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Energy Management in the Sanitation sector
A case study of Sewage Treatment in Brazil

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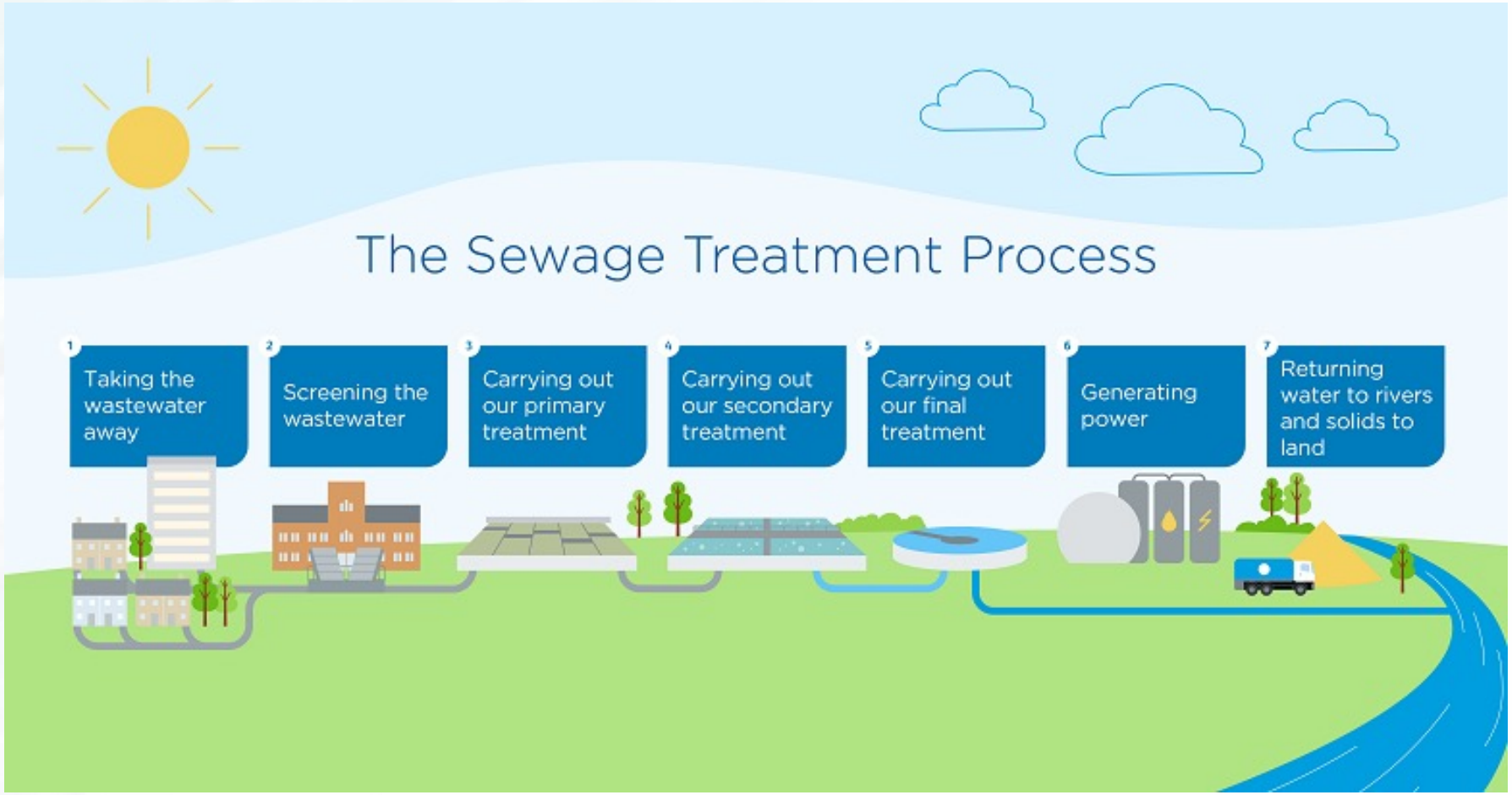
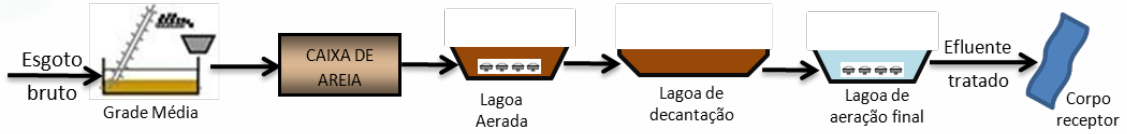
Sabesp in numbers

- Founded in 1973 – State of São Paulo
- Largest sanitation company in Americas
- Water supply and sewage collection and treatment in 365 municipalities
- Attending around 30million people
- 235 treatment plants and 539 sewage treatment plants
- 72.000 km water distribution network and 50.000 km sewers
- 8.500.000 water connections and 7.000.000 sewer connnections

Sewage Treatment Process



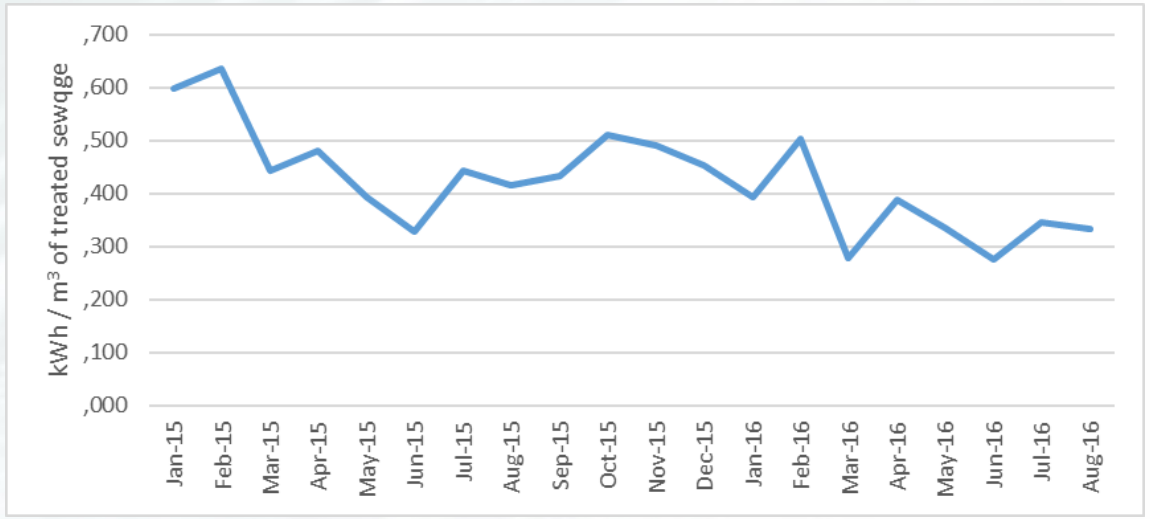
Aruja Case Study

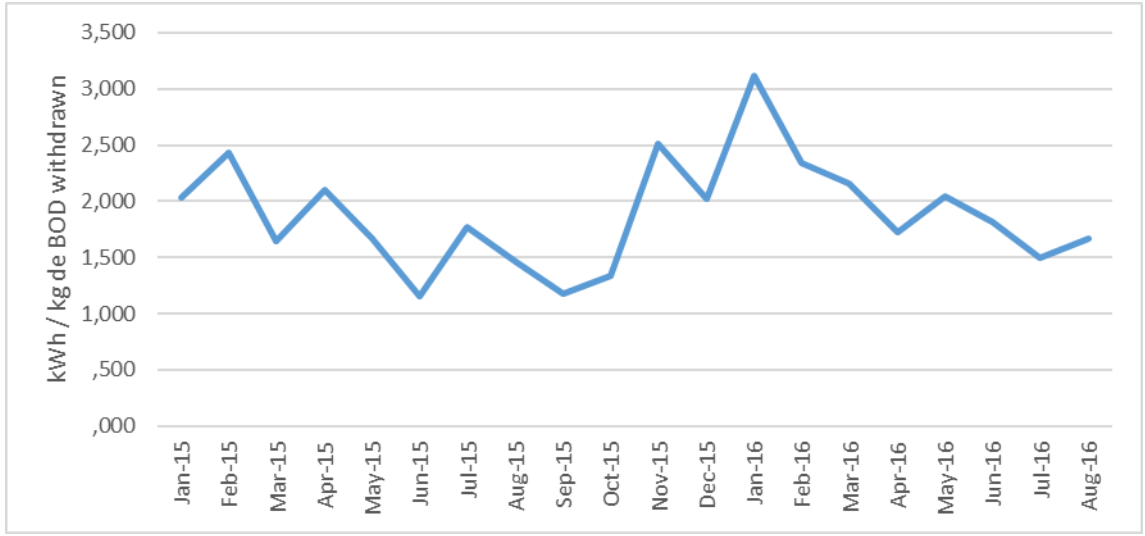


Power Consumption at Aruja

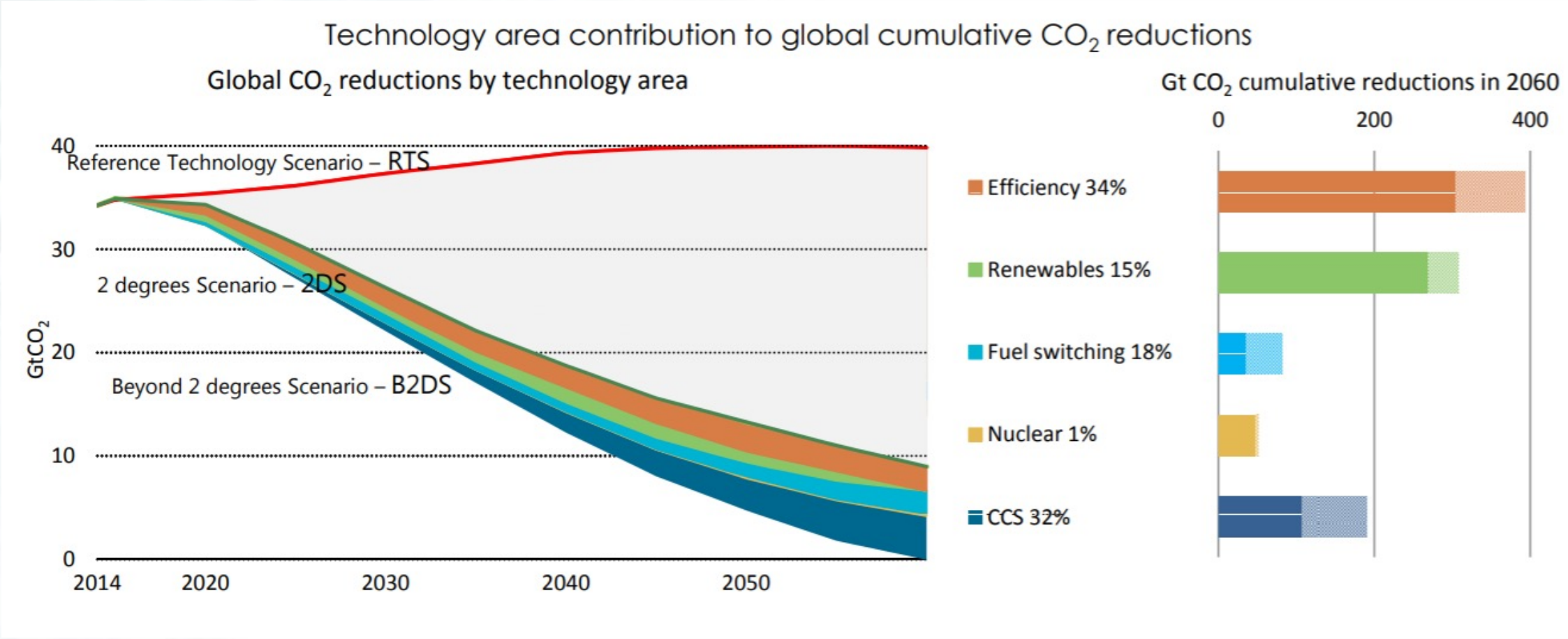
- Mechanized grating
  - 2 motors 0,55 kW (10 years old)
- Sandbox scrapers
  - 2 motors 0,37 kW (1 year old)
- Sand conveyor
  - 1 engine power equivalent 1.1 kW (1 year old)
- Aerators
  - 7 engines power equivalent 14,71 kW each (average 3 years old)

Power Consumption at Aruja



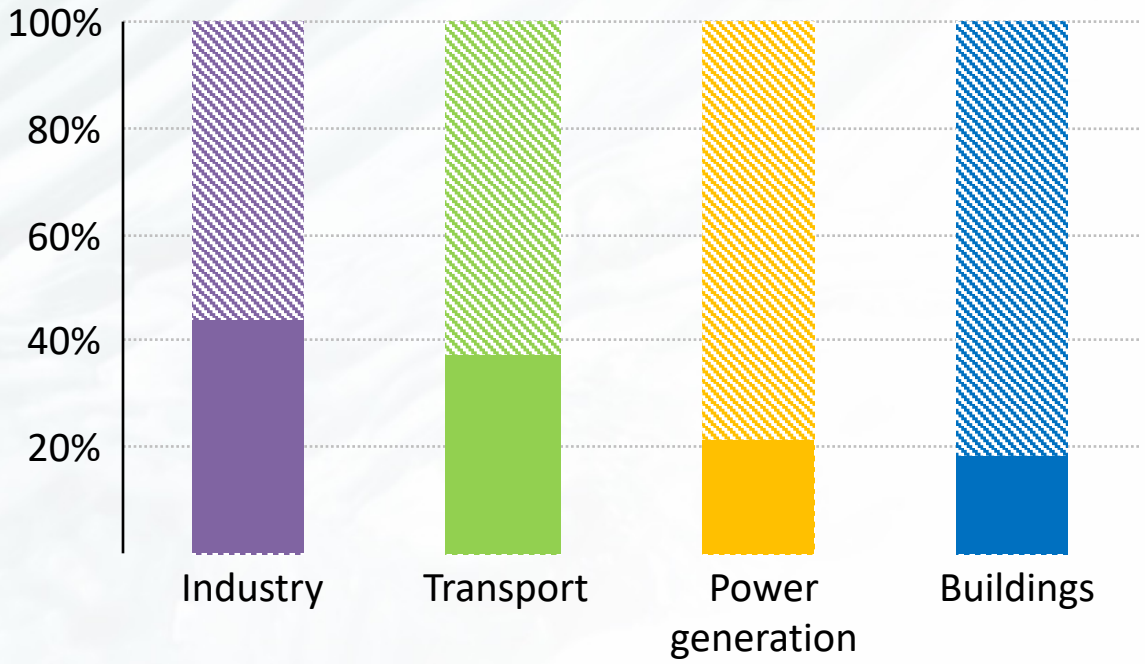


What needs to be done



IEA Energy Technology Perspectives 2017

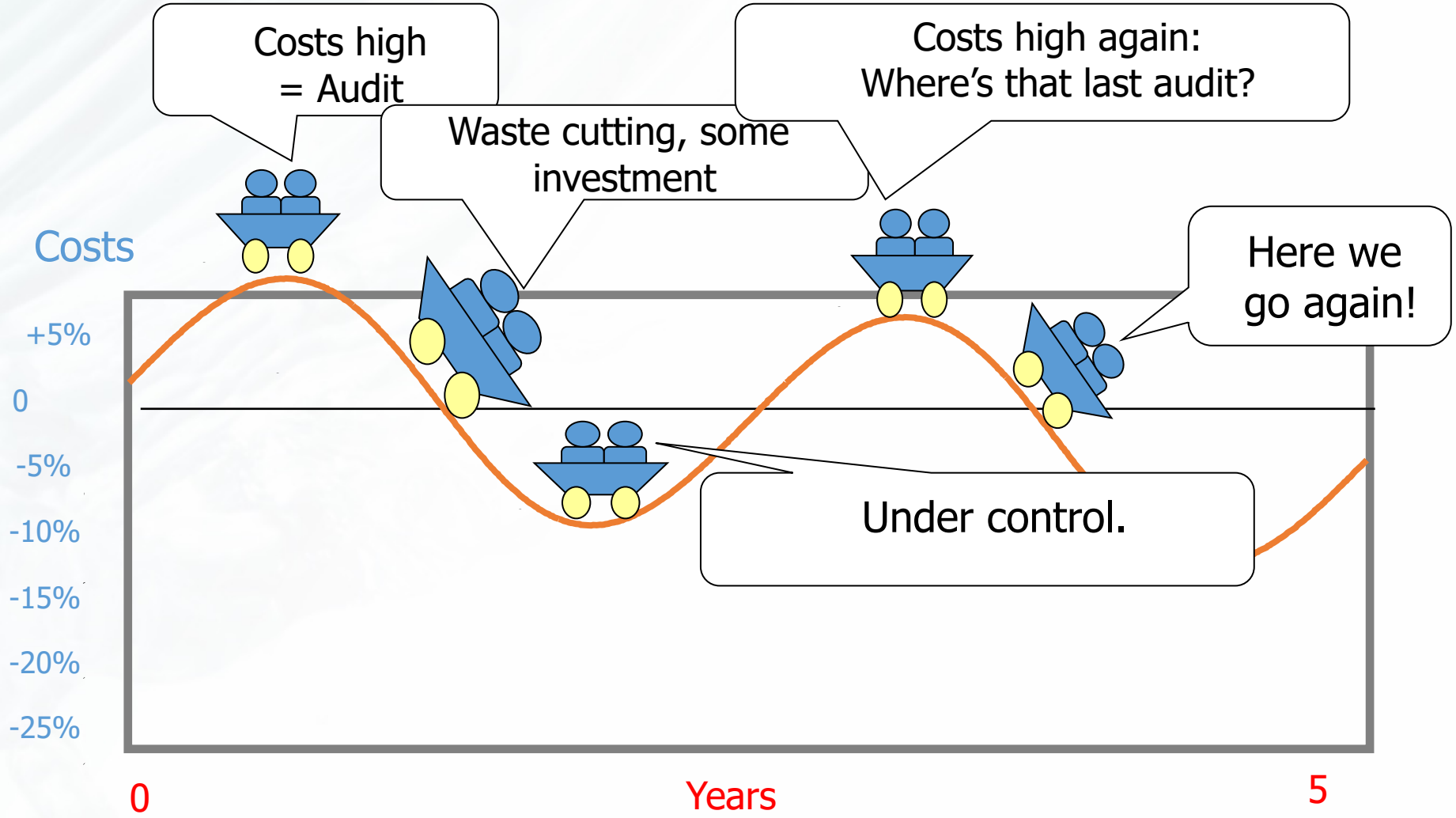
But potentials are going unrealised



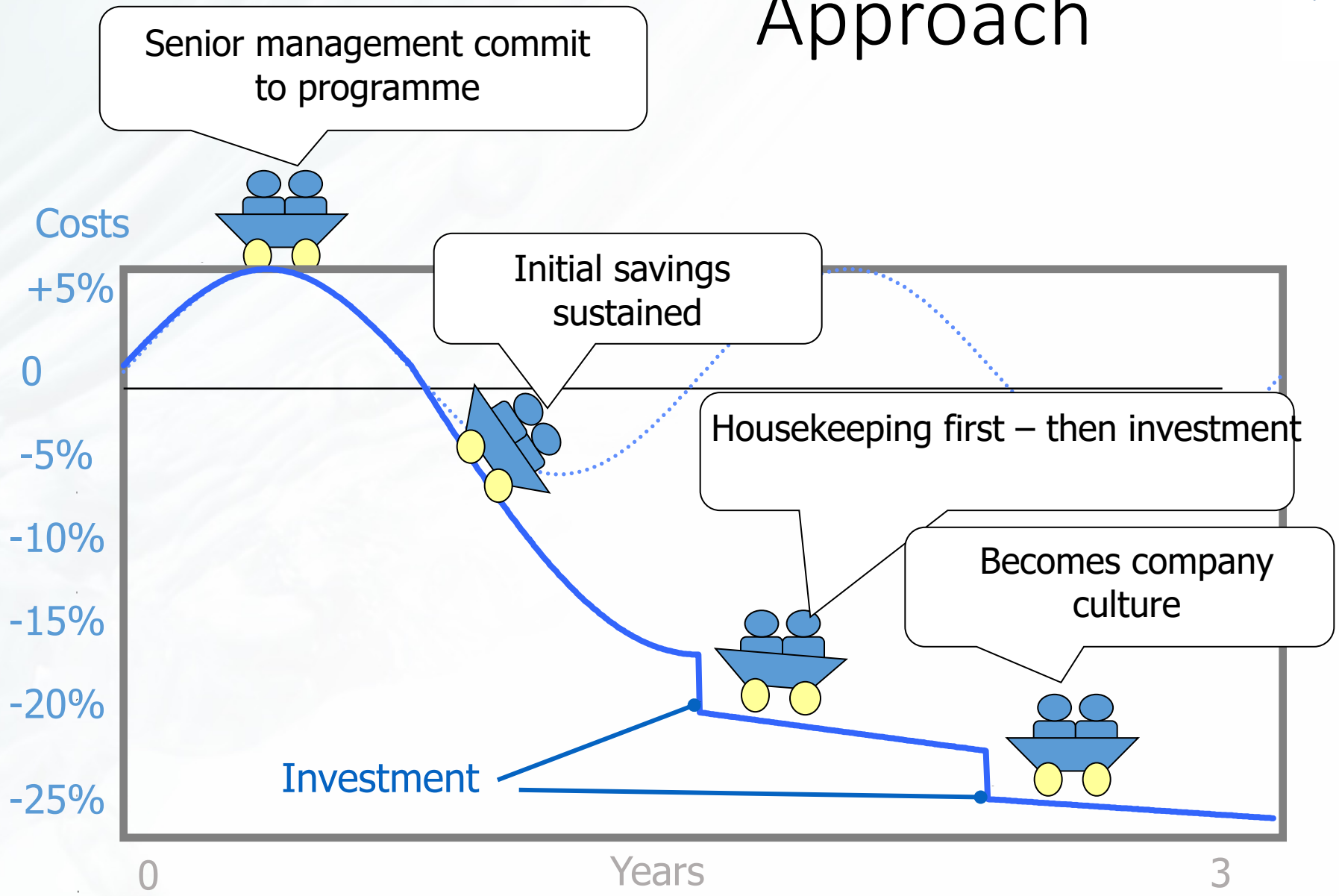
2/3 of the economica potential to improve energy efficiency remains untapped in the period to 2035

IEA World Energy Outlook 2012 – New Policies Scenario

Ad hoc approach to Energy management ....



Structured Approach



Energy Performance - a new “approach”

Energy Efficiency

- Technological Aspects

Energy Consumption

- Quantitative Aspects

Energy Use

- Qualitative Aspects

Barriers

- Difficulty in measuring gains (energy, economic and environmental)
- Lack of knowledge about EnMS
- Difficulty collecting energy data
- Absence or limitation of resources (human and financial)
- Technical knowledge gap on energy systems
- Lack of market recognition or incentives

Opportunities in Sanitation

- Increase awareness about sustainability
- Develop actions to combat climate change through energy issues
- Advancing the debate on energy security
- Seek new frontiers for reducing operational costs
- Act effectively on one of the highest cost items in the sector (energy!)

Opportunities to improve energy performance in WWTP

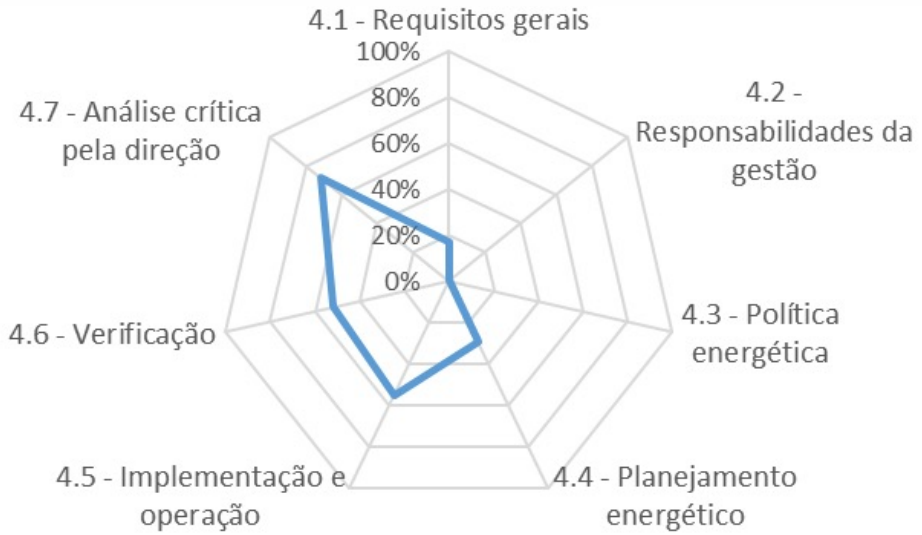
- Energy efficiency
  - Data monitoring and process control systems – SCADA controlling sludge systems
  - Aeration systems (up to 40% of electrical demand) – dissolved oxygen control
  - Replace old motors and use frequency inverters
- Emerging technologies and processes
  - Cultivation of bacteria + control of pH (savings about 25% in aeration systems)
- Power generation
  - Photovoltaic panels
  - Micro wind turbines
  - Methane generated in biodigesters

Gap analysis EnMS at WWTP Arujá

- EnMS (ISO50001) based on EMS (ISO140001) implemented
    - Scope and Energy Policy
    - Energy Planning
    - Operational Control
    - Verification

Compliance with EnMS requirements

Requirements group	No. of req.	Service			Rate of Service
		Total	Partial	Null	
4.1 - General requirements	3	0	1	2	17%
4.2 - Management responsibilities	19	0	0	19	0%
4.3 - Energy policy	9	0	0	9	0%
4.4 - Energy planning	29	5	7	17	29%
4.5 - Implementation and operation	37	10	21	6	55%
4.6 - Verification	30	13	5	12	52%
4.7 - Critical analysis by management	16	7	9	0	72%



Based on ISO 50001:2011 Main Requirements

Planning and activities for EnMS

- 6-7 months proposed schedule to implement EnMS requirements
- Development of energy policy and energy planning
- Improve operational controls and opportunities
  - Low cost activities
- Target to reduce energy consumption

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