

# Sustainable Cities & the Circular Economy

## ENVIRONMENTAL SUSTAINABILITY IN URBAN CENTERS

Robert Horninge

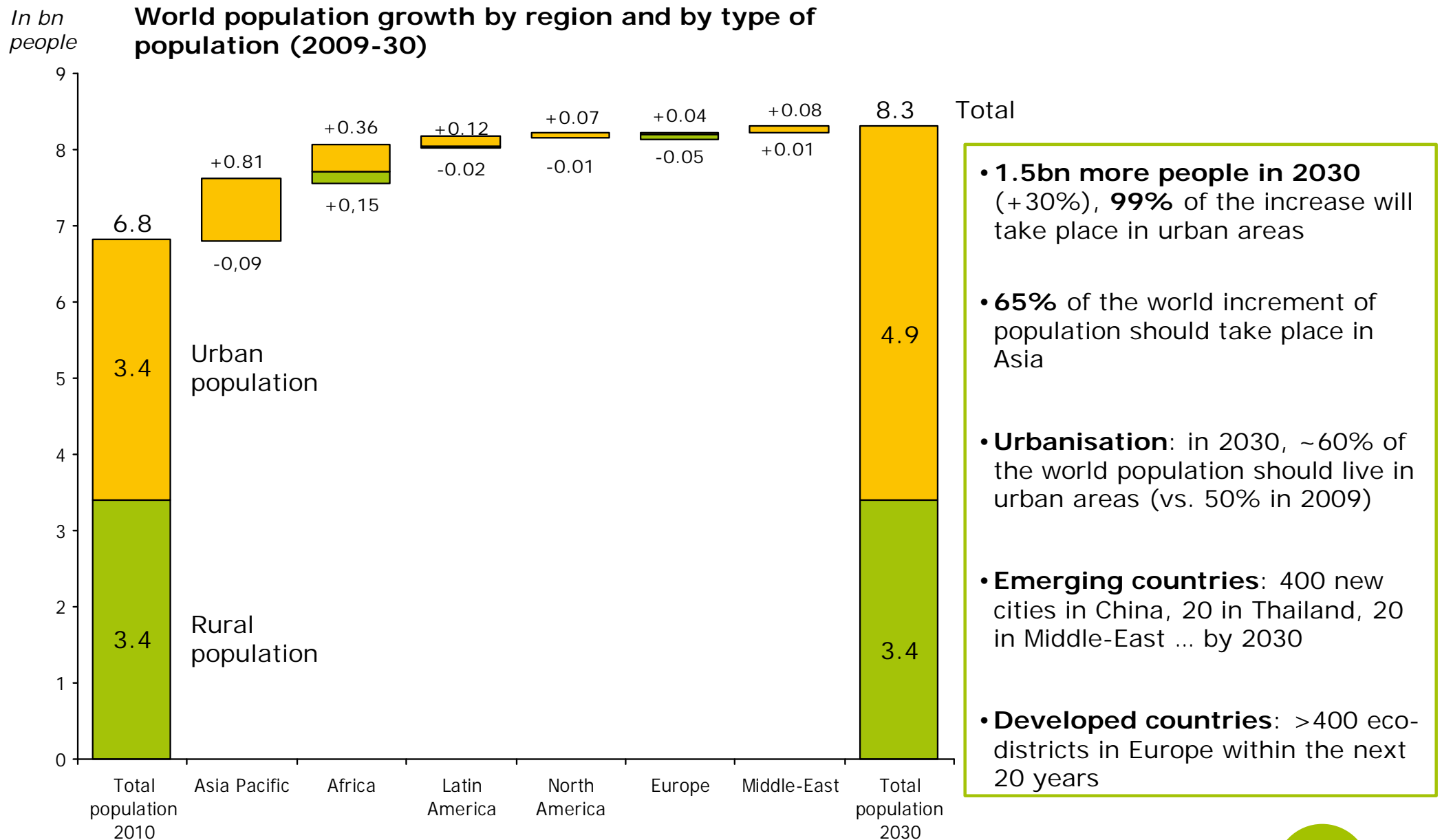


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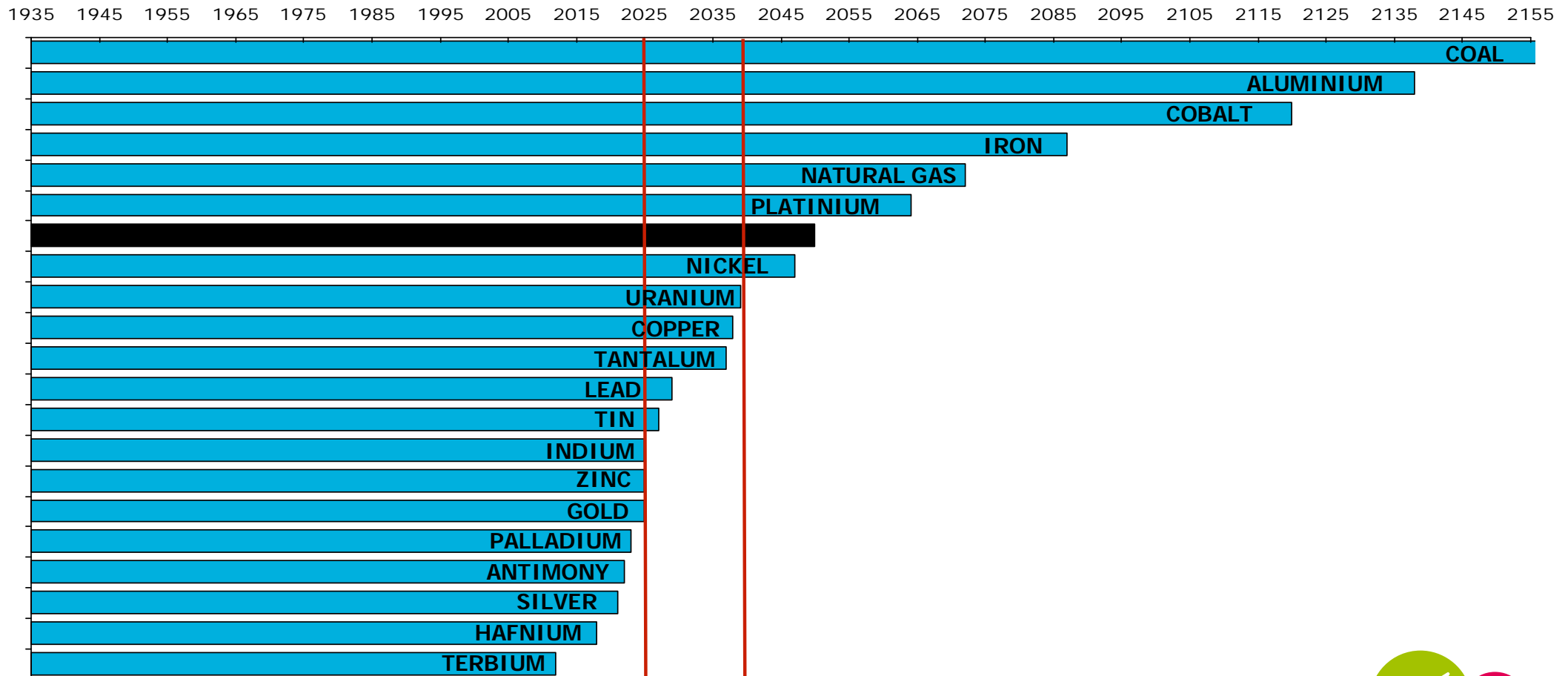
- Key drivers to changes in urban sustainability
- The Circular Economy
- Examples of Initiatives

# A rapid, mostly urban population growth ...

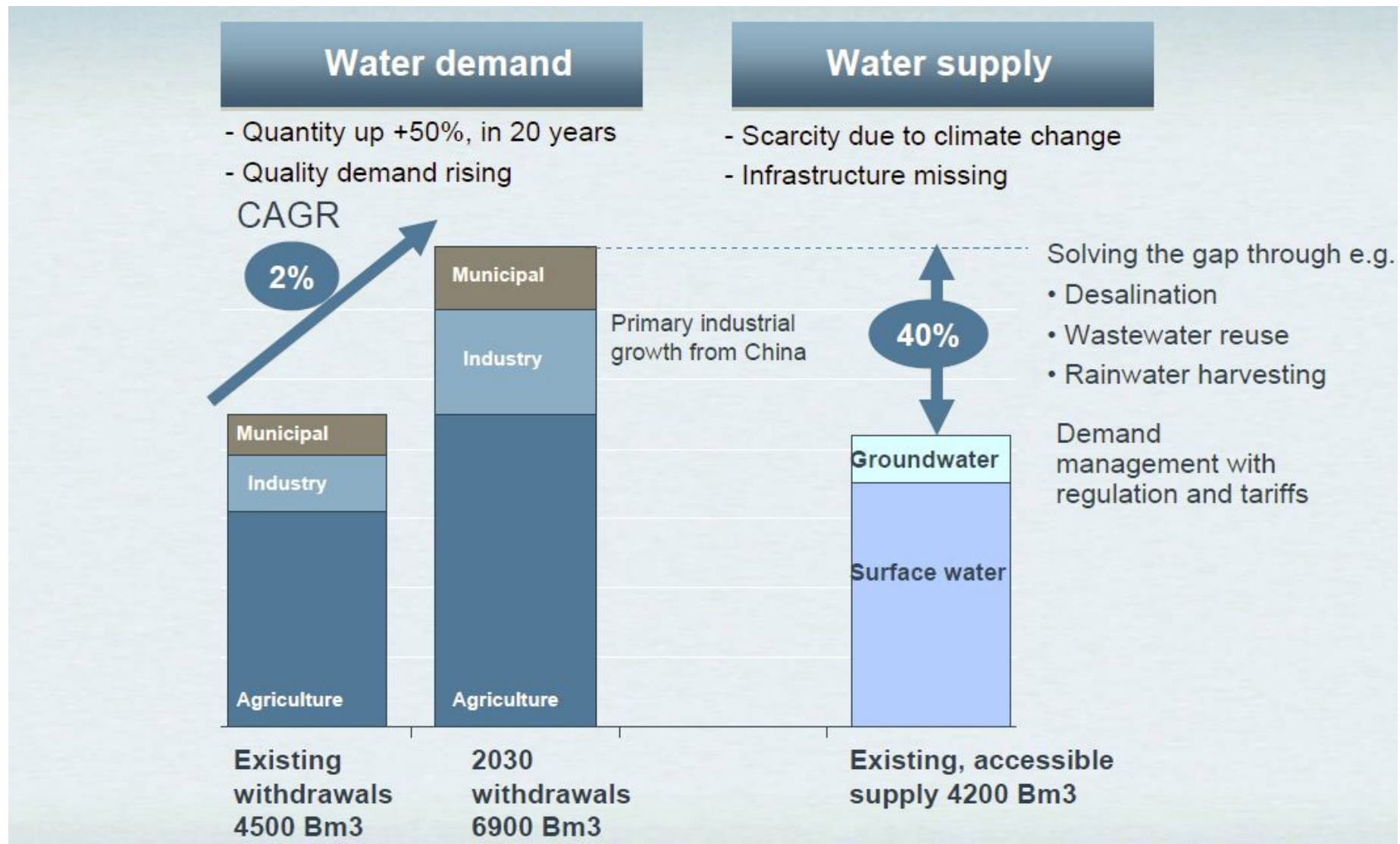


# Raw materials scarcity and increased need for resources savings

Timeline of planet's exploitable resources depletion,  
based on current consumption rate

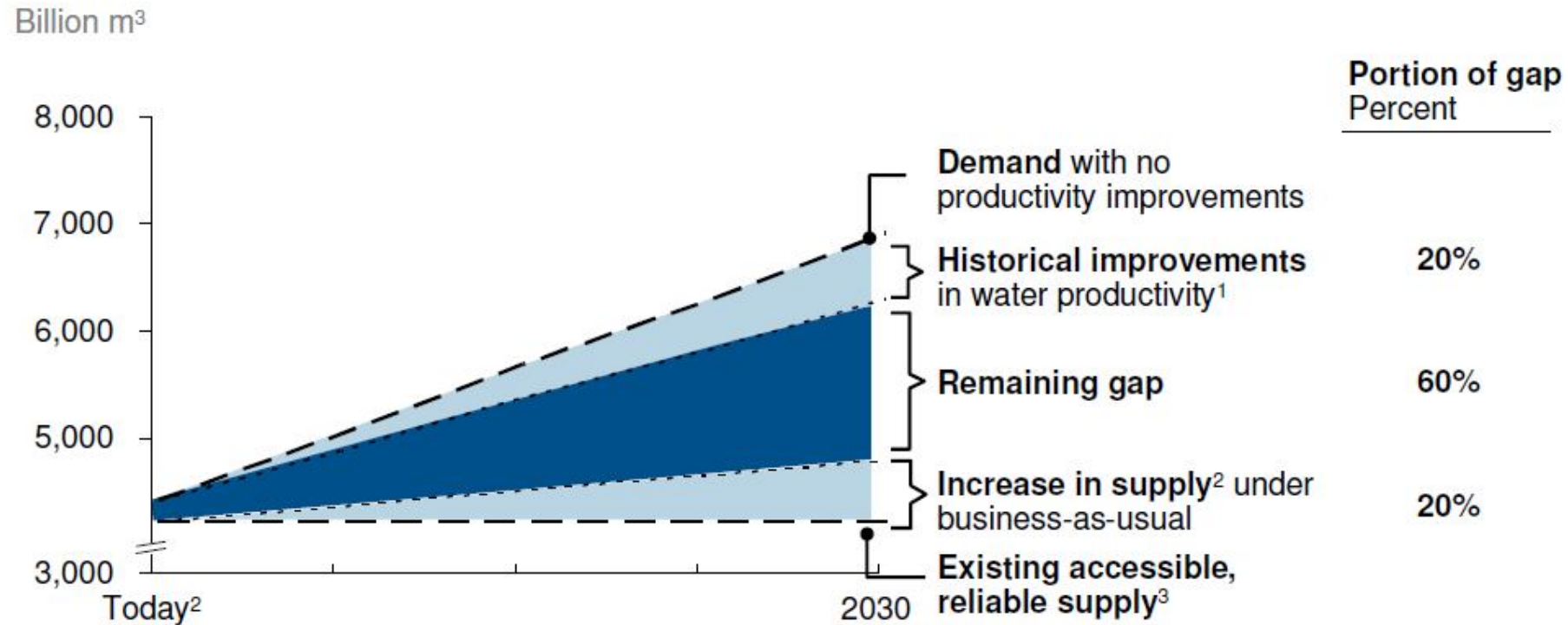


# Projected scarcity of water resources



Source: Charting Our Water Future by 2030 water Resources Group, 2009. Adapted from Water 2030: Global Water Supply and Demand model; agricultural production based on IFPRI IMPACT-WATER base case

# Business as usual approaches will not meet demand for raw water



<sup>1</sup> Based on historical agricultural yield growth rates from 1990-2004 from FAOSTAT, agricultural and industrial efficiency improvements from IFPRI

<sup>2</sup> Total increased capture of raw water through infrastructure buildout, excluding unsustainable extraction

<sup>3</sup> Supply shown at 90% reliability and includes infrastructure investments scheduled and funded through 2010. Current 90%-reliable supply does not meet average demand

SOURCE: 2030 Water Resources Group – Global Water Supply and Demand model; IFPRI; FAOSTAT

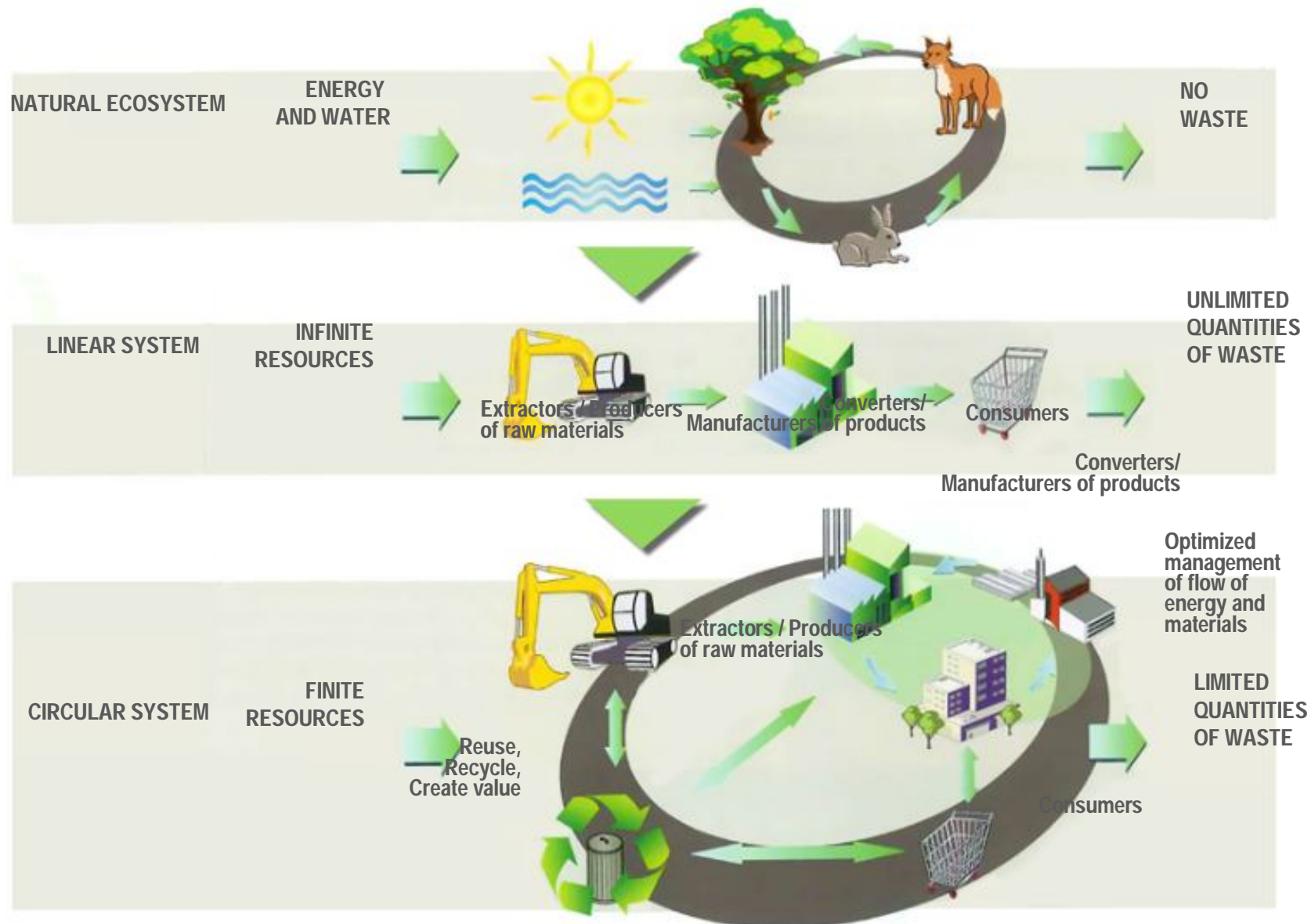


CIRCULAR ECONOMY



# Evolution of the Circular Economy

**Circular economy is about sustainable production and consumption**





# The Circular Economy – Key Points

- Balances:
  - **Economic development** with
  - **Environmental** and **Resources Protection**.
- Emphasis on:
  - Most efficient use and recycling of **resources**, and
  - **environmental protection**.
- Features:
  - **Low** consumption of energy,
  - **low** emission of pollutants and
  - **high** efficiency.
- Replaces: conventional 'linear economics'

# Key Areas for the development of sustainable cities

- Environmental Resources
  - Air
  - Water
  - Waste
- Energy
- Mobility
- Economic competitiveness
- Production
- Social Cohesion
- Governance
- Availability of other natural resources





# EXAMPLES OF INITIATIVES WITH WATER

# Some Practical Examples of Current Initiatives in the Water Sector

- Reduce Demand
- Reduce Water losses
- Securing new Water Sources
- Energy Recovery
- Reuse

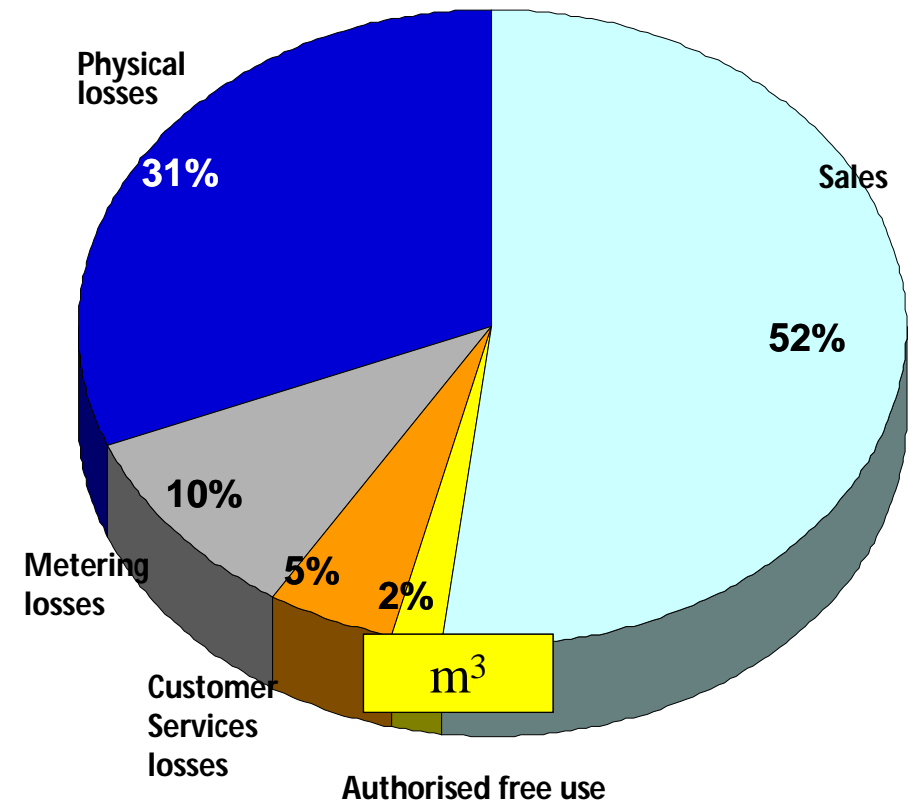
# Real time Information Systems on Resource Consumption.

- Engage with the end user (local citizens).
- Provide real time information on consumption through remote meter reading
- Give people the opportunity to be pro active - Reduce Demand
- Already installed for part of Paris and in Villeneuve Loubet
- Advantages for both the individual and for urban communities



## Water Losses within an urban network

- **Lost Water balance**
- **representation of the water balance by a circle;**
- Actions carried out simultaneously :
- **to deal with losses from the various components of network efficiency**
  - Reduction of the physical losses
  - Reduction of the commercial losses



## Reduce leaks by Installing Permanent Pre-Location system

- Hundreds of acoustic detection devices are distributed across the water network.
- The noise caused by the leak is detected by the sensors.
- Data is transmitted in real time using text messaging to a data analysis system.
- Rapid reaction as soon as a leak is detected.
- Installed in the Dijon network in France.
- In 2007, the city managed to save 1.2 million cubic meters of water as a result of this initiative.
- Today this system is also used in 5 other cities in France.





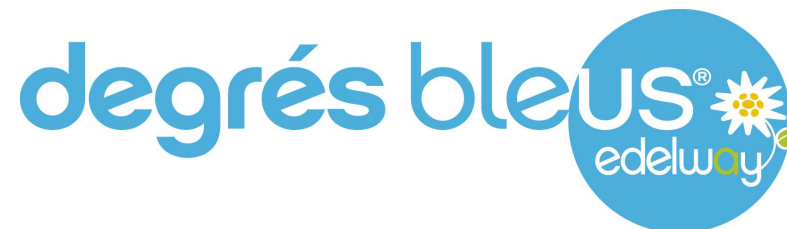
## Securing a New Water Source: Desalination

- 40% of the population lives less than 100 kilometres from the sea.
- Out of 70 cities >1 million people with no access to additional fresh water, 42 are located on a coast.
- Desalination of sea water can provide a suitable alternative source of drinking water.
- The technology is becoming more efficient and viable.
- For a long time, this process was used only in the Gulf countries, but it is now expanding rapidly in countries facing repeated droughts like Australia and Spain



## Energy Saving – Heat Recovering

Recovering heat from wastewater to reduce GHG emissions



**Up to 60 % reduction  
in consumption of non-  
renewable energies**

**Up to 70 % reduction of GHG  
emissions compared to a  
traditional thermal system**

## Custom made recycled water

- A new concept developed for integrated resource management: production of custom-made recycled water for various reuse purposes.
- **Edward C. Little Water Recycling Facility (ELWRF) in El Segundo, California**
  - One of the largest water recycling facilities in the world
  - The only facility in the United States producing **5 distinct types** of recycled water
- Production of over 240,000 m<sup>3</sup>/d of high quality recycled water
- **Various reuse purposes, including:**
  - landscape irrigation,
  - industrial use and
  - aquifer recharge.
- **The key to success:**
  - implementation of advanced technologies
  - A spirit of technical innovation



## Sludge reuse for Agriculture purpose – Noosa WWTP

- First private sector developed urban sewage plant in Australia
- Leading edge plant, using environmentally advanced methods of treatment, that is chemical-free and benchmarked at world's best.
- Sludge Treatment steps:
  - Aerobic digestion
  - Sludge dewatering
- The dewatered sludge is transported 350km away for agricultural reuse:
  - Soil conditioner for Wheat growing
  - Soil conditioner for cotton growing
- Average daily production: 36 Tonnes



# WASTE SECTOR

# The circular economy in the waste sector

- Change our perspective of waste - treat waste as a resource.
- In the circular economy model, it is treated to become a secondary resource.
- Waste has to be treated so that it can either be:
  - products recycled and used as a resource in the manufacture of new
  - returned to the economic cycle in the form of recovered energy.
- the circular economy can only operate effectively if markets can be found for the created products.
- Maintaining the product quality is vital.





# CONCLUSIONS

- Projection of Significant Urban Population Growth by 2030
- Mostly in the Asia Pacific Region
- Urgent need for Sustainable Resource Management
- Focus on the Circular Economy as a solution – someone's waste is another person's feedstock
- There are significant initiatives currently underway
- More focus is required to solve the sustainability challenges of future cities





# ABOUT GDF SUEZ & SUEZ ENVIRONNEMENT

# GDF SUEZ, A major industrial player in the energy, water and waste sectors

The logo for GDF SUEZ, featuring the company name in a bold, sans-serif font. A horizontal teal gradient bar is positioned directly beneath the text.

- € 84.4 billion in 2010 revenues
- N°1 utility worldwide in Forbes' ranking
- N°1 in independant power generation in the world
- N°1 supplier to cities and businesses across Europe in Energy Services
- 214,000 employees throughout the world
- 1,200 researchers and experts in 9 R&D centres



- N°2 in Environmental Services in the world
- € 13.8 billion revenues in 2010
- 78 000 employees throughout the world



Thank you...





## SUSTAINABLE CITIES - DEVELOPMENT CHALLENGES