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science for global insight

# Sector Coupling: How to Overcome Challenges

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# A nexus framework calls for sector coupling

- Targets that compliment others
- Targets that depend on others
- Targets that impose conditions on others

Eradicate hunger & halt rate of obesity

Increased agriculture productivity

Energy efficiency

Doubling renewables

Water use efficiency

Sustainable use of water resources


Access to water, sanitation and hygiene

Governance, institutions & financing

Universal access to energy

Wastewater, pollution and water quality

Eliminate extreme poverty

# Global challenges are interlinked……. energy poor are often also water poor

**Access to an improved water source**
(% of total population)

**Access to electricity**
(% of total population)

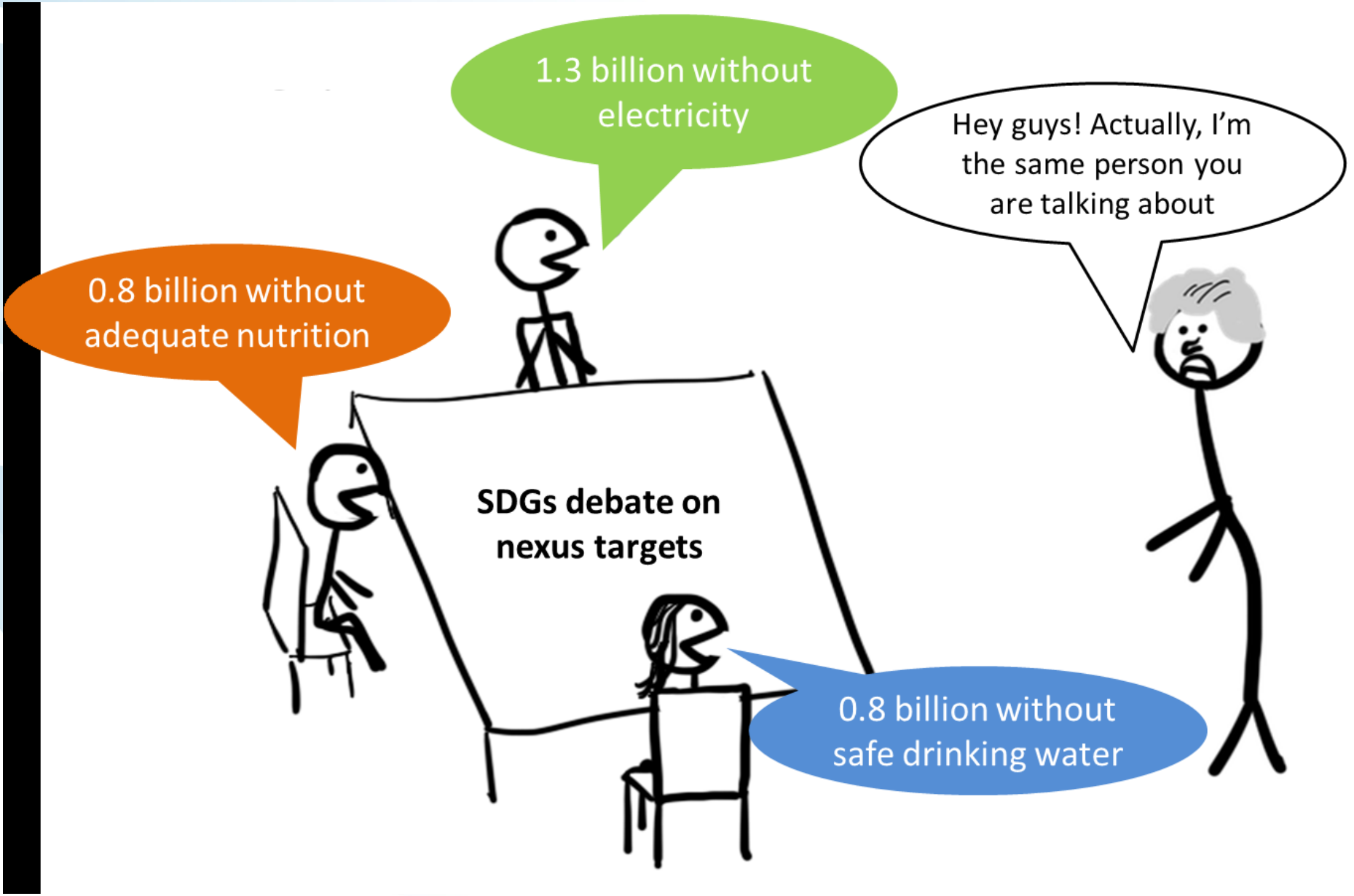
Access to an improved water source vs access to electricity


Improved water source (% of population with access)
39.70 — 100.00

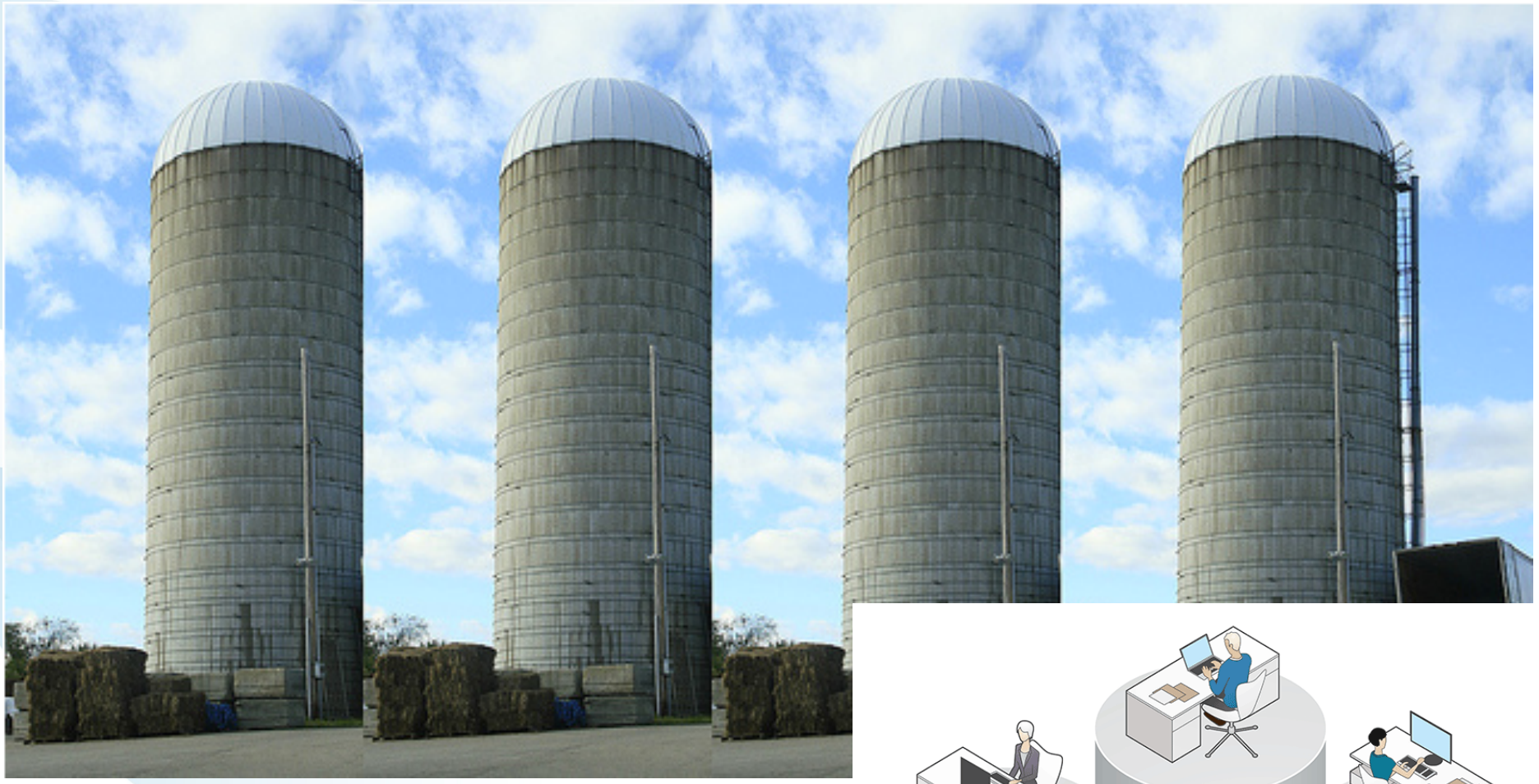

Access to electricity (% of total population)
1.50 — 100.00

Source: World Bank Data. http://bit.ly/improvedwatersource and "Access to Electricity" from http://bit.ly/SE4ALL

# Global challenges are interlinked……. water poor are often also food poor



# Silo mentality is a constraint for sector coupling



# Bring down the silos?????

# Bridge silos facilitates sector coupling

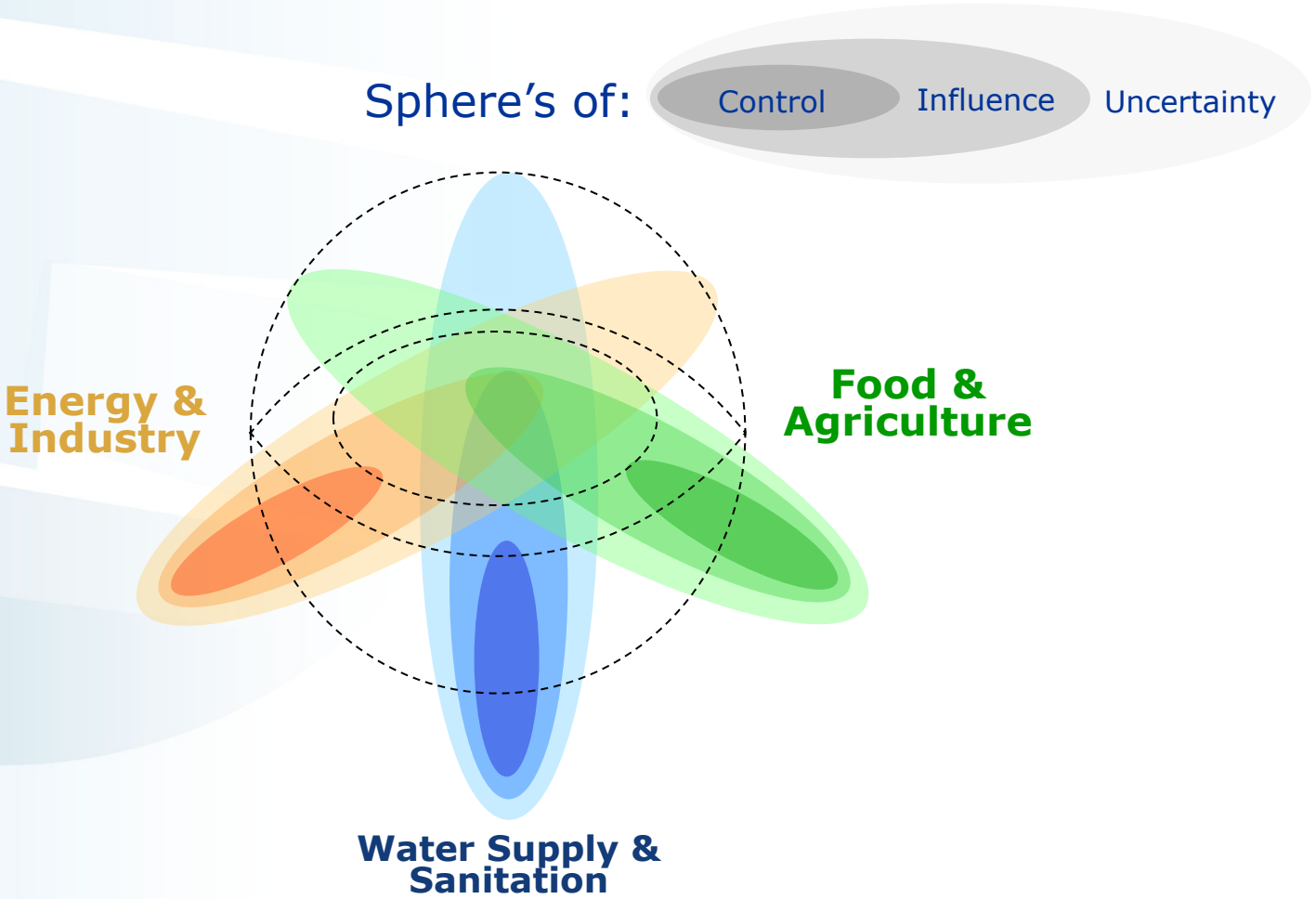

# Seeing the Nexus beyond the links to facilitate sector coupling…….

…..putting more emphasis on the significance of the so-called “nodes”

- Sectors (Energy, Agriculture, Water, Industry)
- Organizations/Institutions (UN entities, Governments, NGOs, Businesses, Civil Society organizations, etc.)

……. the emphasis is not so much on integration but rather on increasing coordination, collaboration and partnerships……

# Sector coupling as a framework for solutions to emerge




…….exploring **shared uncertainties**, searching for **synergy** and gaining **insight** into plans within others' sphere of control……

# Approaches to enhancing policy coherence

1. **Exploring win-win (synergistic) policies**
   - Pursuing multiple policy objectives at the same time

**Example:** increasing water and energy efficiency, e.g. reducing on water leakages in the distribution system and improving on non-revenue water.

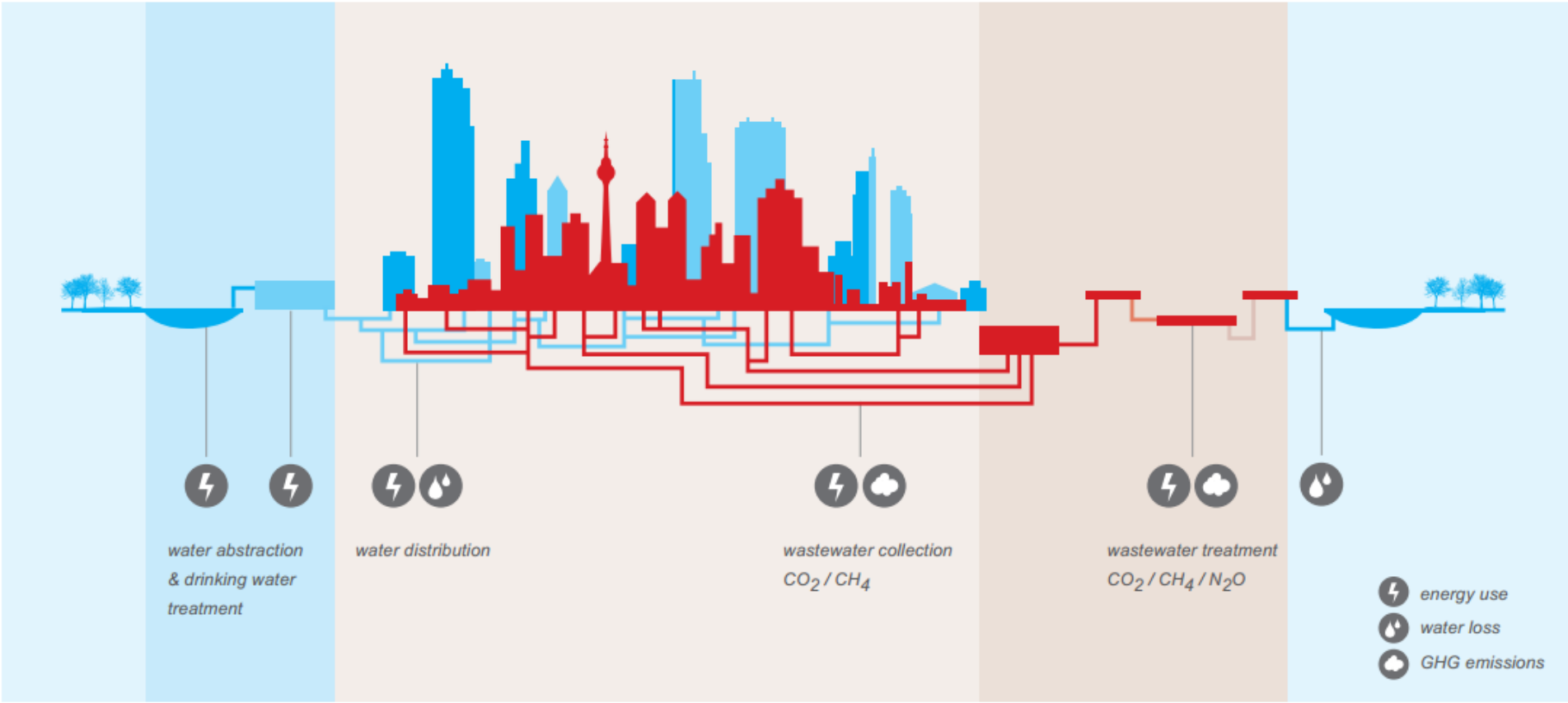
2. **Avoiding conflicts**
   - Pursuing policy objectives that do not undermine others

**Example:** use of waste heat from thermoelectric power plants to desalinate sea water and produce drinking water.

3. **Managing trade-offs**
   - Minimizing negative impact of one policy on other policies

**Example:** recycling wastewater effluent from WTPs to reduce negative impact on freshwater ecosystems.

# Energy is required at all stages to produce drinking water……from abstraction, treatment and distribution of drinking water to collection of raw sewage, transport, treatment and discharge of treated effluents




**Surface water-based systems:** pumping for distribution of treated water dominates energy use (70-80% or more); **Groundwater-based systems** are generally more energy intensive (30% more); Seawater desalination **US$1/m$^3$**; brackish water **US$0.60/m$^3$**; freshwater chlorination **US$0.02/m$^3$**

# Investments on energy efficiency and effective operations can produce economic, environmental, social and other benefits…….

Multiple benefits

Updating technologies with more energy efficient systems is important to reduce costs

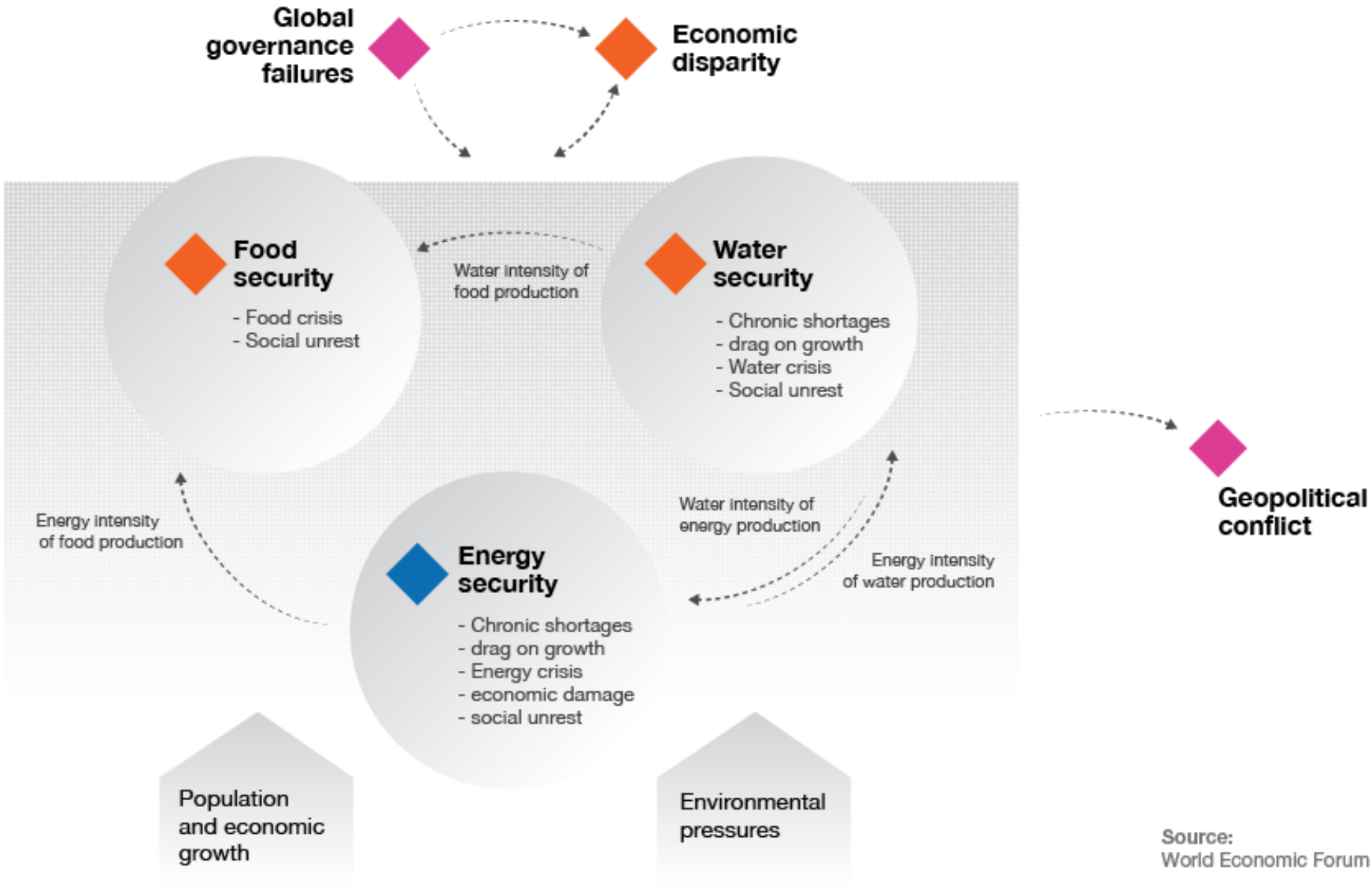

……also to mitigate GHG emissions and critical air pollutants such as $CH_4$ & $CO_2$

Utilities can recover funds for expanding services to unserved or poorly served areas

## ……if well planned, energy efficiency investments can be extremely cost effective with short pay-back times of only a few years

| Intervention | Energy savings /year | Water savings /year | Total cost savings /year | Other associated benefits | Payback period |
|---|---|---|---|---|---|
| **South Africa** | | | | | |
| Pressure management | 14M kWh | 8,000M$^3$ | 3.8M $US | 30 % reduction in water loss | 3 months |
| Prepaid metering, Behavior change | 15.4M kWh | 6,000M$^3$ | 3.5M $US | 10-95 % payment rate increment | < 3yearrs |
| **India** | | | | | |
| Energy Audits | 3.8M kWh | | 336,000 $US | 10 % more supply no additional capacity | < 1 year |
| **Brazil** | | | | | |
| Maximizing existing pump systems efficiency, storage | 88M kWh | | 2.5M $US with an Investment of $1.1M | 88,000 new connections over the original baseline | 4 years |

**Source:** Watergy, 2007 **(The Alliance to Save Energy)**

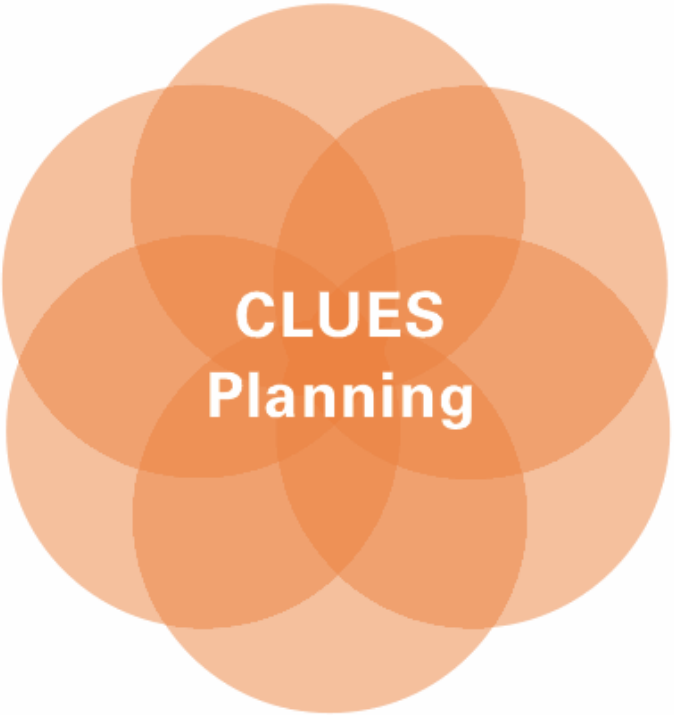



Source:
World Economic Forum


Government Support

Socio-cultural Acceptance

Legal and Regulatory Framework

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