



OECD project: "Strengthening Financial Management Capacity of Local Level Actors in the Water Supply and Sanitation Sector"

Towards Financial Sustainability of Water Utilities (Block 1)

Training of Trainers

26.XI to 1.XII 2007

Kiev



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"Today, one person in six will drink unclear water. One person in three will not have access to proper sanitation. ... That is unacceptable... That is why commitments were made in the Millennium Declaration in 2000 and at Johannesburg in 2002. The commitments were to halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation..."

Statement of the United Nations Secretary General Kofi Annan to the United Nations Advisory Board on Water and Sanitation in July 2004.

Note: The Millennium Development Goal's target for water and sanitation (MDG Target 10) aims to reduce by half the number of people without sustainable access to safe drinking water and basic sanitation by 2015, using 1990 as the baseline year.

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OVERVIEW

- Background and introduction
- Operational sustainability
- Benefits of metering
- Financial sustainability
- Long-term perspective
- Benefits of financial planning

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BACKGROUND AND INTRODUCTION

- Transition from centrally planned economy to market economy accompanied by decentralisation reforms
- Phasing out of price control and reducing public subsidies and slow gradual transformation from social tariffs into tariffs charged according to market prices
- Extensive networks of water infrastructures very often poorly designed and constructed, and not adequately maintained result in serious deterioration and even collapse of infrastructure
- Water utility revenues only cover part of operation resulting in cut back on maintenance, which further accelerates deterioration of infrastructure

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BACKGROUND AND INTRODUCTION (2)

- High operating costs and low operational efficiency accompanied by excessive demand for water
- Affordability concerns and ineffective social assistance programmes limit full implementation of cost recovery tariffs
- Poorly developed tariff rules and tariff-setting procedures have been one of the main causes of the poor financial situation of water utilities
- Long-term strategic planning, medium-term financial and investment planning are still not typical practice
- Not clearly established relations between municipalities and water utilities and low level of citizen participation

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SUSTAINABILITY

Meeting the current needs without compromising the opportunities of future generations to meet their needs

Definition of sustainability by the Brundland Commission formally the UN World Commission on Environment and Development, 1987

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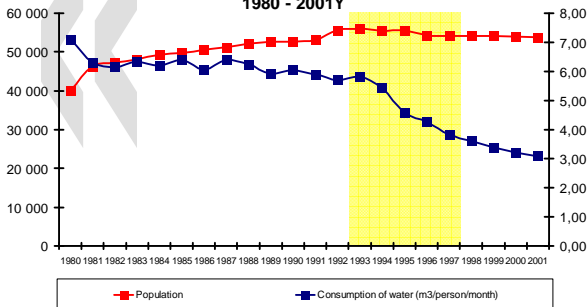
OPERATIONAL SUSTAINABILITY

- Operations & Maintenance is responsible for producing sufficient quantities of safe water to meet demand
- Operations & Maintenance generates most of the enterprise's funds by distributing the water that produces revenues
- Unaccounted-for water (non-revenue water is now the preferred term) is a gauge of the enterprise's operating efficiency

BENEFITS OF METERING

- Enabling customers to evaluate their own marginal benefits and costs, metering leads to more efficient consumption
- Metering generates a wealth of statistical data on consumption leading to more realistic projections and correct decisions
- Metering eventually places pressure on water and wastewater service delivery to become more efficient - due to drop in revenues (decreased consumption in stagnant or declining demographic situation)

Population and per capita consumption of water 1980 - 2001Y



FINANCIAL SUSTAINABILITY

- For water utilities to finance their operations and be financially sustainable, tariffs should cover the water utilities' Operations & Maintenance costs as well as investments
- Financially unsustainable water utilities are dependant on municipal or national budget subsidies and lack financial and institutional autonomy
- To be financially sustainable, water utilities require not only revenues on the books but revenues actually collected.

LEVELS OF FINANCIAL SUSTAINABILITY

- Full financial sustainability – full cost recovery tariff including O&M and investments. The Water Utility has funds to cover all necessary operations and maintenance and invest in development
- Limited financial sustainability – tariff cost recovery limited only to O&M. The Water Utility operates without profit and needs subsidies to conduct investments
- Lack of financial sustainability – tariff does not cover O&M. The Water Utility operates with losses and needs operating and investment subsidies.

LONG-TERM PERSPECTIVE

- Operational and financial sustainability of water utility is a strategic objective rather than a short-term task
- It requires long and medium-term planning framework for considering different ways of achieving the goal
- Typical planning framework consist of strategic and business plans, financial projections and tariffs policies, and capital improvement programs



WHY MEDIUM-TERM FINANCIAL PLANNING

- Long-term strategy of strengthening operational and financial sustainability enables definition of medium-term financial planning
- At the same time, the evaluation of capital investment and financing options is conducted - this is compared to the financial plan



WHY MEDIUM-TERM FINANCIAL PLANNING

- Ensures the continuation of operations and maintenance
- Enables planning of capital investments
- Provides input into the communication of plans and expectations to owners (investors), customers, government



BENEFITS OF FINANCIAL PLANNING

- Benefit to utility: sustainability
- Benefit to owner: possible decrease in subsidies
- Benefit to customers: greater chance of fair price for public service
- Benefit to financing institutions: transparency; greater confidence in ability to repay loans



GROUP DISCUSSION FINANCIAL SUSTAINABILITY OF WATER UTILITIES: INDIVIDUAL COUNTRY PERSPECTIVES



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Forecasting Water Demand, Price Elasticity, and Affordability (Block 1)

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OVERVIEW

- Forecasting water demand
- Price elasticity of demand
- Affordability of tariff

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FORECASTING WATER DEMAND

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IMPORTANCE OF WATER FORECASTING

- Objective of sustainable provision of water and sanitation services requires thorough analysis of water demand components and dynamics
- To set proper tariff, decision-makers should have sufficient information on water demand
- Water demand forecast is an important tool in formulating relevant investment policy
- Forecasting demand leads to the determination of the optimal future level of water use and hence to the design of the future capacity of the water supply system.

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FORECAST VERSUS PROJECTION

- Forecast is effectively an assumption of what will happen in the future based on a certain set of conditions as an analysis of past trends and estimates of future internal and external developments
- Projection is the result of a calculation based on a group of previously agreed assumptions and/or forecasts.

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FORECAST VERSUS PROJECTION (2)

- Projection is a mathematical exercise based on the result of the forecast and assumptions
- Thus, it is most important to analyse and scrutinise the forecasts and assumptions

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METHODS OF PREDICTING DEMAND

- Extrapolation of Historical Demands
- Per Capita Demand Forecasting
- Disaggregated Demand Forecasting



WATER BALANCE

$$\begin{aligned} &\text{Water abstracted} \\ &\quad - \text{production losses} \\ &= \text{Water produced} \\ &\quad - \text{leakages} \\ &\quad - \text{illegal consumption} \\ &\quad - \text{water not charged} \\ &= \text{Water billed} \end{aligned}$$



WASTEWATER BALANCE

$$\begin{aligned} &\text{Wastewater billed} \\ &\quad + \text{illegal discharge} \\ &\quad + \text{wastewater not charged} \\ &= \text{Wastewater discharged} \\ &\quad + \text{infiltration} \\ &= \text{Wastewater delivered to WWTP} \end{aligned}$$

PRICE ELASTICITY OF WATER DEMAND

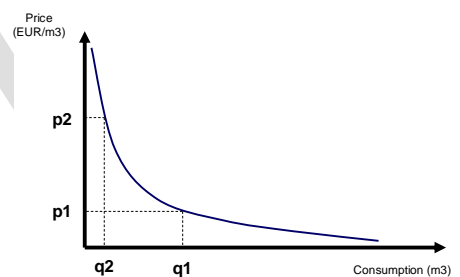


PRICE ELASTICITY OF DEMAND

The price elasticity of demand is defined as the percentage change in the consumption which follows from a percentage change in price.



PRICE ELASTICITY OF DEMAND CURVE



EXERCISE

WATER PRICE ELASTICITY OF DEMAND

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EXERCISE

q (m ³)	Δq	$(q1+q2)/2$	$\Delta q/(q1+q2)/2$	p (EUR/m ³)	Δp	$(p1+p2)/2$	$\Delta p/(p1+p2)/2$	PED
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[4/8]
6,30				0,15				
5,70				0,20				
5,30				0,25				
4,00				0,50				
3,40				1,00				

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EXERCISE - RESULTS

q (m ³)	Δq	$(q1+q2)/2$	$\Delta q/(q1+q2)/2$	p (EUR/m ³)	Δp	$(p1+p2)/2$	$\Delta p/(p1+p2)/2$	PED
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[4/8]
6,30				0,15				
	-0,60	6,00	-0,10	0,05	0,18	0,29		-35%
5,70				0,20				
	-0,40	5,50	-0,07	0,05	0,23	0,22		-33%
5,30				0,25				
	-1,30	4,65	-0,28	0,25	0,38	0,67		-42%
4,00				0,50				
	-0,60	3,70	-0,16	0,50	0,75	0,67		-24%
3,40				1,00				

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AFFORDABILITY OF WATER SUPPLY AND SANITATION SERVICES

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AFFORDABILITY

Water supply and sanitation services are considered economically affordable if households can pay the water bill without a significant reduction of expenditures on other essential goods and services.

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BACKGROUND OF AFFORDABILITY PROBLEM

- Liberalization and rapid growth of prices
- Introducing full cost recovery of services
- Level of poverty and inequality of income distribution

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ABILITY TO PAY

- **Key question:** *Is a customer able to pay?*
- Ability-to-pay indicator aims to answer the question of whether household income is sufficient to pay the increased price of services without seriously affecting its ability to pay for other essential goods and services.
- A household is considered unable to pay the service price when this would require a substantial reduction of other essential expenditures.
- Ability-to-pay analysis is based on statistical data and is more objective.



WILLINGNESS TO PAY

- **Key question:** *Will a customer pay?*
- A willingness-to-pay indicator aims to identify the maximum amount a customer would be willing-to-pay for a given number of units of a service of given quality. In addition, willingness-to-pay for improvement in quality can indicate the maximum amount a household would be prepared to pay for better quality.
- Willingness-to-pay analysis is based on subjective statements of households and their judgment about their income, the quality and the price of the service.



MEASURING ABILITY OF CUSTOMERS TO PAY

- Assessment of the current burden of payment based on macroeconomic data, by calculating the share of average water charges in average household income, i.e. at the level of society as a whole.
- Assessment of the current burden of payment based on microeconomic data, by calculating the share of water charges in the income of individual households or groups of households, i.e. at the household level.



ABILITY TO PAY AT THE COUNTRY LEVEL

- Share of the water and wastewater service bill in average household income (disposable or gross income); or, in the case when household income data are inaccessible or unreliable, in average household expenditures.
- Analysis of household expenditure structure as an indicator of household well-being.
- Household payment discipline as a response to tariff rise (the level of non-payment).



ABILITY TO PAY AT THE LOCAL LEVEL

- Share of the water and wastewater service bill in average household income (disposable or gross income); or, in the case when household income data are inaccessible or unreliable, average household expenditures.
- Access to data needed to calculate - sometimes statistical information is not available at local level and this must be estimated (e.g., using tax return information)



AFFORDABILITY CRITERION

- OECD 3-5%
- EU 3%
- USEPA 2,5%
- IFIs 4%

WAYS TO INCREASE AFFORDABILITY

- Measures aimed at lowering tariffs or tariff methods
- Measures to increase income of low-income households (including financial support of such households)

CONCLUSIONS

- **Affordability analyses for water and wastewater services should become an integral and indispensable element of tariff revision procedure. Such analyses should be introduced into regular practice of local governments in the process of approving tariffs and strategic development plans of water utilities.**
- **Affordability assessments should be required by feasibility studies for large investment projects to ensure that consumers are able to pay for the investments (through tariffs).**

EXERCISE AFFORDABILITY OF WATER SUPPLY AND SANITATION SERVICES

EXERCISE

Average Monthly Income (EUR)	No of Households	% of Population	Consumption m3/month/ household	Monthly Charge (EUR)	Monthly Charge as % of Monthly Income
(1)	(2)	(3)	(4)	(5)	(5/1)
Less than 10	3000	2%	12	3,6	
11 - 50	6000	4%	13	3,9	
51 - 100	45000	30%	16	4,8	
101 - 200	52500	35%	16	4,8	
200 - 500	30000	20%	15	4,5	
500 - 1000	7500	5%	17	5,1	
More than 1000	6000	4%	18	5,4	

EXERCISE - RESULTS

Average Monthly Income (EUR)	No of Households	% of Population	Consumption m3/month/ household	Monthly Charge (EUR)	Monthly Charge as % of Monthly Income
(1)	(2)	(3)	(4)	(5)	(5/1)
Less than 10	3000	2%	12	3,6	Up to 36%
11 - 50	6000	4%	13	3,9	36 – 8%
51 - 100	45000	30%	16	4,8	8 – 5%
101 - 200	52500	35%	16	4,8	5 – 2%
200 - 500	30000	20%	15	4,5	2 – 1%
500 - 1000	7500	5%	17	5,1	1 -0,5%
More than 1000	6000	4%	18	5,4	Below 0,5%

**THANK YOU
FOR YOUR ATTENTION!**



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Full Cost Recovery: Water and Sewer Tariff

(Block 1)

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OVERVIEW

- Functions of tariff
- Rate structure design overview
- Educating customers
- Exercise

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TARIFF FUNCTIONS

- Efficiency function
- Revenue function
- Administrative function
- Affordability function
- Social function ... ???

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EFFICIENCY FUNCTION

- Effect of tariff on rational behavior of customers
- Setting tariff at level of full cost recovery
- Ensuring that customers will pay exactly the amount as the cost of providing the service

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REVENUE FUNCTION

- Effect of tariff on revenues of the company
- Effect of revenues on the degree of financial autonomy of the company
- Effect of financial autonomy of the company on responsibility (accountability) for achieving results

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ADMINISTRATIVE FUNCTION

- Effect of tariff on administrative activities associated with settlements with customers
- Effect of tariff on administrative costs
- Effect of tariff on the understandability of billing of customers for services

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AFFORDABILITY FUNCTION

- Effect of tariff on economic affordability of services
- Effect of tariff on discipline of payments and outstanding payments

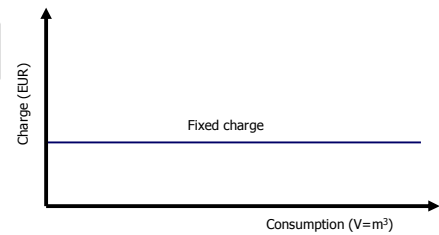
SOCIAL FUNCTION ...???

- Tariff for water and sewer services as an element of social policy sets prices below costs of delivery of those services
- Prices of services at a level lower than the costs of providing those services means that the company will have to be subsidized
- Subsidizing enterprises means depriving them of financial independence
- Weak financial condition of local governments means problems with the adequacy and timing of the subsidy for enterprises, which will lead to financial problems
- Lack of financial independence of enterprises translates into a lack of clear responsibility for the level of services provided
- Lack of clear responsibility for level of services means a drop in the effectiveness of providing these services

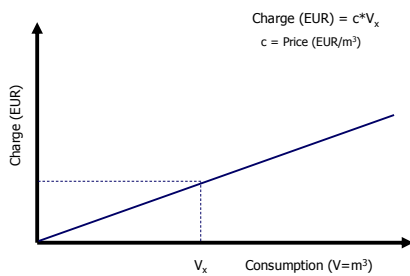
RATE STRUCTURE DESIGN OVERVIEW

- **Non Metered System:**
 - Uniform Flat Rate
- **Metered System:**
 - Uniform Rate
 - Two-part Rate
 - Descending Block Rates
 - Ascending Block Rates
 - Seasonal /Peak Use Rates

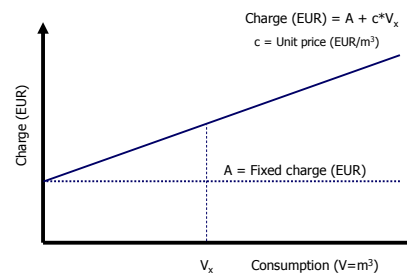
UNIFORM FLATE RATE

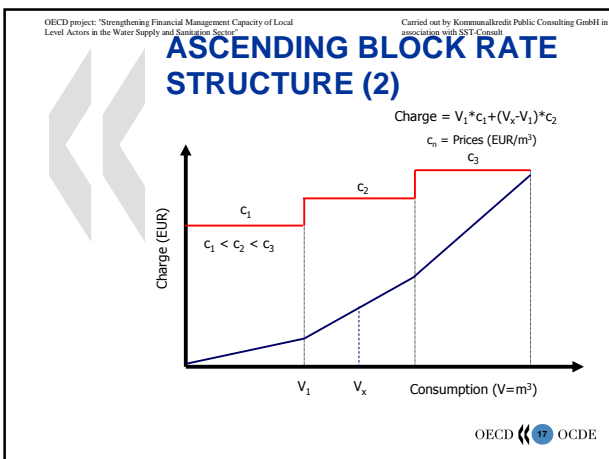
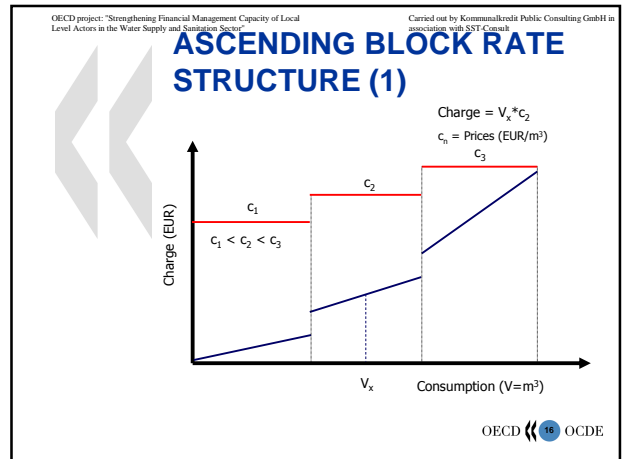
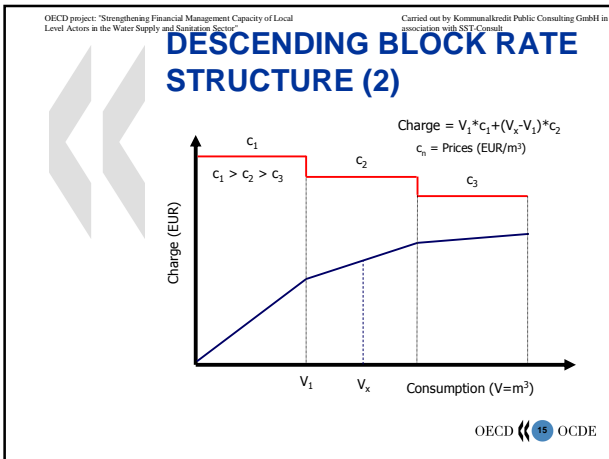
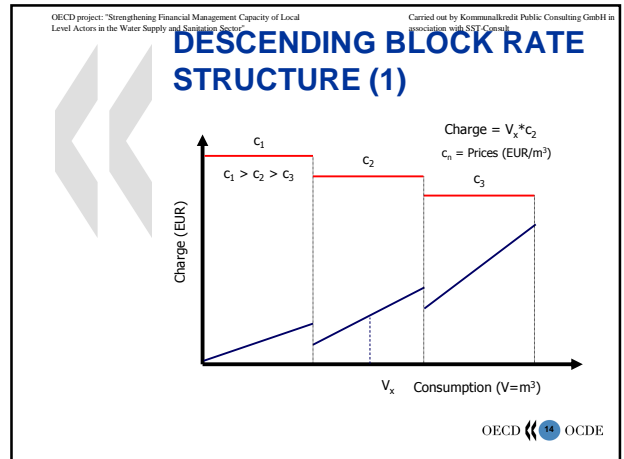
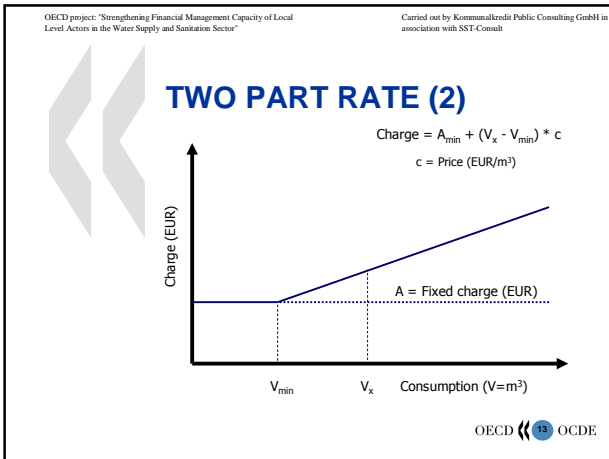


UNIFORM RATE



TWO PART RATE (1)





FULL COST RECOVERY TARIFF CALCULATION

- Water/ Wastewater balance
- Direct costs calculation
- Indirect costs calculation
- Allocation of indirect costs
- Bad debt
- Calculation investment costs
- Level of required revenue
- Tariff structure

EDUCATING CUSTOMERS

- Customers who understand the importance of safe water to their individual health, the health of their families, and the economic future of their community are willing to pay for it.
- Customers who understand the rate structure and believe it is equitable are willing to support needed rate increase.
- Customers will be willing to support a rate increase if they know the facts and understand how much it costs to produce and distribute clean water.

EXERCISE WATER TARIFFS STRUCTURE AND FORMULAS

EXERCISE

Uniform Rate with Fixed Charge	Total	Residential	Budgetary	Other
Number of Customers	89 000	88 000	150	850
Billed consumption (000s of m3)	37 300	28 000	2 800	6 500
Revenue requirement total (000s)	18 650	14 000	1 350	3 300
Revenue requirement B&C (000s)	800			
Fixed charge per month				
Unit rate per m3				

EXERCISE - RESULTS

Uniform Rate with Fixed Charge	Total	Residential	Budgetary	Other
Number of Customers	89 000	88 000	150	850
Billed consumption (000s of m3)	37 300	28 000	2 800	6 500
Revenue requirement total (000s)	18 650	14 000	1 350	3 300
Revenue requirement B&C (000s)	800			
Fixed charge per month	0,75	0,75	0,75	0,75
Unit rate per m3	0,479	0,472	0,482	0,507