

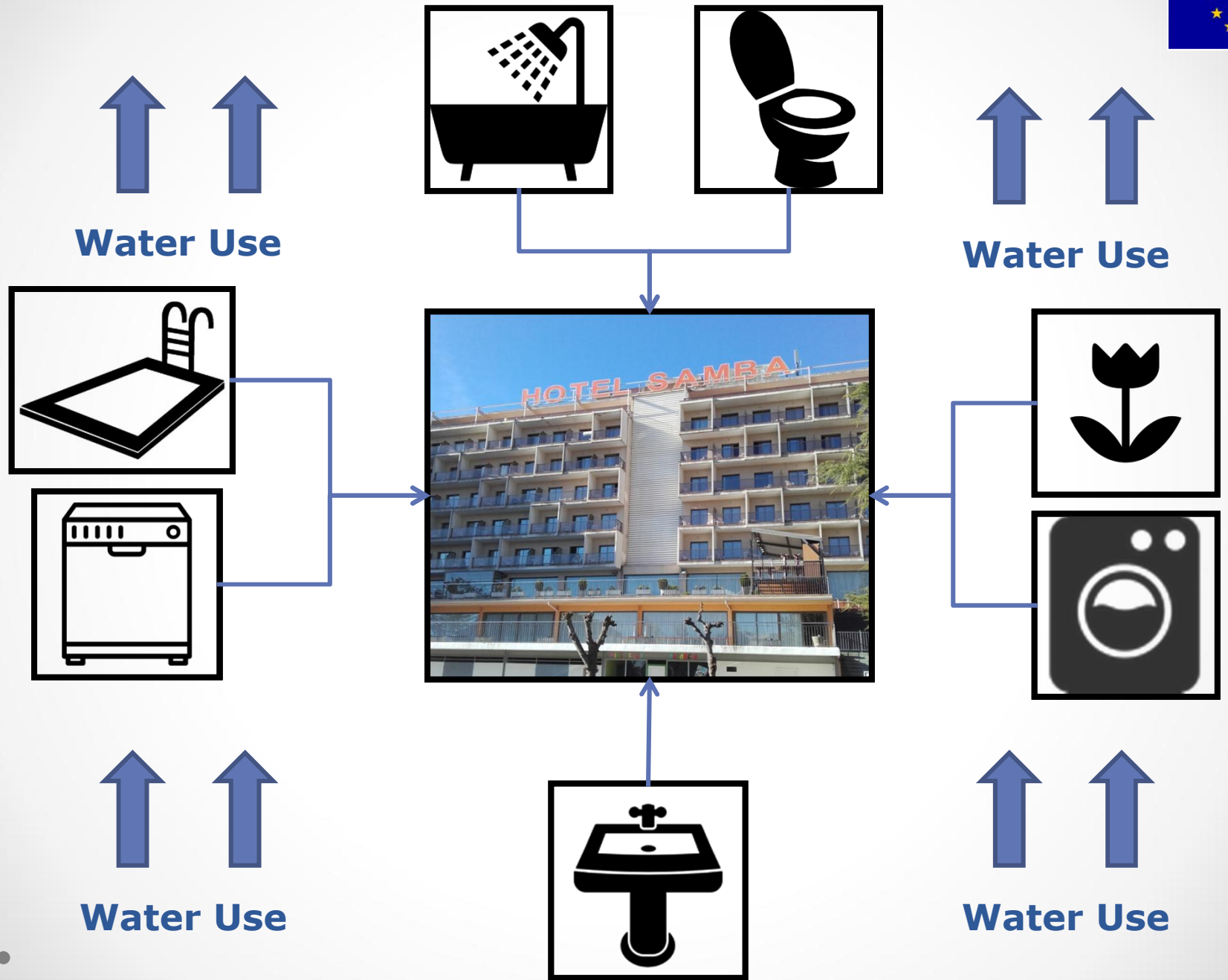
Work Package 8: Integrated Water Management: DSS and Modelling



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Barcelona
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Water Use

Water Use

Water Use

Water Use

Sampling



Hotel Information



Flows



Technologies



DSS: SAMBANET

Determine water balance with respect to flows and quality



Estimate system environmental impacts and energy cost



Simulate water reuse scenarios, estimating water savings and environmental, energy, and economic impacts



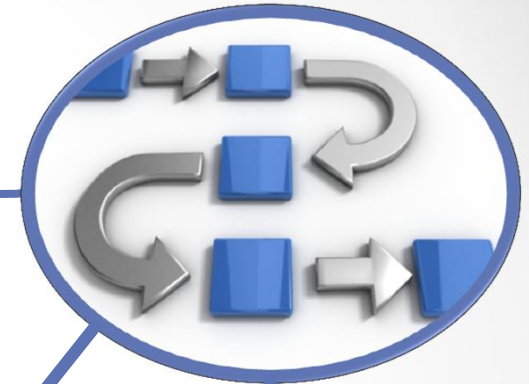
USING SAMBANET



1. Enter hotel characteristics

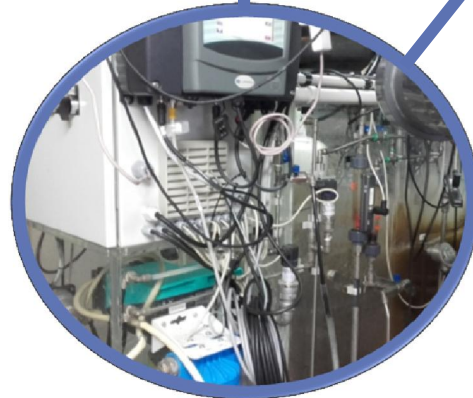


2. Set up water management network



3. Estimate water flows and water quality

4. Incorporate reuse technologies



5. Impact analysis of reuse scenarios

1. Enter hotel characteristics

SambaNet 1. Water use 2. Create network 3. Solve network 4. Contaminants 5. Water reuse

1. Water use: calculate water consumed per day

Inputs: data about the hotel

- ▼ Services
 - ▼ General
 - Number of guests
 - Number of diners
 - ▼ Room
 - ▼ Toilet
 - Flush capacity (L/flush)
 - Use frequency (uses/person/day)
 - ▶ Sink
 - ▶ Shower
 - ▶ Bath
 - ▶ Pool
 - ▶ Garden
 - ▶ Laundry
 - ▶ Lobby
 - ▶ Kitchen

Water use is calculated based on the numbers of guests and diners and the appliance characteristics

The user can modify the number of guests and diners
The user can also modify appliance characteristics

Outputs (L/day) — [see equations](#)

▼ Services	
▼ Room	
- Toilet	32,400
- Sink	4,176
- Shower	43,200
- Bath	4.8

2. Set up water management network

Graphical representation of the network



Samba

2. Create net

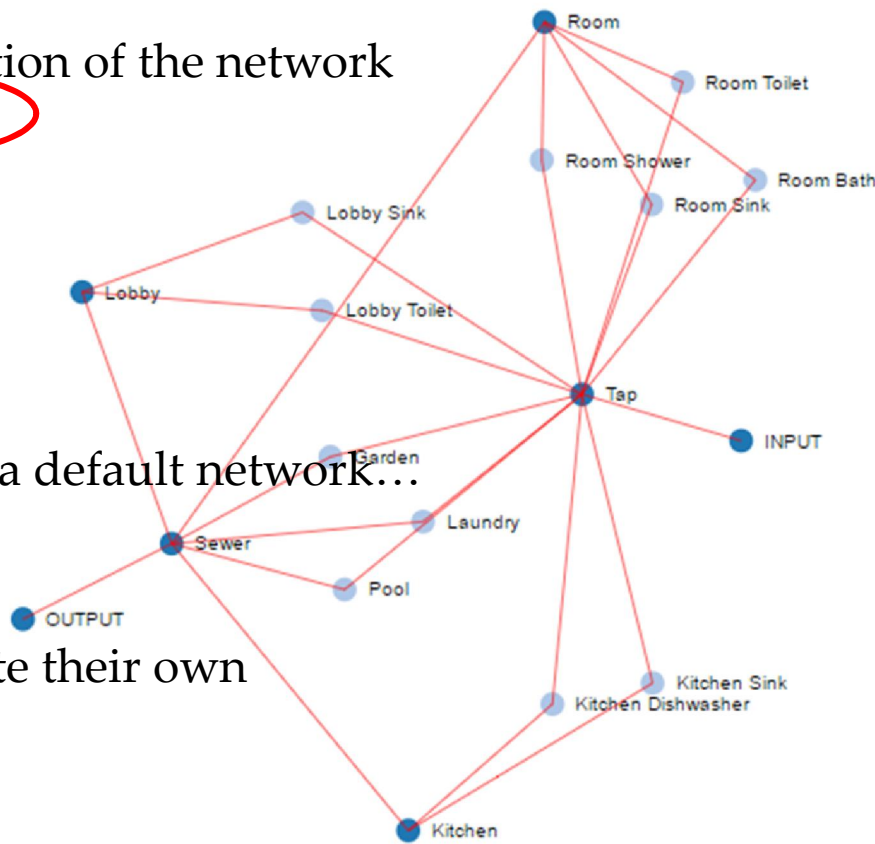
+ New connection (= From Room Toilet

+ New tank (=new noc Name Tank name

All Connections Re ~No connections

All Tanks Remove ~No tanks

green



User can create a default network...

...or create their own

nk

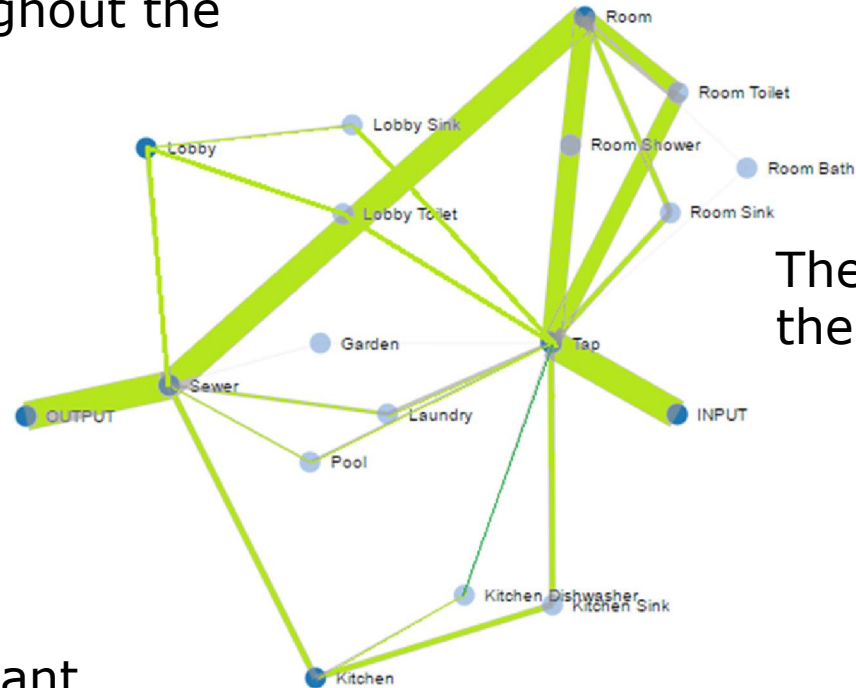
3. Estimate water flows and water quality

SambaNet 1. Water use 2. Create network 3. Solve network 4. Contaminants 5. Water reuse 6. Results

3. Solve network: Find flows

Water quality also graphically represented throughout the network

Node	Output
Room Sink	4,176
Room Toilet	43,200
Room Bath	4,800
Pool	600
Garden	10
Laundry	1,800
Lobby Toilet	1,080
Lobby Sink	432
Kitchen Sink	4,800
Kitchen Dishwasher	0
Tap	88,560
Room	70,752
Lobby	1,512
Kitchen	4,800
Sewer	88,560
INPUT	88,560
OUTPUT	88,560



full screen

The user can choose the contaminant

The user can choose the contaminant

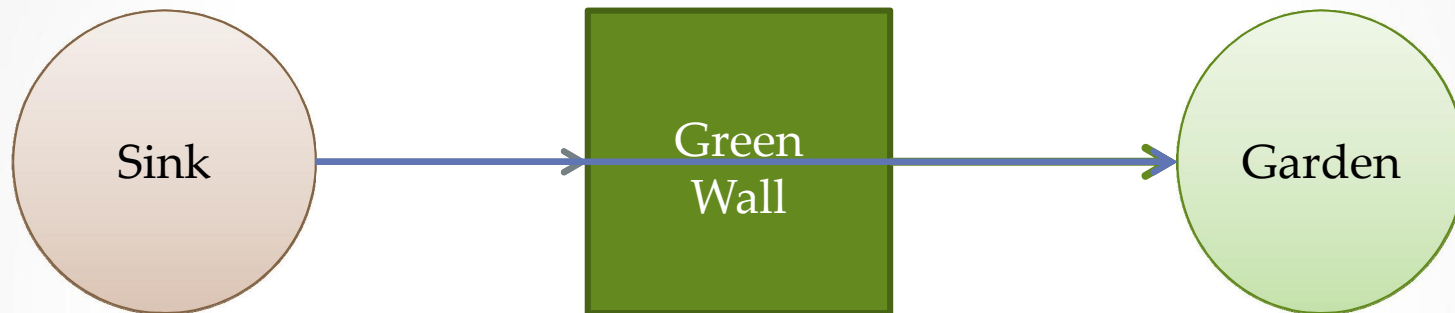
Value of contaminant concentrations represented by line thickness

3. Estimate water flows and water quality

Parameters:

- TSS (Total Suspended Solids)
- Phosphate (P-PO₄)
- Sulfate (S-SO₄)
- Total Organic Carbon (TOC)
- Chemical Oxygen Demand (COD)
- Biochemical Oxygen Demand (BOD)
- Total Nitrogen
- Caffeine
- Carbamazepine
- Diclophenac

4. Incorporate reuse technologies



Determine reuse connections

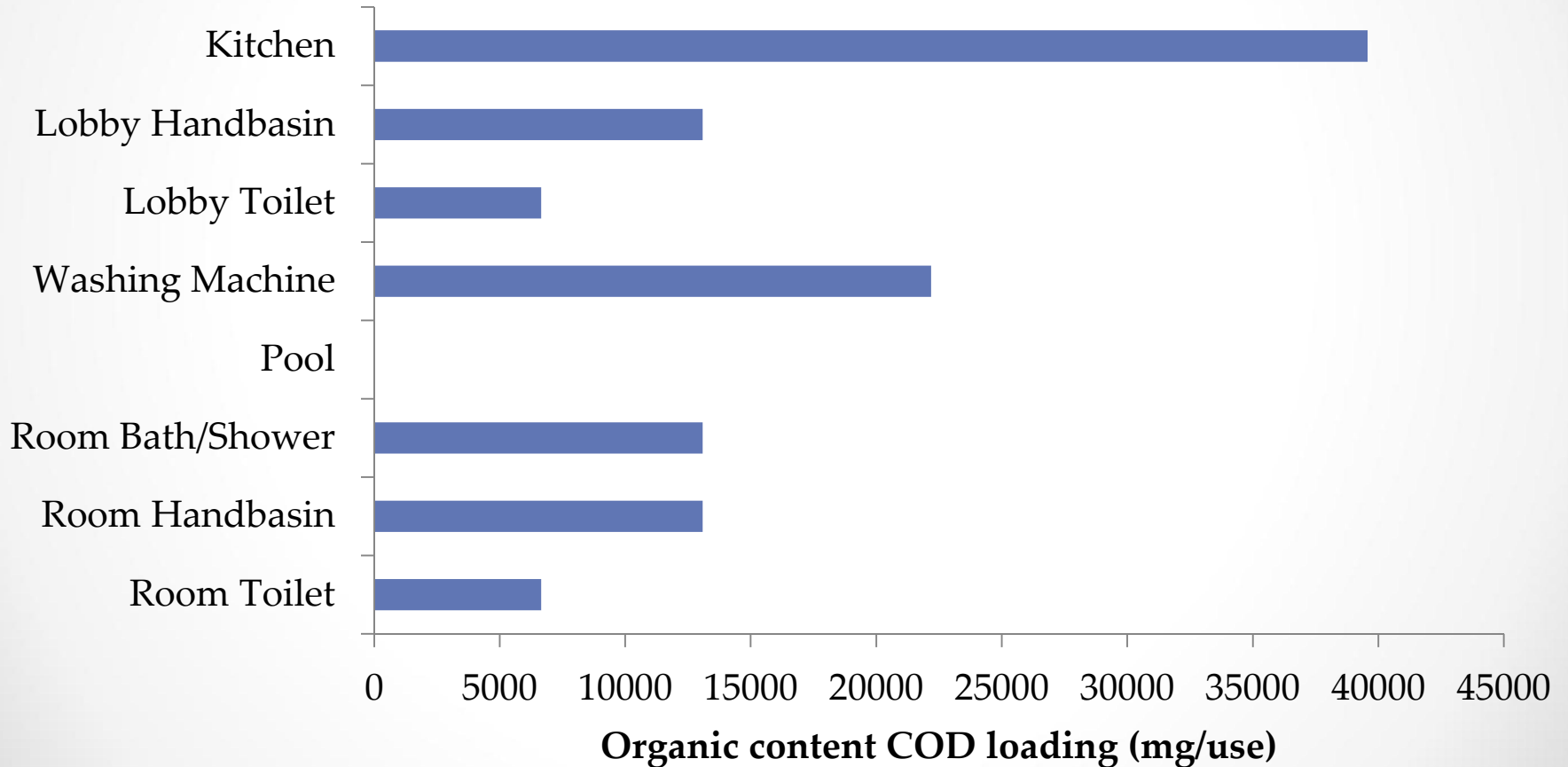
Determine technology

Technology
Tech 1
Tech 2
Tech 3
Green Wall



4. Incorporate reuse technologies

Appliance loadings customization



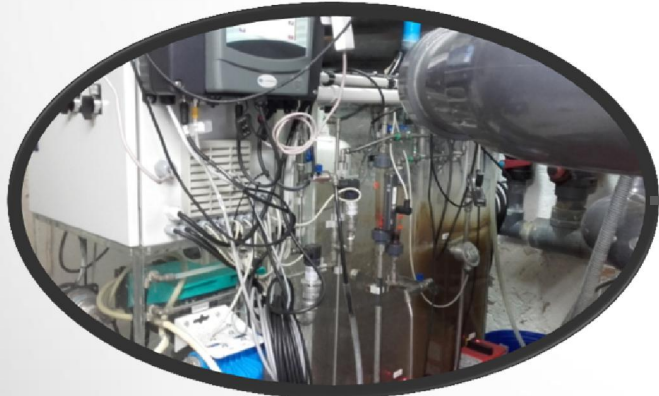
4. Incorporate reuse technologies

Information needed to add a new technology



Removal Rates

Environmental & Economic Impacts

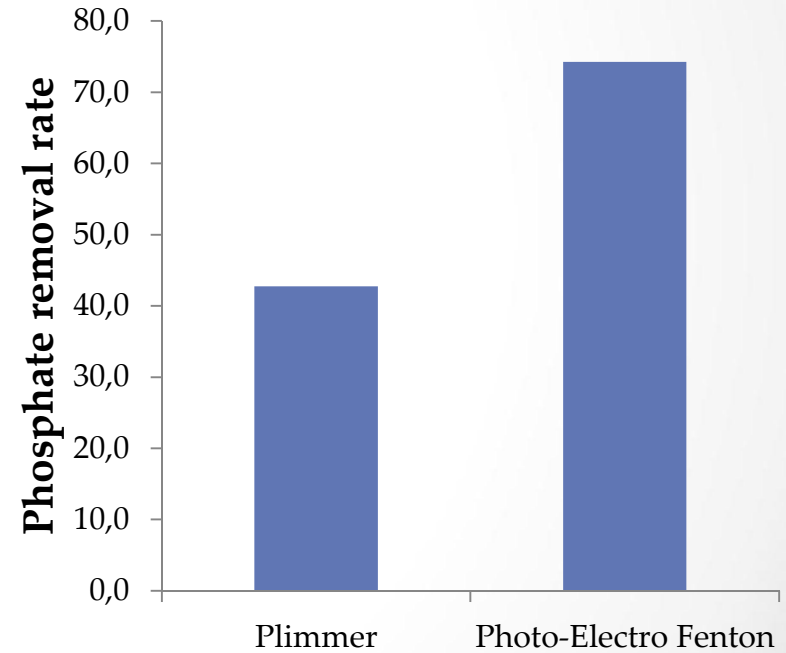
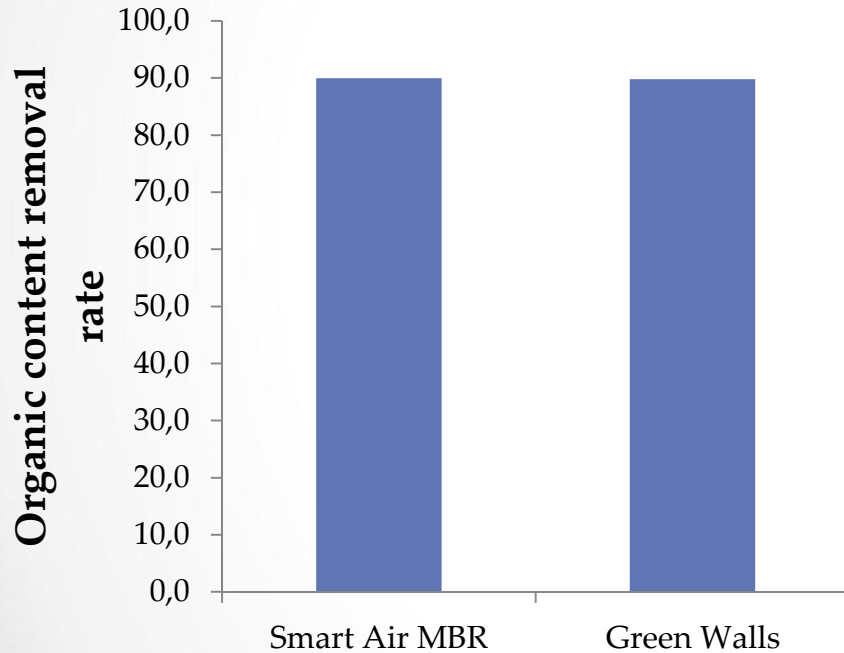


Removal Rates

Environmental & Economic Impacts

4. Incorporate reuse technologies

Modify existing technological removal rates



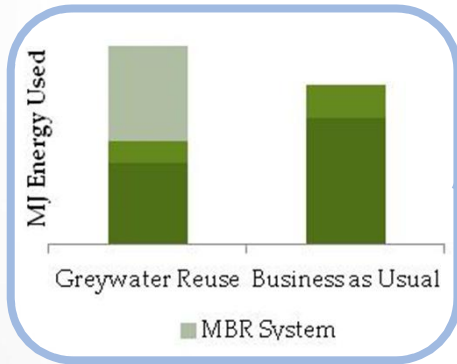
5. Impact analysis of reuse scenarios



Water Used



Water Saved



Environmental
Impacts

Economic
Impacts



CASE STUDY: HOTEL SAMBA

Kitchen

Pool

441 Rooms



Garden

Laundry

1. ENTER HOTEL SAMBA CHARACTERISTICS



SambaNet 1. Water use ▶ 2. Create Network ▶ 3. Solve Network ▶ 4. Solve Loads ▶ 5. Results

1. Water use: calculate water consumed per day Options ▼ Expand all ▶ Collapse all Reset all inputs to default value

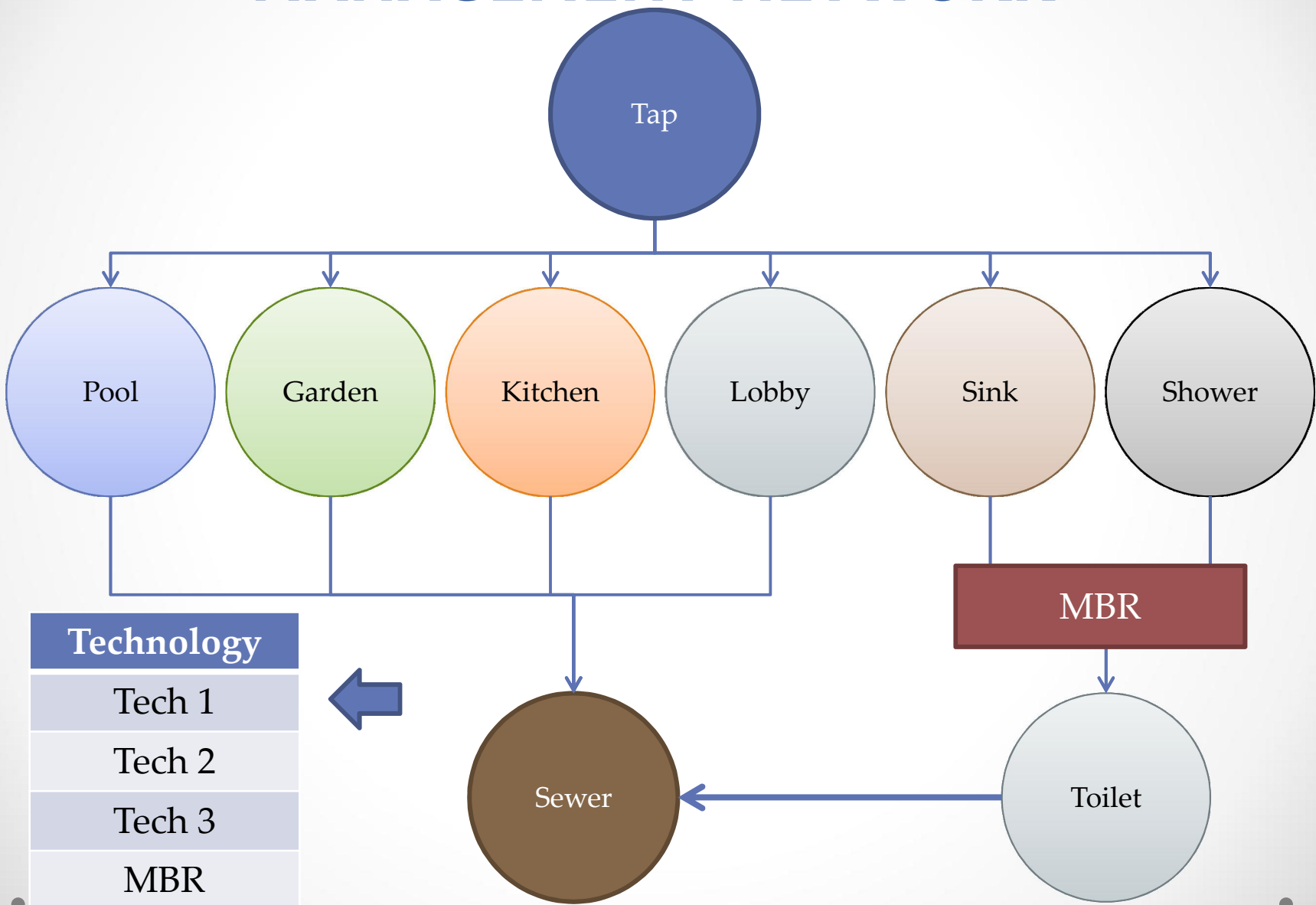
Inputs: data about the hotel

- ▼ Services
 - ▼ General
 - Number of guests
 - Number of diners
 - ▼ Room
 - ▼ Toilet
 - Flush capacity (L/flush)
 - Use frequency (uses/person/day)
 - ▼ Sink
 - Discharge rate (L/min)
 - Use duration (min/use)
 - Use frequency (uses/person/day)
 - ▼ Shower
 - Discharge rate (L/min)
 - Average use (min/use)
 - Use frequency (uses/person/day)
 - ▼ Bath
 - Bathtub volume (L)
 - Average % of volume filled per use (%/use)

Outputs (L/day) — [see equations](#)

- ▼ Services
 - ▼ Room
 - Toilet 32,400
 - Sink 4,176
 - Shower 43,200
 - Bath 4.8
 - ▼ Pool
 - Evaporation 242.84
 - Flow 600
 - ▼ Garden
 - Area 0
 - Sprinklers 10
 - ▼ Laundry
 - Laundry 1,800
 - ▼ Lobby
 - Toilet 1,080
 - Sink 432
 - ▼ Kitchen
 - Sink 4,800
 - Dishwasher 0
 - TOTAL 88,745.64

2-4. SET UP HOTEL SAMBA WATER MANAGEMENT NETWORK



Technology
Tech 1
Tech 2
Tech 3
MBR

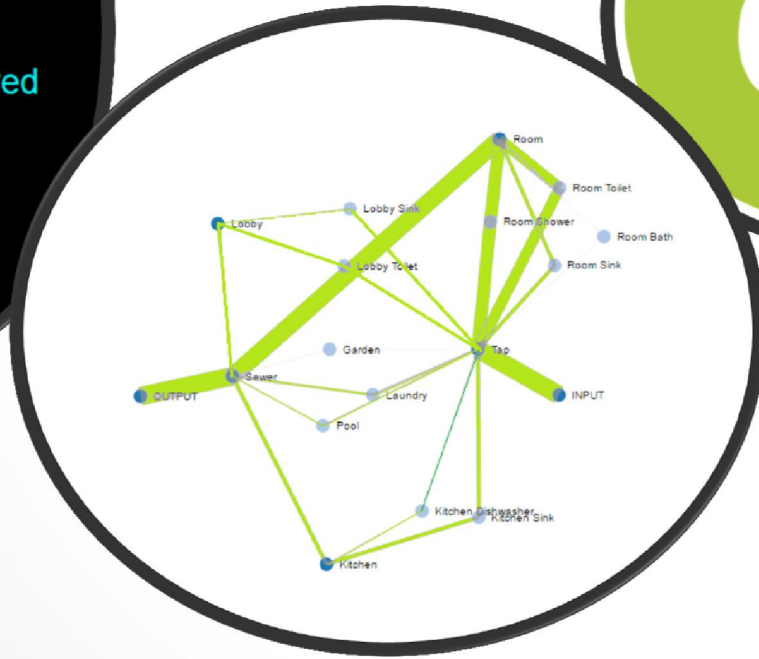


5. IMPACT ANALYSIS OF HOTEL SAMBA REUSE SCENARIO

Potable Water
70
m³
Water Saved
34
m³

Water Used and Water Saved

Environmental Impacts



Water Quality

Economic Impacts

SAMBANET FEATURES

- **Steady State**
 - Average flows and concentrations over a day
 - Possibility of dynamic later
- **Versatile**
 - Can be applied to all types of hotels
 - Different services
- **Incorporates Water Reuse**
 - Flows
 - Technologies
 - Qualities (Pre- and post-reuse)
- **User-Friendly**
 - Interface
 - Default values to make data entry easier
 - Web-based

FINAL STEPS

- **Tasks to be finished**
 - Verification of water reuse module (create default scenarios)
 - Add Results
 - Environmental Assessment
 - Economic Assessment
 - Improve overall aesthetics for increased user-friendliness

HOW TO GET SAMBANET

Available on the web

<http://84.89.61.64:8030/demeaumed/reuse.php>

If you want to aid in the development of
this software, contact us:

msantana@icra.cat

Thank You!!