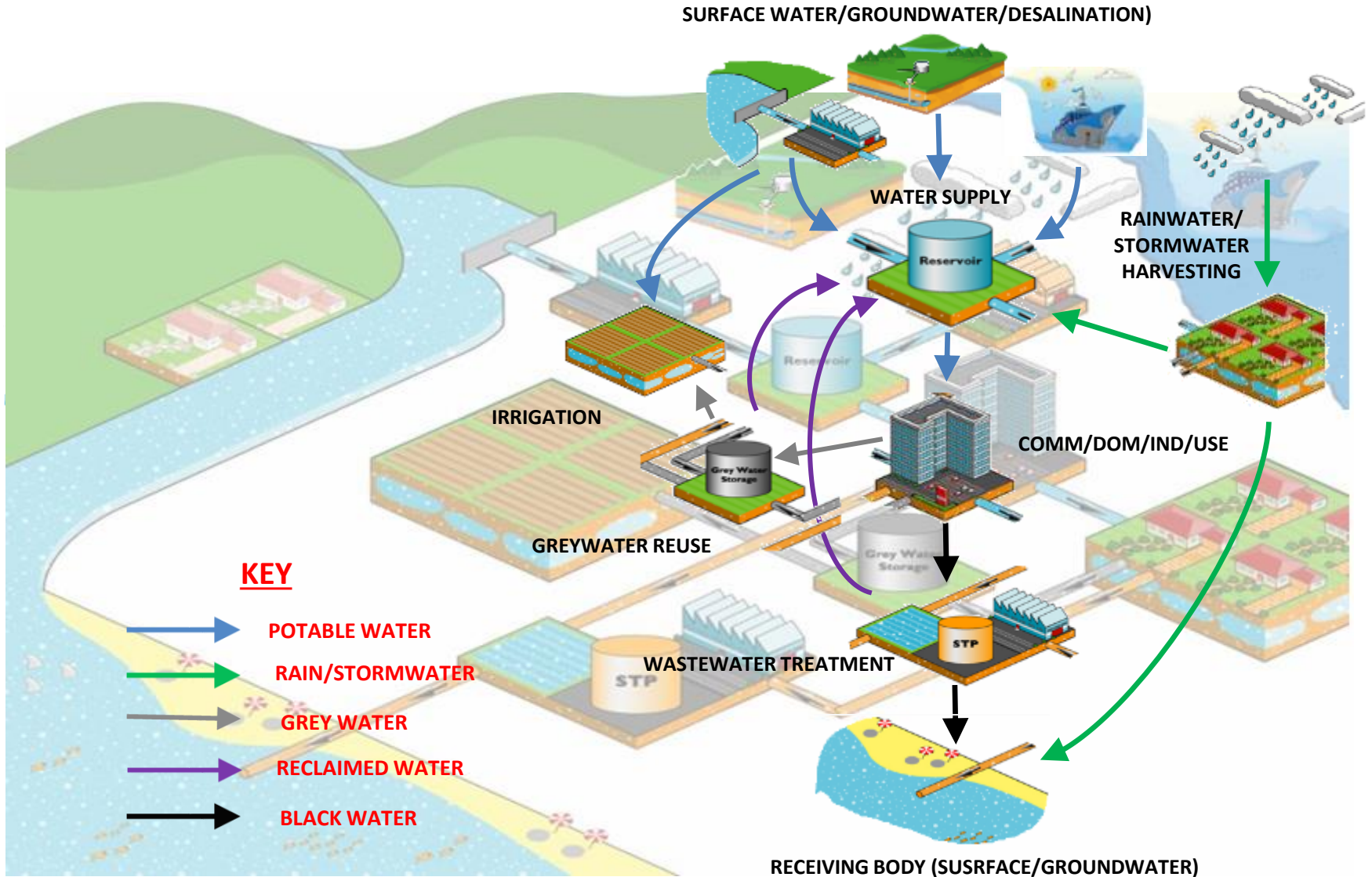
RO(x2): **Refinery**



# We need to have a systems perspective of the water cycle



# Modelling allows us to connect all flows with productive uses





# Exploring alternative urban water solutions to rapid population growth



**Water demand will at least double until 2035**

**I.C.L.E.I**  
Local Governments for Sustainability

Patel College of  
**Global Sustainability**



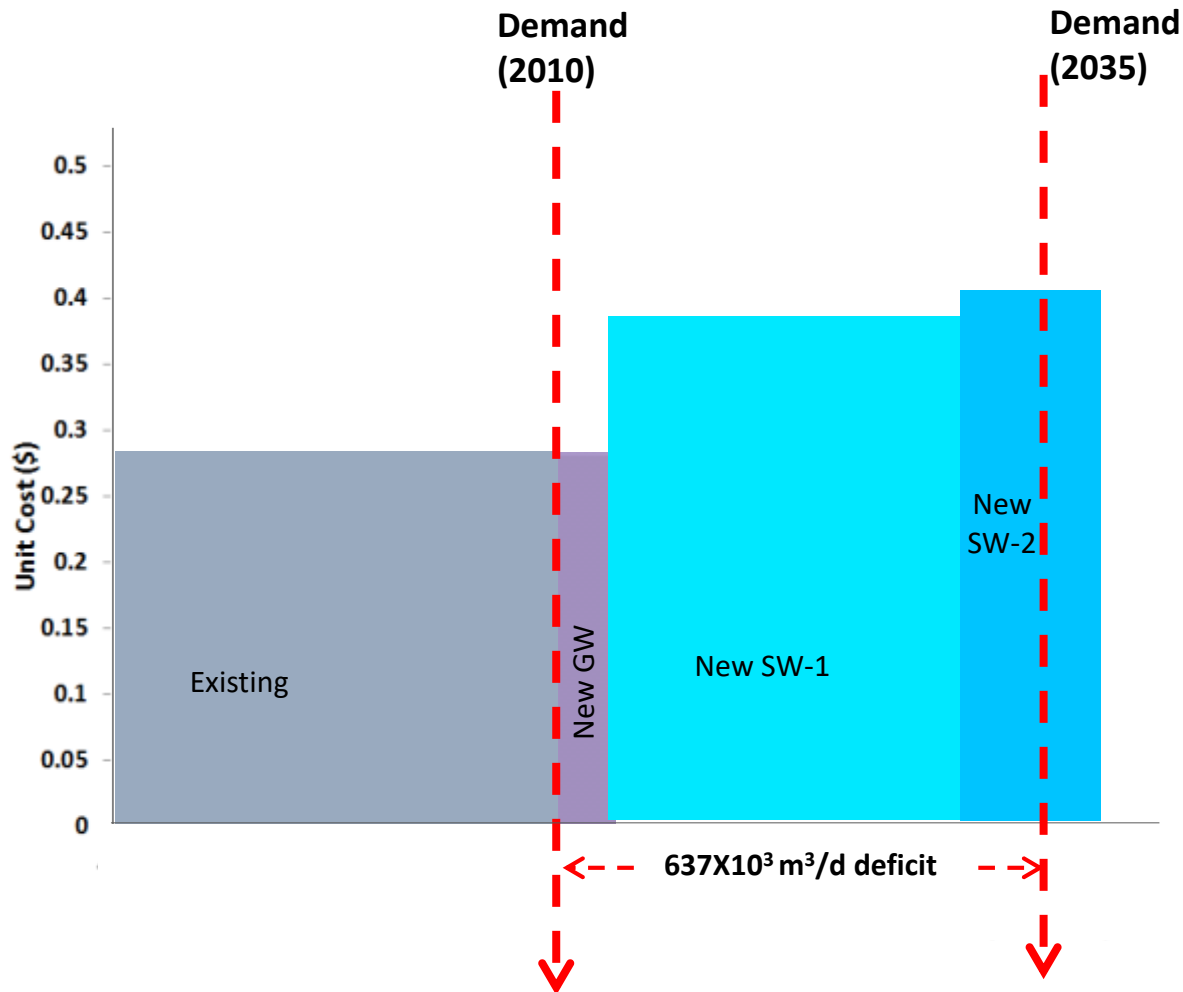
**MAKERERE UNIVERSITY**

**Panafcon**



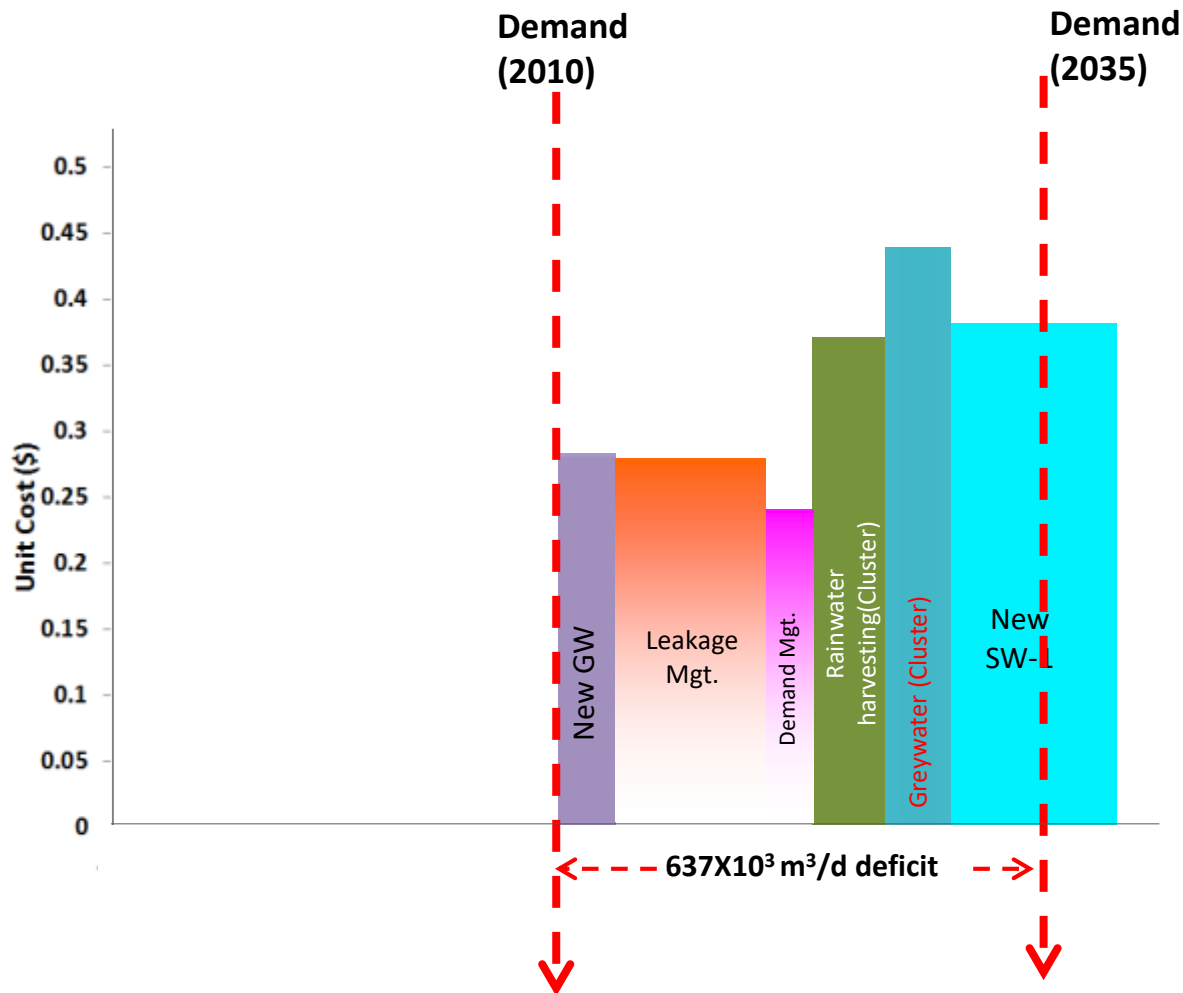
# Typical solutions - import more water to meet growing needs

- Unit costs of **US\$ 0.36/m<sup>3</sup>**



# Need to consider non-conventional resources – a portfolio of options

- Unit costs of **US\$ 0.31/m<sup>3</sup>** (cf. to 0.36)



# Need to consider non-conventional resources – a portfolio of options

- Unit costs of **US\$ 0.4**

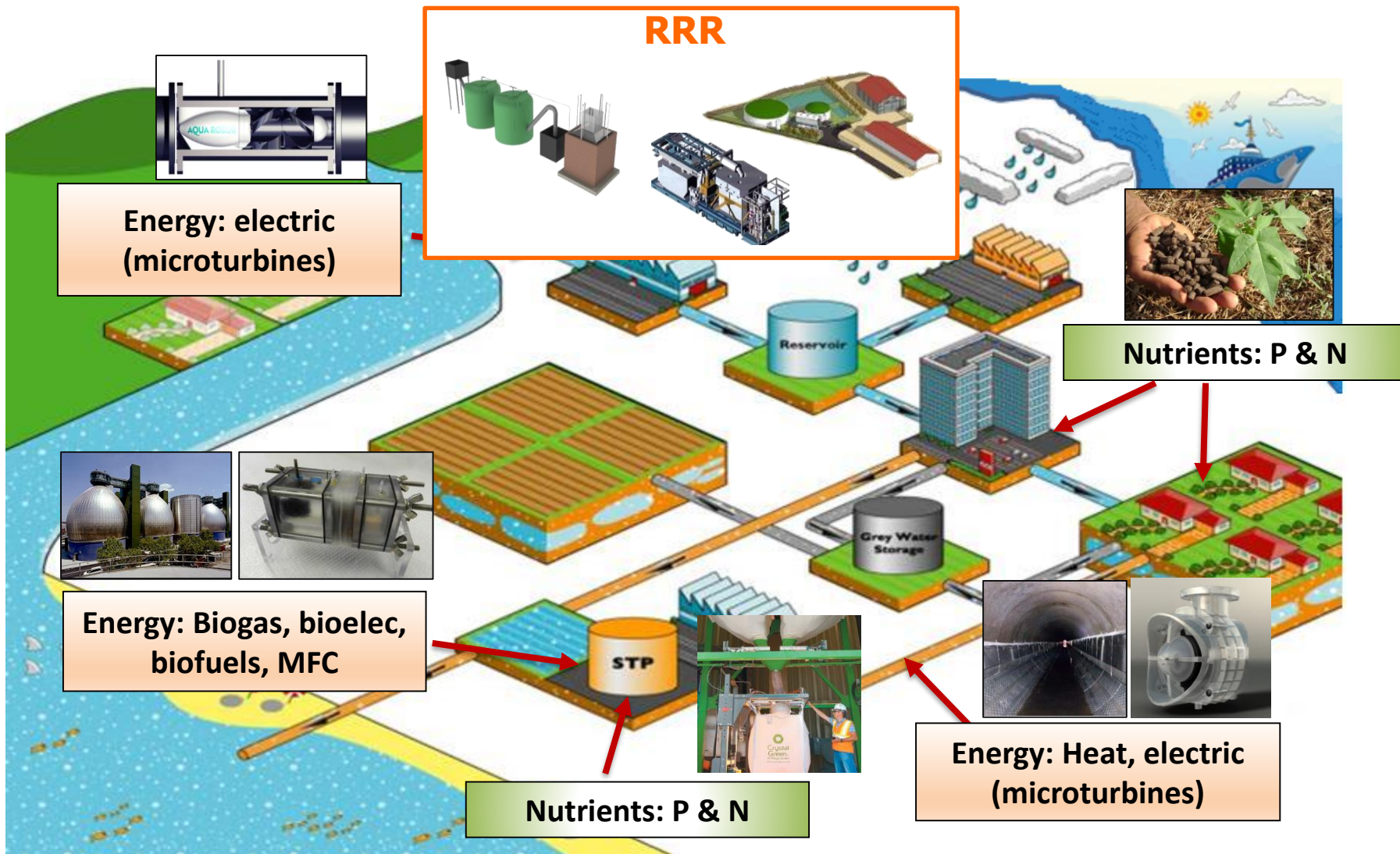




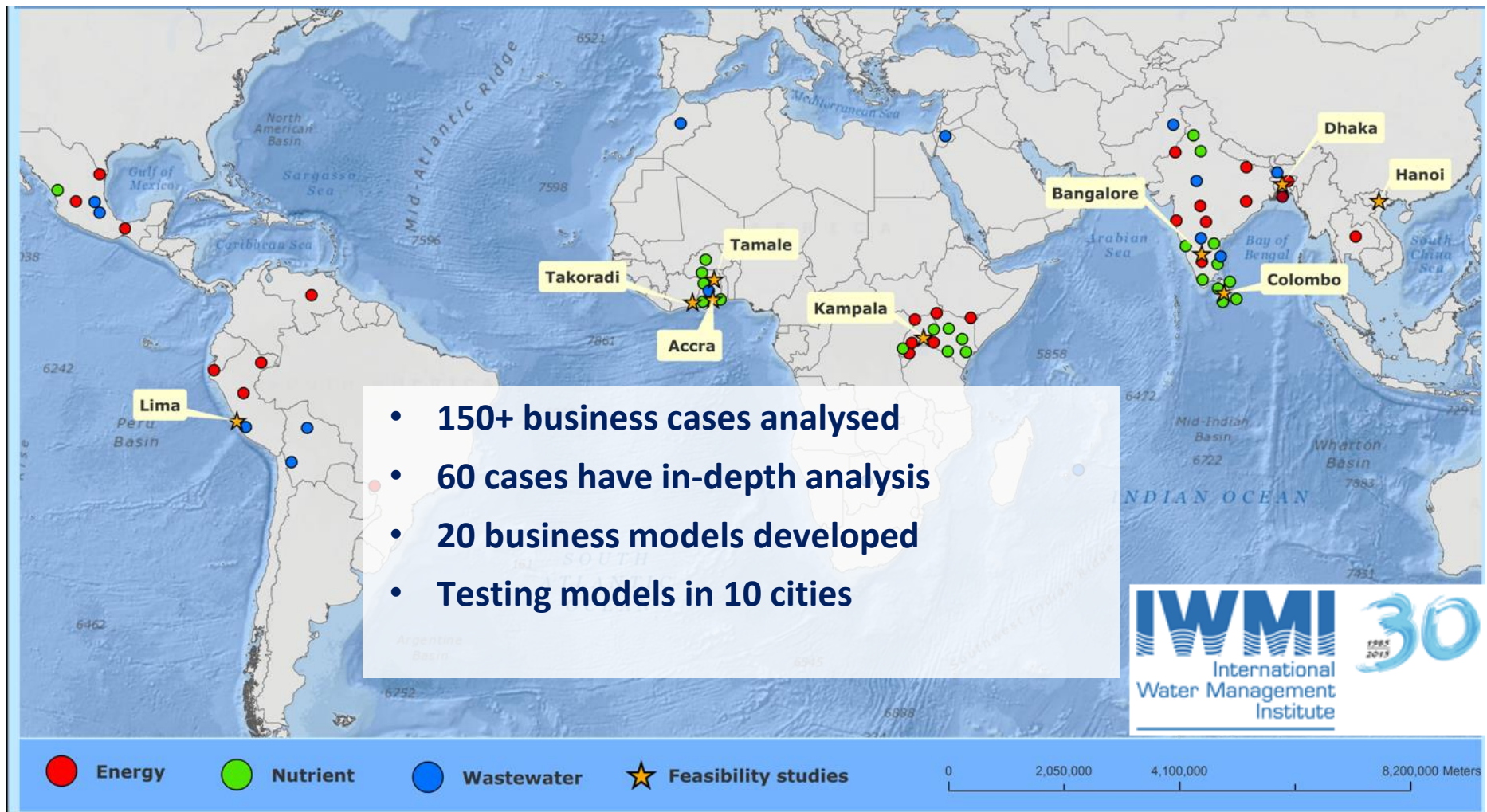
**major change in perspective**

**waste as a resource**

# Changing our perspective creates opportunity to do things differently



# IWMI catalogue of RRR business cases



**earthscan**  
from Routledge



# **RESOURCE RECOVERY FROM WASTE**

Business Models for Energy, Nutrient and  
Water Reuse in Low- and Middle-income Countries

Edited by Miriam Otoo and Pay Drechsel

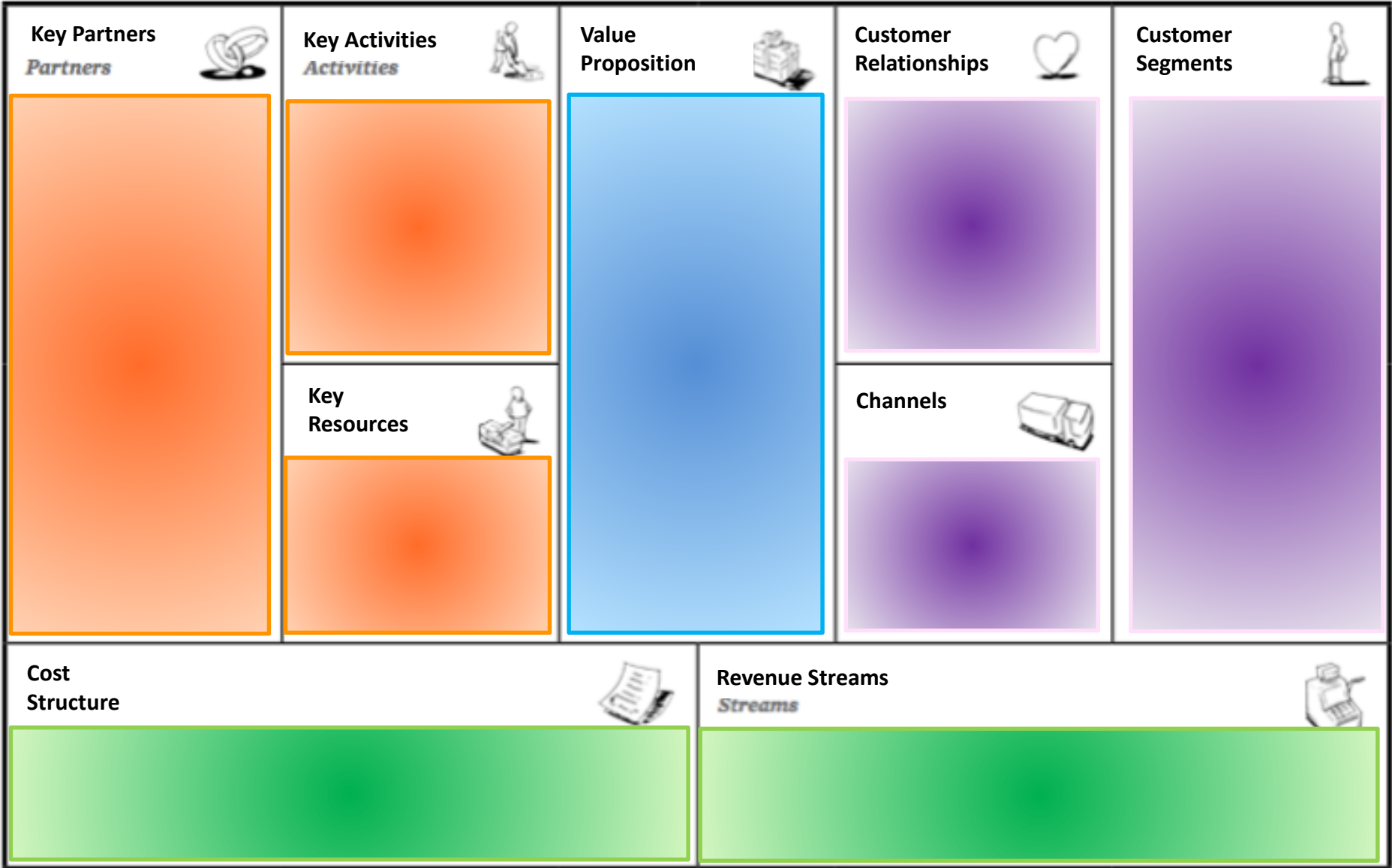
## **BOOK LAUNCH**

**Tues 29 Aug.5.30pm**

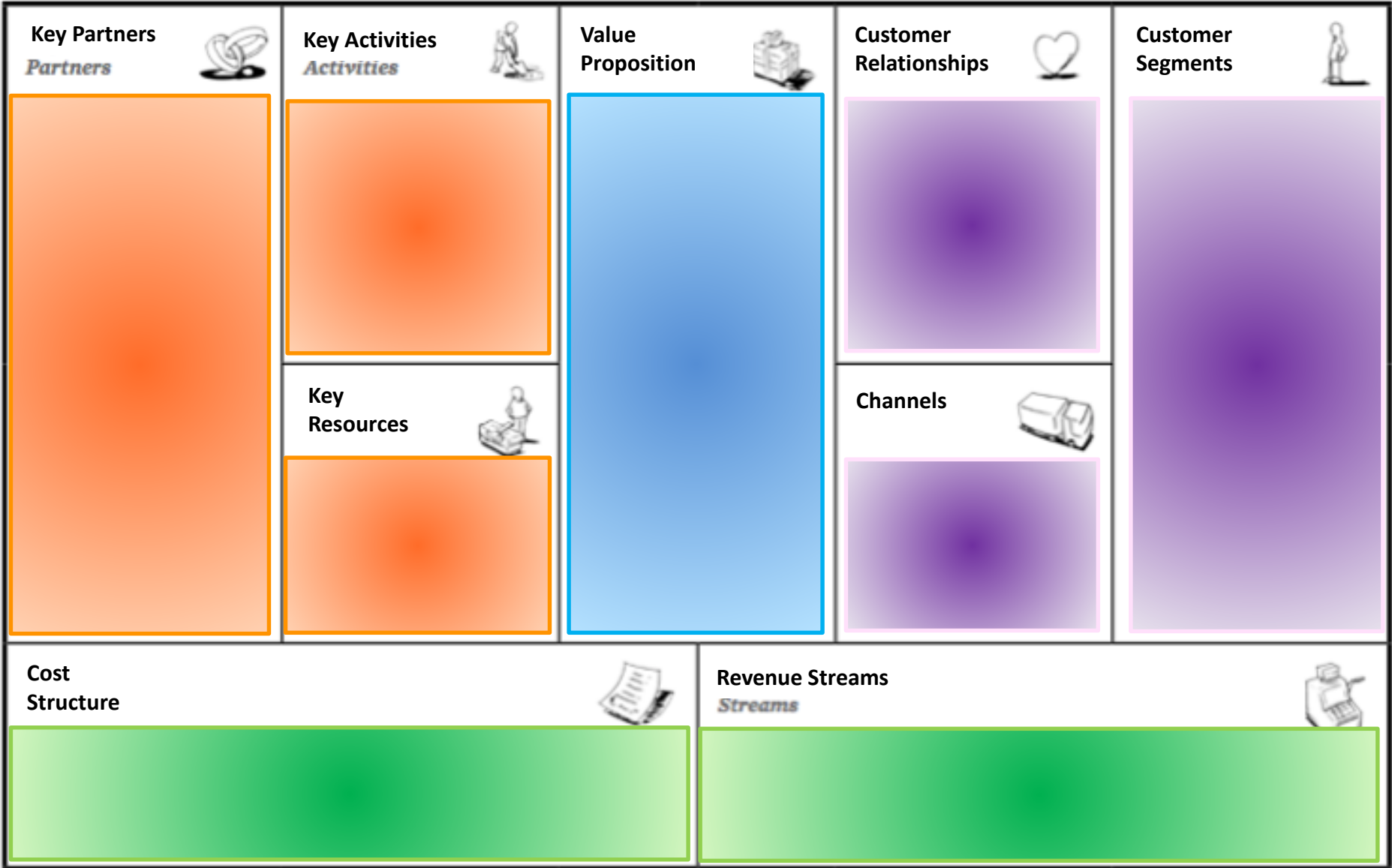
**Location: Booth 45**



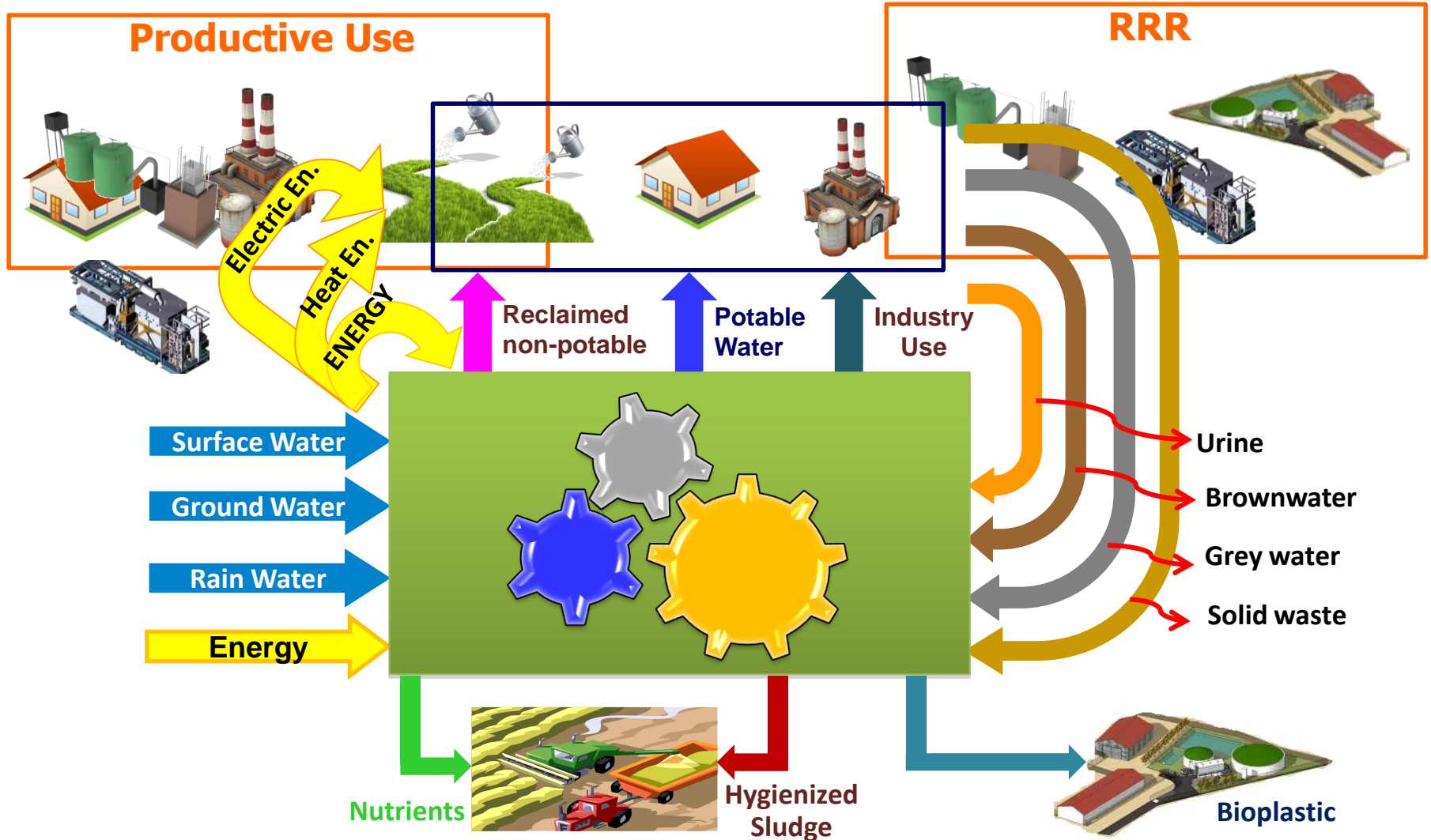
# The Business Model Canvas



# The Business Model Canvas

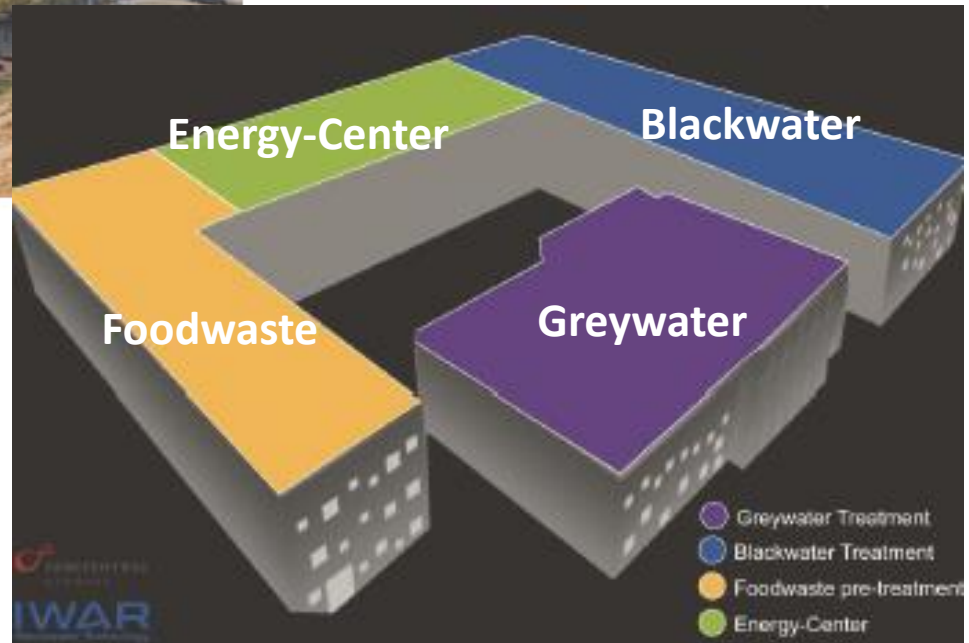


# We're starting to talk about machines and factories



# April 2014: Semizentralized Resource Recovery Center Qingdao Shiyuan

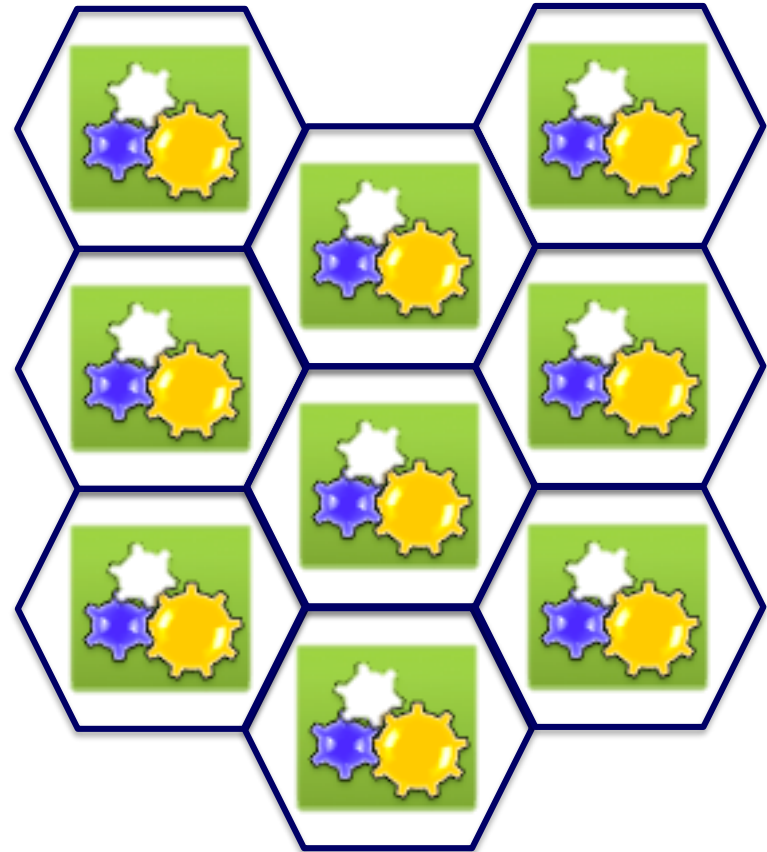
© Cosalux u. Susanna Neunast



# These perspectives lead to a more decentralized type of thinking?

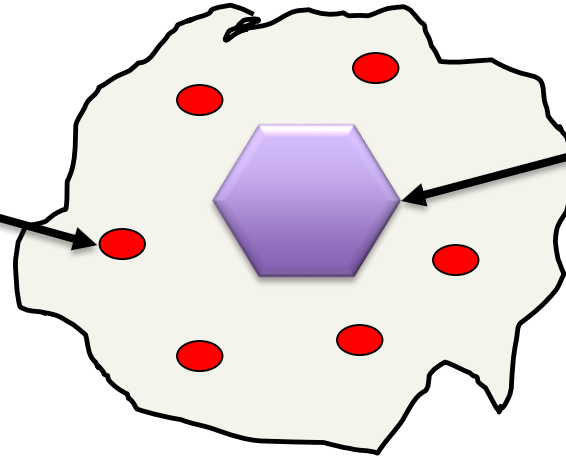
## Decentralization well suited for:

- Energy recovery (heat recovered and used close to source)
- Minimizing energy consumption (for moving water)
- Source separation (to maximize nutrient recovery)
- Adjusted growth (to deal with rapid growing cities)
- Increased resiliency (dampens the propagation of failures)



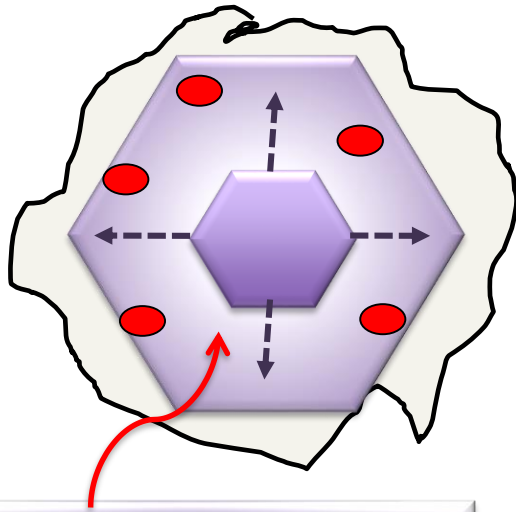
# Look for opportunities to create new paradigms (not extend old ones)

**Outskirts**  
Demand met by  
informal systems

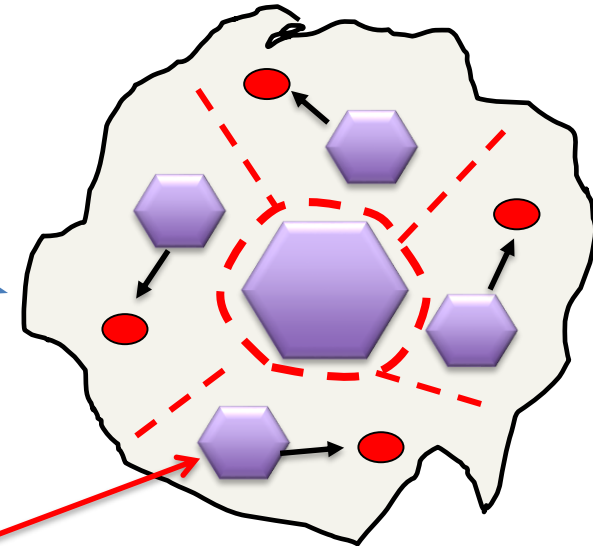


**City Core**  
Formalised water &  
waste system

**Growth**



**Expansion of existing  
system to growing areas**



**Distributed &  
Decentralized**

# Getting of the grid – disruptive

## Dockside Green, BC

2,500 people; Recycling, RWH, waste-to-energy

## Battery Park City NY

10,000 people, Recycling, RWH, CHP

## Siyuan Campus

18,000 students, Recycling, Comsump. down by 50%

## Hammarby Sjöstad

12,000 people, Recycling, waste-to-energy



# Exploring opportunities to do things differently in emerging cities

Quick growing emerging towns



UGANDA

I.C.L.E.I  
Local  
Governments  
for Sustainability

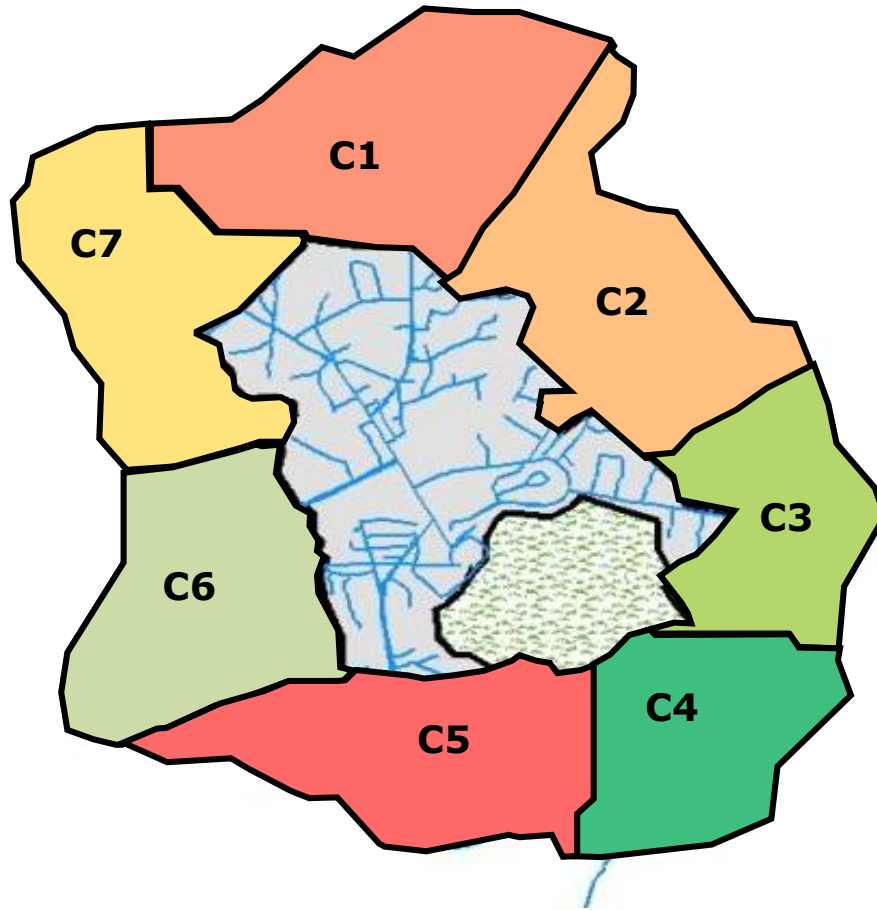


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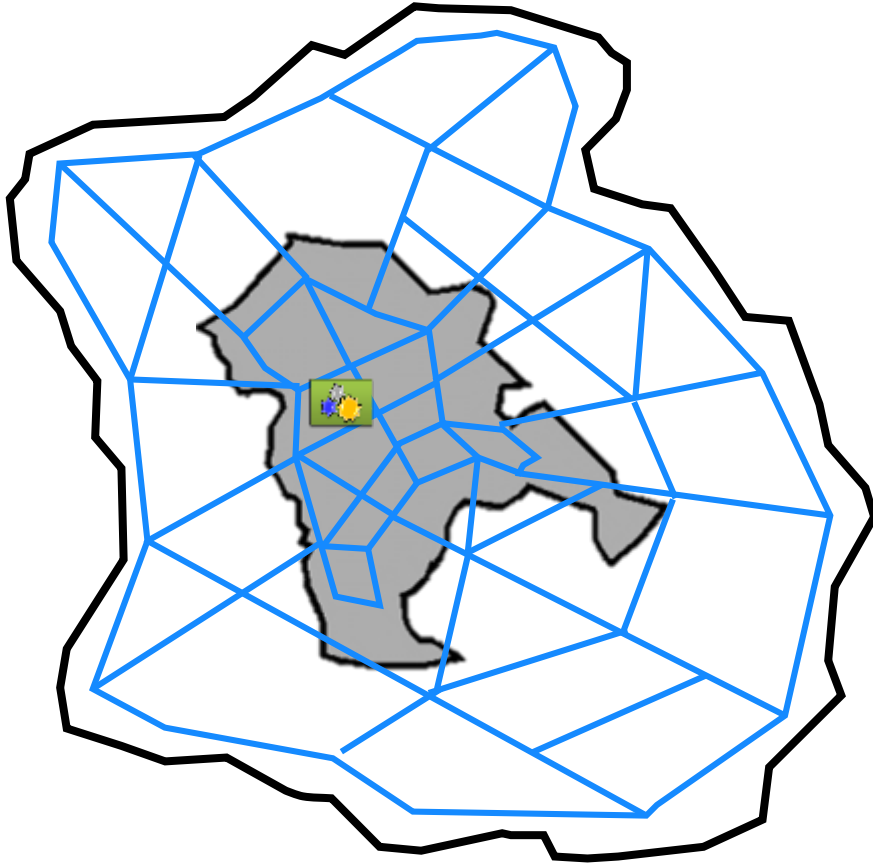




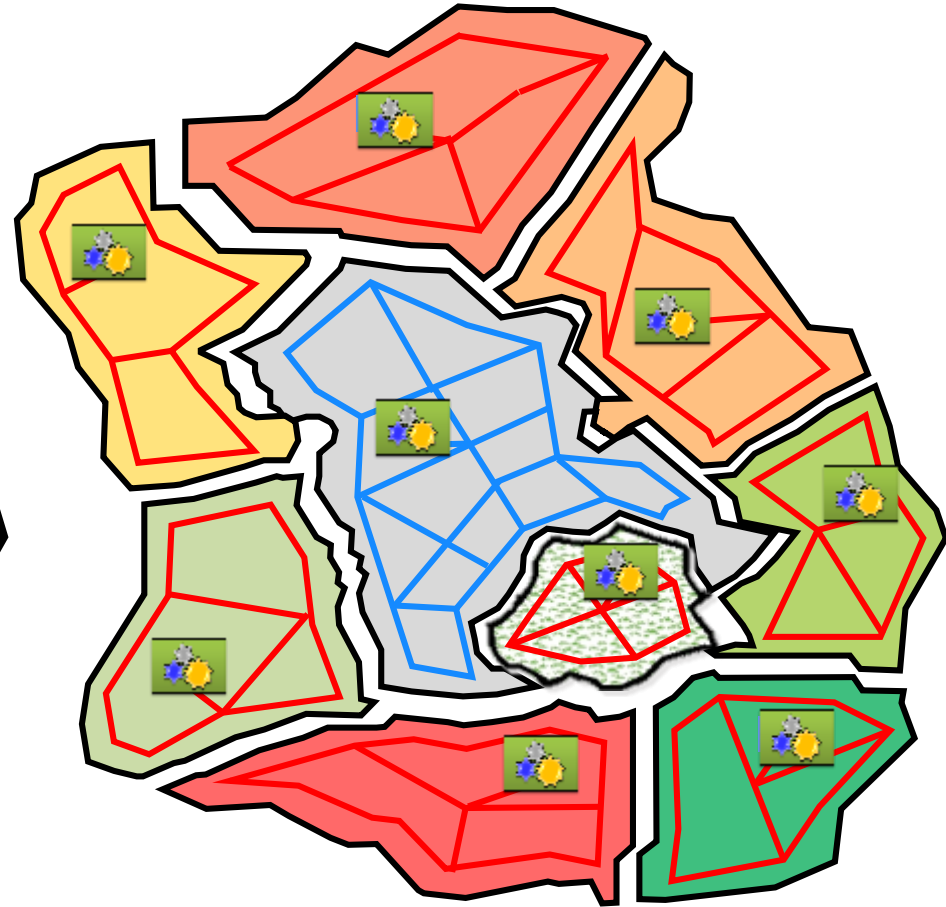
# Look for opportunities to create new paradigms (not extend old ones)



# Semi-centralized is cheaper?

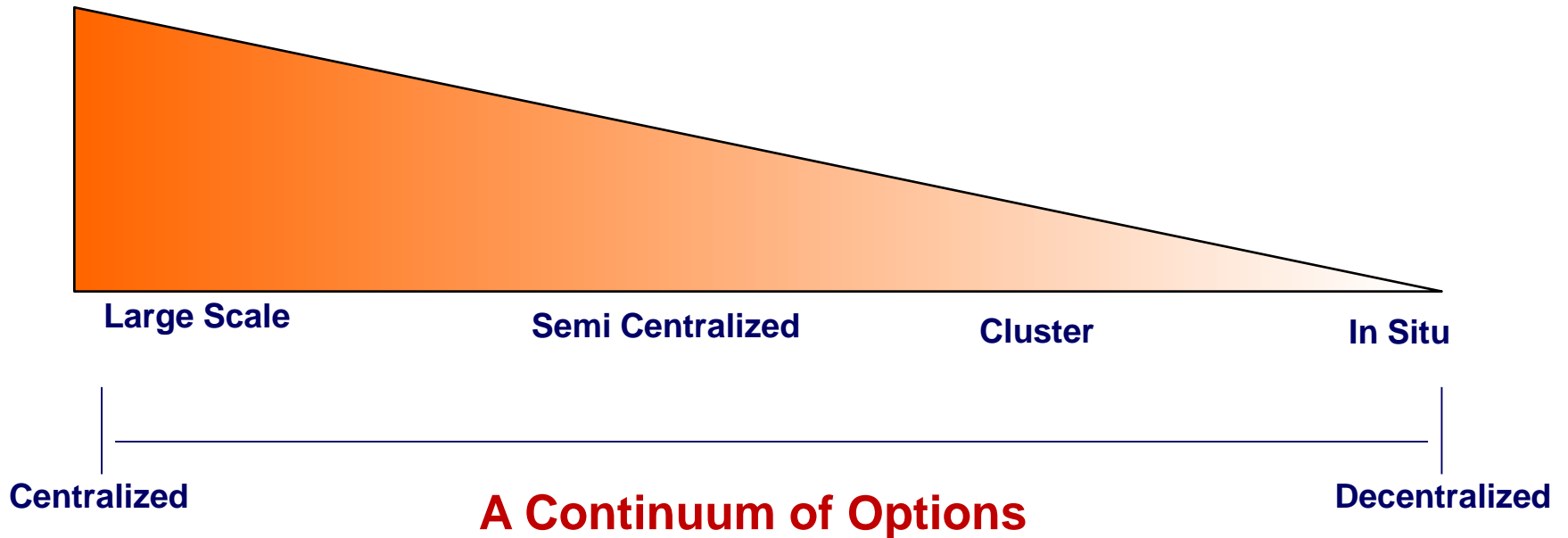


**Average Annual Costs**  
**5,148,000 US\$**



**Average Annual Costs**  
**3,787,000 US\$**

# To centralize or decentralize?



# And that our main challenges are political and institutional in nature

## Political & Institutional Barriers



Need **collaboration, cooperation, and coordination** between institutions

# Choices Before Us

**Stay in Lane**

**Business as Usual**

**Try Harder**

**Spend More for Traditional Sys**

**Paradigm Shift**

**Truly Different Approach**





**Thank You**

**Kalanithy Vairavamoorthy**