



# Economic analysis of water uses and services

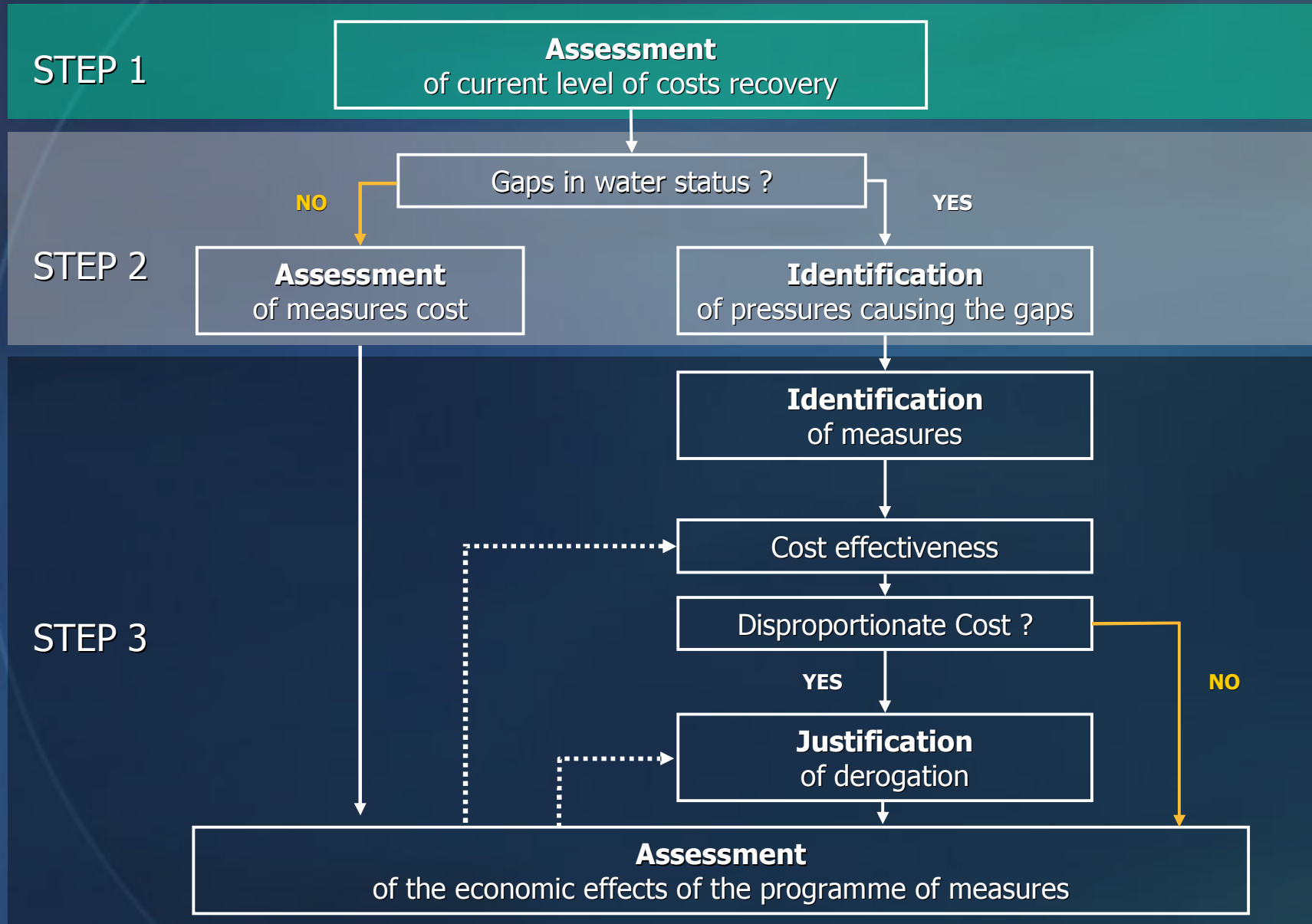
## Development of pricing policies

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# Economic Aspects of the WFD

- An integrated water management framework
- Proposes a wide set of:
  - **Economic principles**
    - Polluter pays principle
    - Full cost
  - **Economic tools**
    - Economic analysis of water uses
    - Cost effectiveness analysis of measures
  - **Economic instruments**
    - Pricing of water services
    - Cost recovery of water services
    - Appropriate contribution of water uses to the recovery of costs

# Economic analysis – The process



# Water pricing objectives

- Cost recovery
- Transparency & accounting
- Efficient water use
- Fair allocation of costs
- Social responsibility

# Premises – Cost recovery

- Financial sustainability
  - Appropriate rates & charges for an adequate revenue
  - Application of fixed and/or minimum charges
- Ensuring a proper level of water services

*Subsidies are sometimes unavoidable  
However, they should be transparent & accounted for*

# Premises

## Transparency

- Transparent allocation of costs
  - Cost accounting at **provider level** and for each **water service**
- Understandability
  - Adopting simple structure in water tariffs
  - Justification of tariff adjustments
- Accountability & control
  - Publication of financial records

## Efficient water use

- Incentives for efficient water use
  - Consumption metering and control
  - Volumetric pricing, especially in irrigation
- Conveying the right signals to consumers
  - Systematic recording of water consumption
  - Analytical water billing
  - Simplicity in water tariffs

# Premises

## Fair allocation of cost

- Elimination of inequalities
  - Uniform tariffs
  - Uniform quality of the provided services
- Application of the “polluter-pays” principle
  - Setting water tariffs so that each consumer assumes the cost that he incurs

## Social responsibility

- Ensure access to water services
  - Provide a “basic” quantity of water at low price (Increasing Block Tariff)
- Affordability of water charges
  - Take into account the socio-economic impact of all pricing reforms and adjustments to:
    - Low income households
    - Local economy in general

# Economic analysis in the LIFE-Water Agenda Project

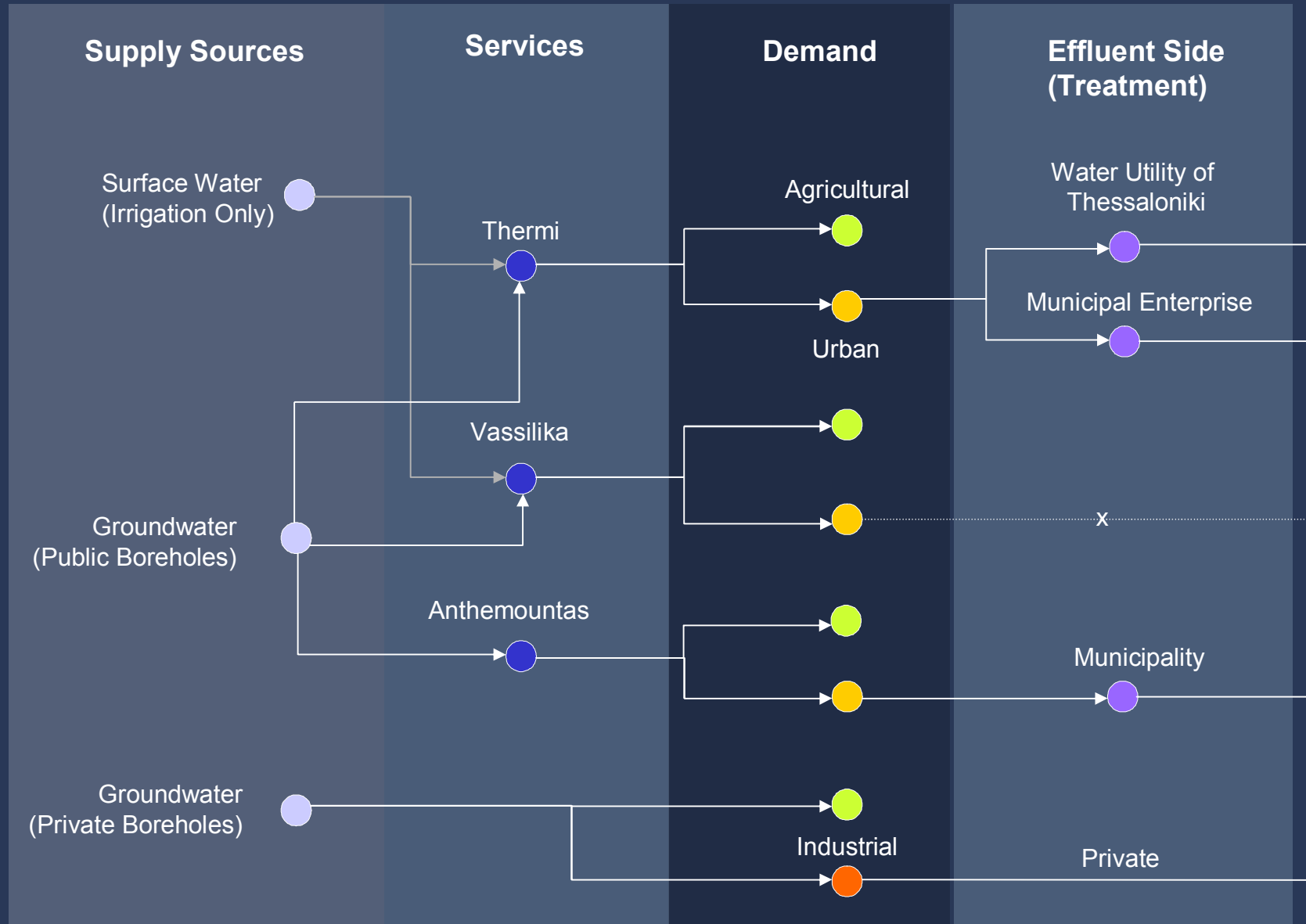
- **Phase A: Analysis of existing framework**
  - Institutional framework analysis (services & requirements)
  - Economic analysis of water uses
  - Evaluation of existing pricing policies
- **Phase B: Evaluation of WM strategies**
  - Development of alternative water pricing schemes towards cost recovery
- **Phase C: Cost-Benefit analysis**
  - Cost-effectiveness analysis of alternative water management options
  - Development of cost allocation schemes
    - Costs include environmental and resource costs
    - Scenario analysis of different levels of unified water services



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# **Phase A: Analysis of Existing Framework**

# Water services in the Anthemountas River Basin



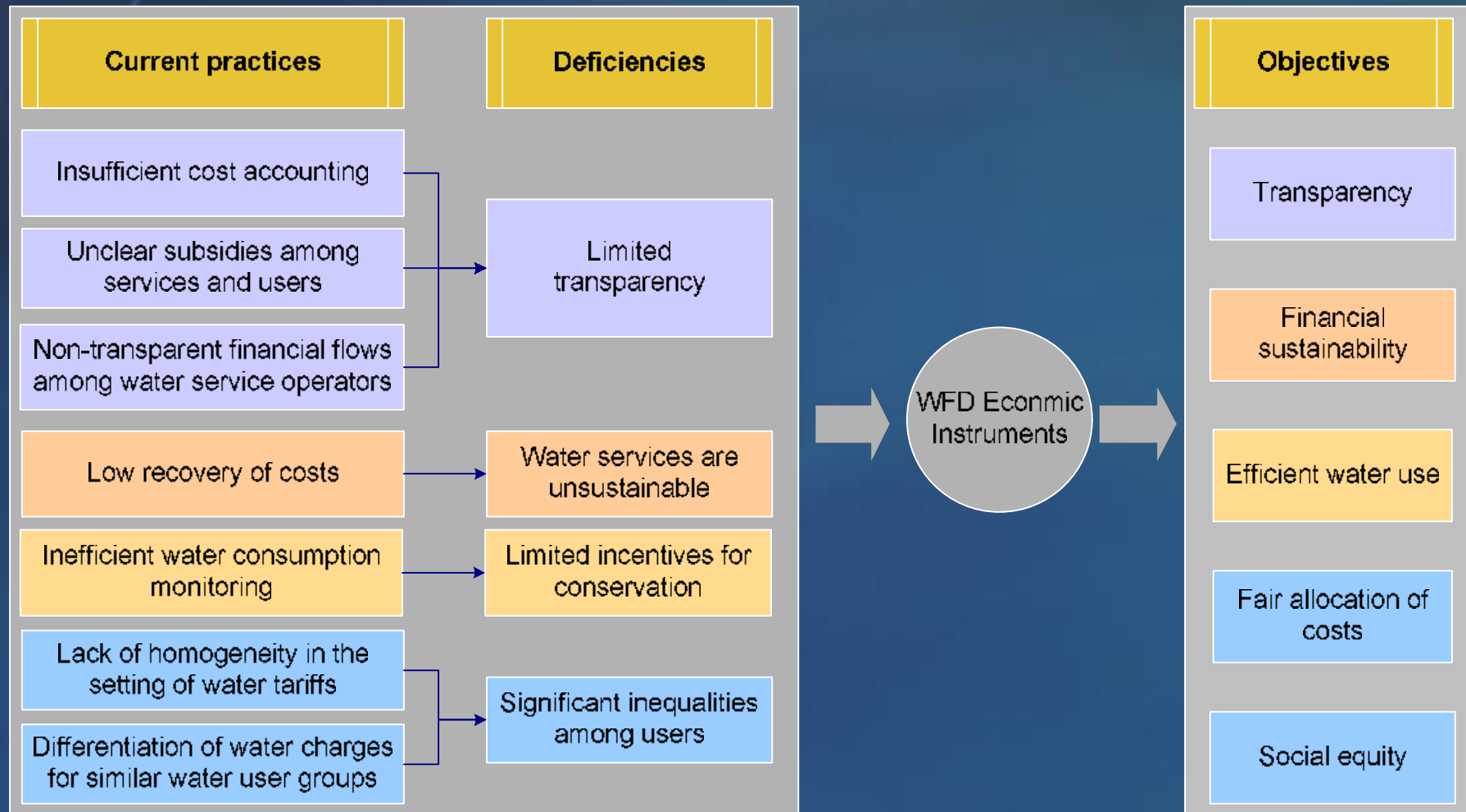
# Challenges for Water Services

- Demand exceeds renewable water resources
  - Irrigation is the main water use (80% of the total water demand)
  - Groundwater resources are severely overexploited
- Increasing domestic demand
  - Extensive water supply network expansions
  - In search of new supply sources
- Non-efficient water use
  - Irrigation method improvements
  - Leakage control efforts
  - Consumption metering
- Inadequate wastewater treatment
  - Need for new investments
  - Construction/Expansion of sewerage networks
- Inadequate metering & control of abstracted quantities
  - Expansion of public supply networks for irrigation
  - Monitoring of private boreholes

# Water pricing methods

- **Cost** = Operation & Maintenance cost for water service provision
- **Allocation methods**
  - Potable water supply & sewerage services
    - Volumetric pricing (Increasing Block Tariff) combined with fixed charges
  - Irrigation
    - Volumetric pricing
    - Charges indirectly related to water consumed
    - Flat area pricing

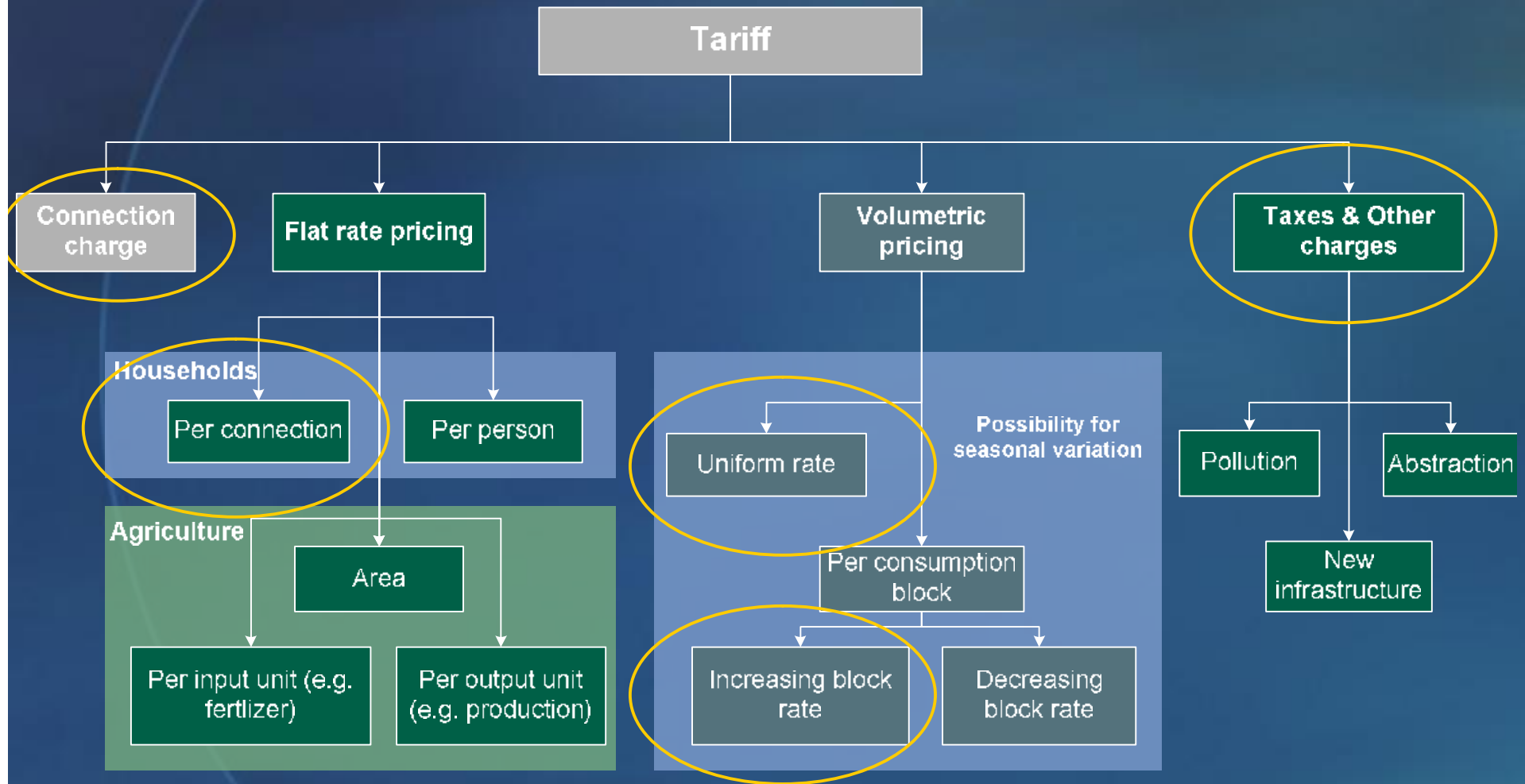
# From Deficiencies to Objectives



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# **Phase B: Development and evaluation of alternative Pricing Schemes**

# Water Tariff Elements



# Linking tariff elements to objectives

- Flat rate pricing
  - Revenue stability (Recovery)
  - Understandability (Transparency)
- Uniform volumetric rate
  - Understandability (Transparency)
  - Consumption metering/incentives (Efficient water use)
  - Charges proportional to water consumption (Polluter-pays principle)
- Increasing Block Rate Tariffs (Volumetric pricing)
  - Consumption metering/Incentives (Efficient Water Use)
  - Possible application of the “polluter-pays” principle (Fair allocation of costs)
  - Increased affordability for lower consumption (Possibly a more socially equitable system)



# Water pricing schemes

- **Domestic supply**
  1. Simple, two-part tariff
    - 100% financial cost recovery
    - Fixed charge
    - Uniform volumetric rate
  2. Two part tariff – Increasing Block Rate
    - 100% financial cost recovery
    - Fixed charge
    - 3 consumption blocks, same for all 3 Municipalities
- **Wastewater collection & treatment: Two-part tariff**
  - Full recovery of financial cost
  - Fixed charge
  - Volumetric charge according to water consumption
- **Irrigation: Volumetric pricing**
  - Full recovery of financial costs
  - Uniform volumetric rate

# Public participation and water pricing

- **Phase 1**
  - Discussion upon the basic principles for water pricing policies within the framework of the WFD
  - Debate on principles
  - Brief, non-technical introduction on the findings concerning the current system for the provision and pricing of water services
- **Phase 2**
  - Debate on:
    - The current water pricing policies and the need for reform
    - The work of the project team on the development of alternative water pricing schemes
  - Recording of perceptions on:
    - Current pricing policies
    - Needs for improvement

# Evaluation against the set criteria

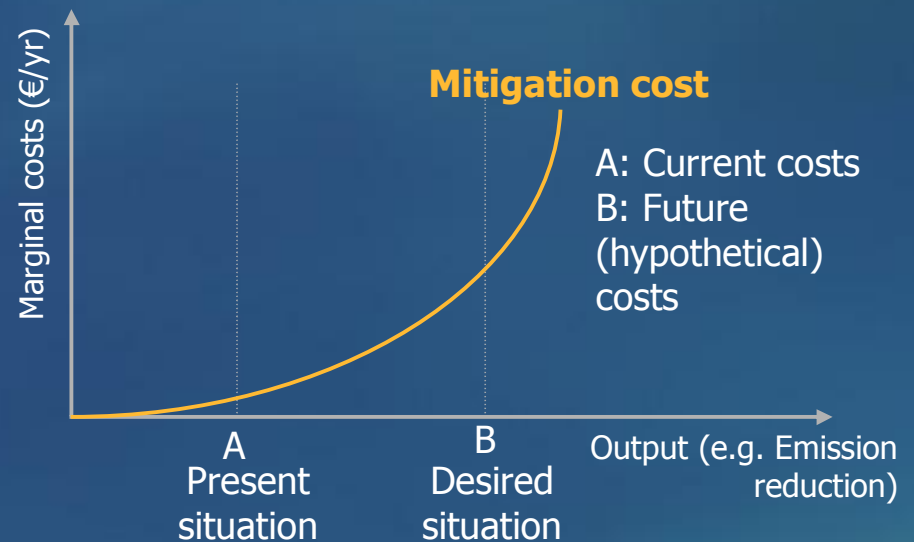
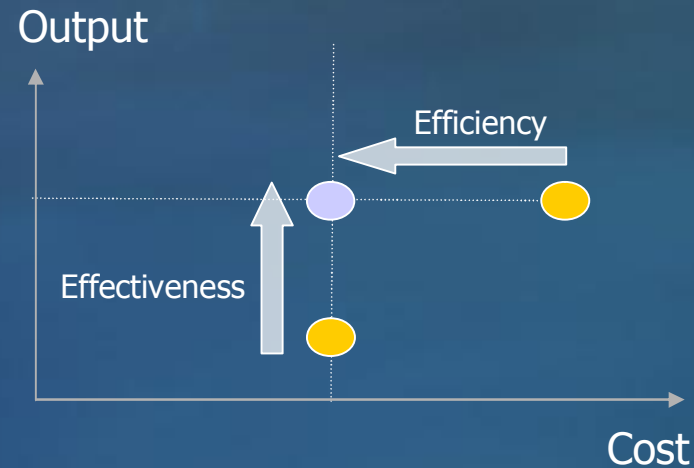
		Objectives	Potable water supply		Wastewater collection & treatment	Irrigation
			Two-part tariff (UVR)	IBT		
WFD 2000/60	Transparency	Transparency in the involvement of the different operators/accounting	∩∩	✓	∩∩	✓
		Identification of financial flows	✓	✓	✓	✓
		Understandability by the average consumer	∩∩		∩∩	✓
		Simplicity in application	∩∩	✓	∩∩	✓
		Consumption monitoring	✓	✓	✓	✓
	Efficient water use	Incentives to reduce consumption	Moderate			High
	Fair allocation of costs	Elimination of inequalities	✓	✓	✓	✓
		Allocation of costs according to the "polluter-pays" principle	✓	✓	✓	✓
	Financial autonomy & sustainability	Full financial cost recovery	✓	✓	✓	✓
Ensuring a minimum stable revenue		✓	✓	✓		
Social equity	Ensuring access to water services		✓			
	Affordability	Moderate	High	✓	3 10% of agricultural gross income	

# Phase C

1. Cost-effectiveness analysis (CEA)
2. Formulation of alternative schemes for the organisation of water services
3. Analysis of different cost allocation mechanisms

# Cost-effectiveness analysis

- Determines solutions (combination of measures):
  - Economically effective
  - Economically efficient
- Identifies
  - Minimum cost solutions
  - Incremental Cost Curve
  - Optimum action plan, with respect to available funds

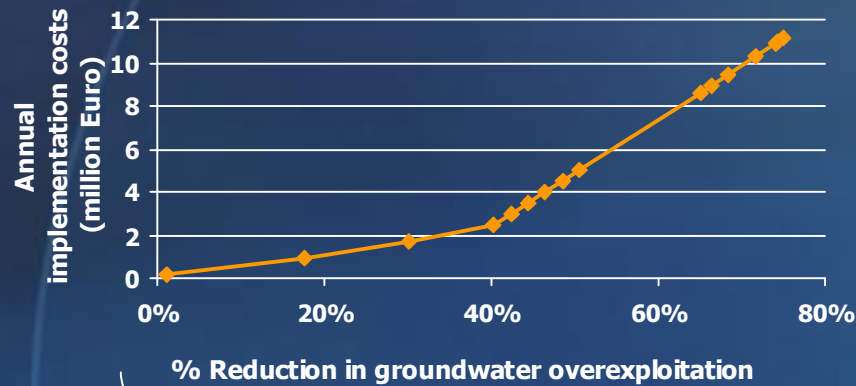


# Effectiveness, Cost & Measures

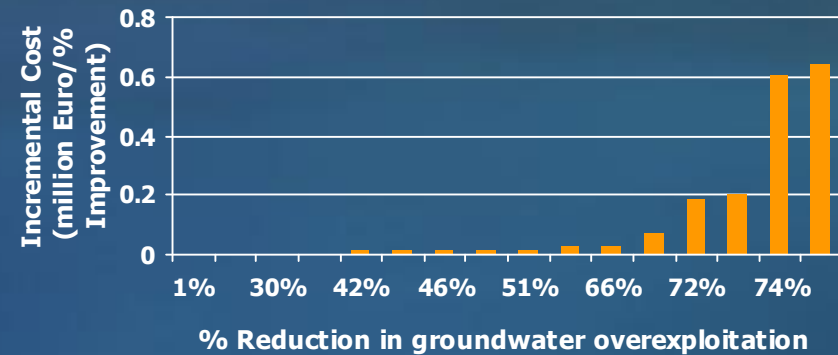
- Output
  - % reduction in groundwater overexploitation
- Costs
  - Annual implementation cost for each measure
    - Capital cost based on the amortization of the total investment
    - Additional operation and maintenance costs
- Measures proposed within the framework of the LIFE-Water Agenda Project
  - Soft measures
    - Agri-environmental programmes
  - Structural measures
    - Storage reservoirs
    - Tertiary treatment and water reuse
    - Network improvements
    - Collective irrigation schemes
    - Interception dams

# Summary of results

Minimum Cost Solutions



Incremental Cost Analysis



## Ranking of measures

1	Agri-environmental measures
2	Interception dams
3	Small storage reservoirs in mountainous areas
4	Water reuse in agriculture
5	Collective irrigation networks
6	Potable water supply from the water utility of Thessaloniki
7	Rehabilitation of domestic distribution networks

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**Environmental and  
Resource Costs  
Water service provision  
Cost sharing**



# Environmental & Resource Costs

- **Environmental cost**
  - Costs incurred from environmental damage/degradation
    - Ecosystems, other users
    - Pollution, overexploitation
- **Resource cost**
  - Costs incurred
    - Under scarcity and inefficient water allocation
    - When resources become depleted (inter-generational cost)

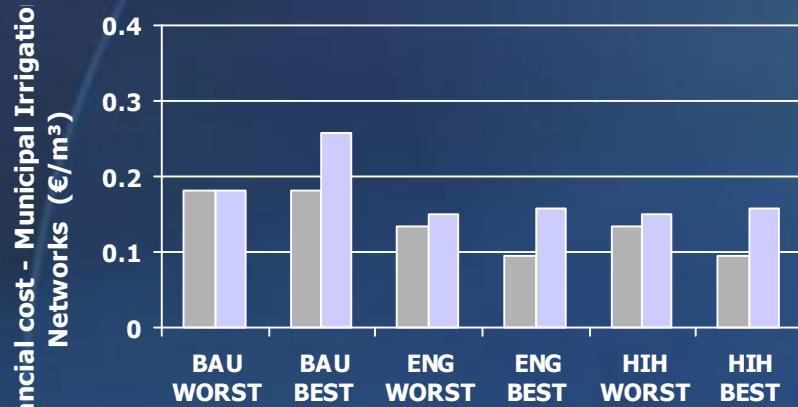
Refer to the entire river basin, and is induced from one or more water use(r)s

# Allocating the Capital cost of New Infrastructure

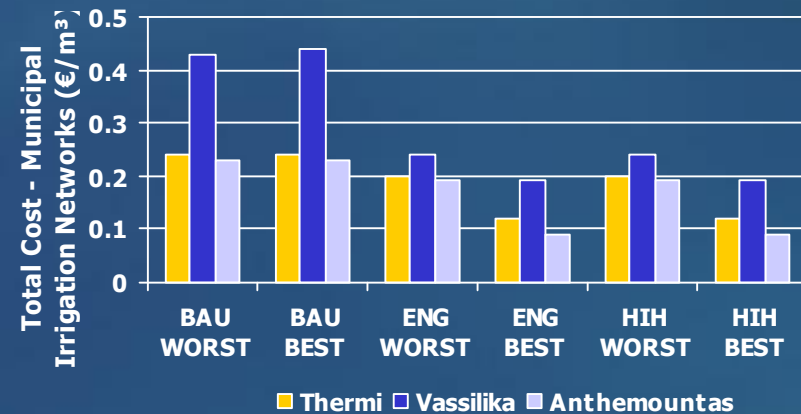
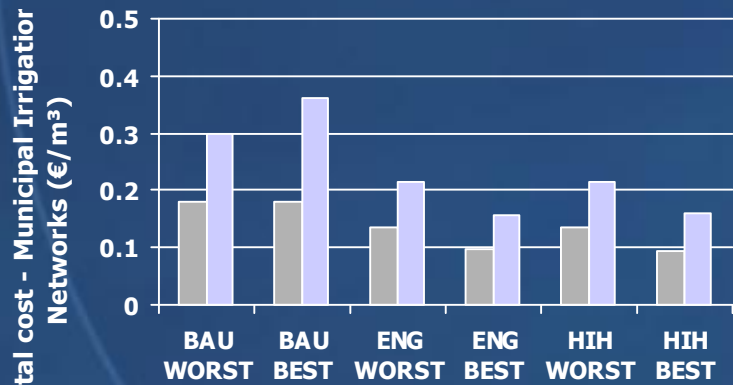
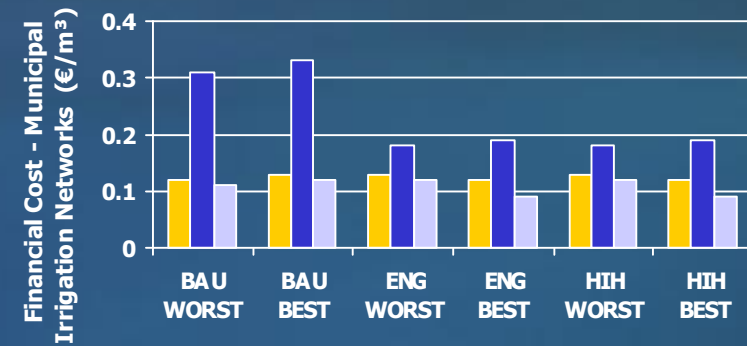
- Costs are allocated to Municipality and Service in which infrastructure is constructed
- or
- Costs are allocated to all water users and services across the Basin
  - Per household
  - According to:
    - The volume of water (from the new infrastructure) consumed
    - Pollution incurred

# Indicative results

(A) Consolidation of water services



(B) Current state remains unchanged



■ Per household ■ Per use

■ Thermi ■ Vassilika ■ Anthemountas

# Instead of Conclusions: Cost-sharing issues

- Which distribution arrangement can be considered most fair and equitable ?
  - The polluter pays principle
  - Economic impacts on water use sectors
  - Social cohesion and equity
  - Net social benefits
- The willingness to assume the costs for arriving to a “good environmental status” is strongly dependent on:
  - Environmental awareness
  - Public education
  - Public involvement