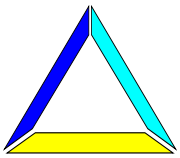
INSTITUTE FOR ECONOMIC RESEARCH AND POLICY CONSULTING
IN UKRAINE
GERMAN ADVISORY GROUP ON ECONOMIC REFORM

Reytarska 8/5-A, 01034 Kyiv, Tel. (+38044) 278-6342, 278-6360, Fax 278-6336
E-mail: institute@ier.kiev.ua, http://www.ier.kiev.ua



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Household gas prices in Ukraine

How to combine economic and social requirements

Abstract

Gas prices for private households are under strong upward adjustment pressure. Ukraine's government just decided to implement a new pricing scheme where households will receive domestically extracted gas at rather low prices, but consumption above a specified threshold level will become more expensive. While this is a step in the right direction, the new pricing scheme has important drawbacks and needs further adjustment. We analyze consumption pattern and affordability of gas for Ukrainian households and develop an alternative pricing scheme with more need- and cost- oriented prices and consumption thresholds. Such a scheme would stimulate investments and sets incentives for energy saving. Our proposal includes income transfers to the poorest households to ensure general affordability of natural gas for all households in Ukraine.

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1. Introduction

Gas prices for private households are under strong adjustment pressure. The issue will become even more severe when import prices for natural gas will be raised from January 2007. Ukraine's government just implemented a new pricing scheme for households who will continue to receive domestically extracted gas at rather low prices but will have to pay higher prices for consumption above a specified threshold. This new scheme, however, has important drawbacks. First, keeping the price for domestic gas at about half the world market level diminishes incentives for domestic gas extraction, which the government actually wishes to expand. Second, the chosen threshold levels are rather high so that the current low-prices-for-all scheme will effectively be prolonged, thereby still setting no incentive towards more rational use of gas.

In order to develop a more reasonable pricing scheme this paper analyzes consumption pattern and affordability of gas for Ukrainian households. Based on this analysis we suggest a pricing scheme with more need- and cost- oriented prices and consumption thresholds which a) stimulates investments, b) sets incentives for consumers to save energy, and c) includes income transfers to the poorest households to ensure general affordability of natural gas for all households in Ukraine.

2. The current situation

Domestic prices of natural gas in Ukraine are differentiated by type of consumer into prices for households, budget institutions, district heating companies and industries. The first three categories consume at regulated tariffs while industries receive gas from traders at more flexible prices. Since the end of 1999, regulated tariffs have remained remarkably flat and increased only in 2006 after import prices almost doubled (Table 1). However, while industry prices immediately jumped up to levels above the new import price of 479.75 UAH/tcm (95 USD/tcm) tariffs for budget institutions and district heating companies reached such levels only in July. Until then, gas deliveries at tariffs below import prices caused financial losses of about UAH 1.5 bn.[1] At the same time, gas consumption by private households at prices of about half the import price level has not caused direct financial losses since by regulation domestically extracted gas is exclusively supplied to households at a tariff that – according to the Ministry of Fuel and Energy – covers the reported costs of extraction and distribution. With an annual household demand of about 18bcm and domestic production of 18 to 20bcm during the past 6 years this seem to exactly balance, thereby providing a cheap supply source for household consumers.

Table 1
Domestic gas prices

	1999	2005	2006				2007**
			Jan - Apr	May - Jun	Jul - Oct	Nov - Dec	
Households	185.0	185.0	185.0	231.0	414.0	339.0	??
Budget institutions	231.0	231.0	288.0	360.0	648.0	648.0	886.3
District Heating	189.0	241.5	304.5	383.4	686.0	686.0	686
Industry*	131.9	442.0	663.5	663.5	663.5	663.5	886.3

Note: * average traders prices.
**expected based on an import price of 656.5 UAH/tcm and a 35% margin
Sources: Energobusiness, Resolutions of the CMU, NERC and IEA

3. Future development

After the scheduled increase of import prices to 130 USD/tcm (656.5 UAH/tcm) in 2007 further increases of domestic prices must be expected (see also Table 1). While market forces and budgetary pressure will cause industry prices and tariffs for budget institutions and district

[1] Budget institutions and district heating companies consumed about 0.7bcm and 7.7bcm in the first four months of 2006, and 0.3bcm and 0.6bcm from May to July (source: Energobusiness).

heating companies to rise – possibly with some delay as in 2006 – it is less straightforward to predict how the strictly regulated prices for household consumers should and eventually will adjust. In fact, despite the drastic increased of import prices the Cabinet of Ministers of Ukraine (CMU) has even lowered household prices in November 2006 on the ground of "new insights" on "justified" costs of gas extraction. In this section we will discuss the tariff scheme for household consumers that the government recently approved for 2007. Based on the identified problems of this scheme we will then suggest improvements.

In general, tariffs for regulated consumers need to balance economic and social requirements. Economic requirements include cost covering tariffs that signal the full economic value to both, producers as well as consumers. Particularly, tariffs need to:

° Incentivize gas distributors and suppliers for investment in service quality; and

° Incentivize consumers for rational use of gas.

Social requirements mainly imply that the affordability of gas as an essential service for all private households should be maintained. In addition, the administration of any pricing scheme should be as simple as possible. This in particular means that prices should not depend on consumer-specific factors such as living space, availability of gas-heating systems etc. because this gives rise for misuse and is generally difficult to administer.

In the case of household gas prices in Ukraine, economic requirements provide a clear case for strong price increases, which counteract the social requirements unless households in need are not compensated through other means. Against this background the following section discusses the tariff scheme recently implemented for 2007.

3.1 The "new scheme" of the government

The Cabinet of Ministers of Ukraine has recently approved a new scheme for household prices depending on consumption levels that will be in force as of January 2007. In particular, the CMU decision established the following consumption blocs:

- Annual gas consumption of up to 2.5 tcm will cost 339 UAH/tcm;
- Annual gas consumption between 2.5 and 6 tcm will cost 480 UAH/tcm;
- Annual gas consumption between 6 and 12 tcm will cost 980 UAH/tcm; and
- Annual gas consumption above 12 tcm will cost 1173 UAH/tcm.

In order to secure the rather low prices in the first two blocs the pricing scheme prolongs the regulation that domestically extracted gas has to be exclusively sold to household consumers.[2]

Judged on the basis of economic and social requirements as discussed above the scheme fails to provide incentives for investments and more rational energy consumption. Instead, it appears to be far too one-sidedly focussed on securing low household prices. In detail, we raise the following concerns:

First, the regulated supply of domestic gas to households at prices based on normative costs of extraction rather than on market values strongly hampers the growth in this sector. In fact, domestic gas producers face high opportunity costs from selling to private households since wholesale market prices are about twice the level of regulated household prices. Accordingly, they have little or no incentives to increase production volumes or even to invest in new capacities, which is urgently necessary for increasing domestic extraction volumes.[3] Worse, despite regulated prices at below market values gas extraction is even taxed at increasing

[2] In the same step the CMU also freezes tariffs for district heating companies at their current levels (UAH 686/tcm) and allows for provisions to compensate the gas supplier Naftogas from the central budget for possible losses it might face from supplying at this price.

[3] For example, an increase of 10 bcm per year from proven reserves is estimated to require capital investment of USD 1.5 bn. See IEA (2006): Ukraine. Energy Policy Review. Paris.

rates.[4] Overall, this strongly contradicts the government's own intention to increase domestic production in order to reduce Ukraine's import dependency. It is however not surprising that domestic extraction volumes have stagnated at around 18-20bcm since 1992.

Second, the consumption threshold until which gas is sold at the lowest price (2,5 tcm per year) is rather high. According to the Derzhkomstat household budget survey for 2005 average gas consumption accounted for about 1.5tcm per household and 70% of all households with access to gas consume less than 2.5 tcm per year.[5] It thus appears that the main objective of the price scheme is to secure low prices on average consumption levels rather than to specifically target a minimum consumption level. However, a more elaborate assessment of relevant minimum consumption levels must also consider different types of gas use (i.e. heating, cooking) as well as other factors such as availability of alternatives (i.e. district heating) etc. Our analysis in the next section will start from this point.

Third, regulated tariffs for all type of consumers should reflect the full costs of delivery. In fact, the costs of distribution and supply to households with rather small consumption volumes are higher than those for industrial consumers. Accordingly, cost-based household prices must also be above industry (wholesale) prices. Such cost-oriented tariff and price setting is not socially unresponsible. It rather provides incentives for industries to invest in infrastructure and service quality while stimulating rational use of energy resources by consumers. Inevitably, socially motivated and more far-reaching affordability concerns are a task for the social safety net rather than for industries that deliver costly services. The extent to which generally low and not cost-oriented tariff setting distorts the performance of Ukraine's gas industry is e.g. demonstrated by the observation that only about 60% of planned annual investment can actually be executed (Table 2).

Table 2
Investment needs and expenditures of NAK Naftogas, UAH bn

	2004	2005	2006	2007
Investment needs	6.98	6.28	7.21	8.49
Actual investments	4.34	3.58	3.82	4.50
Coverage of investment needs	62%	57%	58%	53%

Source: Energobusiness

Finally, the prolonged regulation that domestic gas has to be sold to private households at rather low prices creates arbitrage opportunities for gas producers and traders. Despite the existing legal barriers, the increasing wedge between household and industry prices makes an increase in rent-seeking activities and corruption even more likely.

Overall, the scheme approved by the CMU does not provide a balanced pricing mechanism for domestic gas pricing. Instead, given still rather uncertain import prices[6] and the increasing wedge between household and industry prices it can be expected that further price adjustments will soon be necessary.

3.2 An alternative suggestion

Before we proceed with suggesting sufficient improvements we first define and analyze the affordability of gas for private households at different price levels.

[4] E.g. the current tax on gas extraction of UAH 30.6 per tcm is scheduled to increase to UAH 50 per tcm in 2007.

[5] Calculated on the basis of expenditure data including in-kind gas transfers for all households with access to the gas grid and the average household price for 2005 (185 UAH/tcm).

[6] Import prices are so far confirmed for 2007 only.

3.2.1 Affordability of gas for private households

Affordability of energy and other utility services for private households is typically defined as maximum acceptable share of the respective bills in household income.[7] The respective shares vary across different countries, depending on economic as well as on other circumstances. Determining a specific level requires policy makers to compromise between social considerations, budgetary pressure as well as the need to keep sufficient incentives for rational use of the provided services.

In Ukraine, utility services (that is including electricity, district heating, gas, water, wastewater, garbage collection etc.) are considered to be no longer affordable if the sum of all bills exceeds 20% of the disposable household income. Other countries have set less restrictive thresholds. In Hungary, for example, energy services (that is, only electricity, gas and heating) are considered to be not affordable if:

- Monthly energy expenses reach or exceed 35% of the total monthly household income; and
- Monthly heating expenses reach or exceed 20% of the total monthly household income.

In addition to the problem of defining affordability thresholds for utility services in general, setting a maximum level for expenditures on the consumption of a specific type of energy such as gas is even less obvious since – mainly depending on local conditions – households might be able to substitute different fuels with one another. Accordingly, specifying a sufficient affordability threshold requires an adequate understanding of the availability of different energy alternatives and their types of use. An overview of alternative affordability thresholds determined by different institutions is given in Table 3.

Table 3
Affordability Benchmarks (in % of total household income)

Source	Electricity	Heating	Water
World Bank (2002)	10-15%		
WHO (2004)	10%		
IPA Energy (2003)	10%	20%	
UN/ECE*		15%	
UK government**		10%	3%
US government***		6%	2.5%
EBRD****	10%	10%	5%

Note: * Available online at http://www.unece.org/env/europe/reps.pdf.
**The UK government set 3 per cent as a burden threshold for the lowest income decile (see http://www.sustainable-development.gov.uk/sustainable/quality04/maind/04j06.htm and http://www.scotland.gov.uk/library5/environment/sfps.pdf).
***The US Environmental Protection Agency (http://www.epa.gov).
****Fankhauser and Tepic (2005): Can poor consumers pay for energy and water? An affordability analysis for transition countries. EBRD Working paper No. 92.

In Ukraine, households consume gas for two principal reasons, cooking and heating (water and space). For the former, gas can theoretically be replaced by electricity. However, electricity is more than two times as expensive as gas[8] so that a substitution is barely economic. For heating, the decision mainly depends on the availability of alternatives. More than 80% of urban households are connected to district heating systems at very low prices and thus, do not rely on gas for heating purposes while those who do so use independent gas-fired heating systems mainly for convenience and reliability reasons. On the contrary, only about 18% of rural households are connected to district heating systems while more than 50% have access to the central gas grid. Accordingly, a much larger fraction of rural households is forced to rely on gas

[7] See e.g. EBRD (2003): Can the poor pay for power? The affordability of electricity in South East Europe.
[8] Even gas prices of UAH 800 per tcm correspond to 8.4 Kopeks per kWh which is significantly below electricity price levels (e.g. average wholesale prices are already at 20 Kopeks per kWh).

for heating purposes. Finally, another important dimension is the time over which substitution can occur. In general, the shorter the period of consideration the fewer are possibilities for substitution.

Against this background and on the basis of the alternative threshold levels indicated above we suggest assessing the affordability of gas on the basis of:

- gas expenditures of 5% of disposable income for urban households (with access to district heating); and
- gas expenditures of 10% of disposable income for rural households who need gas also for heating.

The Derzhkomstat household budget survey for 2005 provides information on the annual gas consumption pattern of urban and rural households.[9] As expected, average consumption levels of rural households are about twice as high as those of urban ones (Table 4). But the data also show that consumption levels in general are rather high for all households. About 8% of urban and even 21% of rural households consume more than 3tcm a year. More astonishingly, maximum annual consumption levels of urban households exceed 20tcm and for rural even 33tcm. For private consumption purposes these levels are implausibly high. For comparison, based on estimates of the International Energy Agency (IEA) on annual energy use for heating purposes in CIS countries it needs about 2.5tcm of gas per year to heat a living space of 100m2 (250m3).[10] In contrast, average living space of urban and rural households in the survey accounts for 33 and 43 m2. Accordingly, peak consumption levels of the household survey suggest commercial rather than "normal" private consumption pattern. Hence, an assessment of social affordability should not fully rely on such data. To develop a more meaningful benchmark we have estimated gas consumption by individual households as a function of disposable income as well as relevant household characteristics.[11] While average annual consumption levels in our estimates yield similar results as the household survey, maximum consumption levels are now more realistic (1.5 tcm and 2.5 tcm for urban and rural households, respectively, see Table 4). We therefore conclude that our estimates provide a reliable basis for the pattern of gas consumption based on which the affordability of gas for different households can be assessed.

Table 4
Annual gas consumption by Households in Ukraine (2005)

	Derzhkomstat		**Own estimates**	
	Urban	Rural	Urban	Rural
Household consumption (in tcm)				
- average	1.0	1.9	1.1	2.1
- maximum	20.8	33.7	1.5	2.5
Number of households with gas consumption below:				
0.5 tcm	54%	17%	0%	0%
1.0 tcm	76%	34%	17%	0%
1.5 tcm	81%	48%	100%	0%
2.0 tcm	84%	60%		28%
2.5 tcm	88%	70%		100%
3.0 tcm	92%	79%		

Source: Derzhkomstat household budget survey, own calculations.

[9] Household expenditures for gas as well as the value of in-kind transfers for gas have been converted in consumption levels based on the average household price for 2005 (185 UAH/tcm).

[10] IEA (2005). Coming in from the cold. Improving district heating policy in transition economies. Paris. The upper level of annual energy use per space heated in CIS countries is 90kWh/m3. Assuming 250m3 of space this means 22.5MWh or 2.4tcm of natural gas.

[11] A significant impact was found for access to the central gas grid and district heating systems as well as for living space per household.

A first such assessment of affordability is provided in Table 5. At an average household price of 339 UAH/tcm 49% of rural households will have gas expenditures above 5% of their disposable income but only 11% have to spend more than 10%. The slightly higher gas price of 440 UAH/tcm which prevailed from July to October 2006 (Table 1) delivers similar results. Now, 46% of all households spend more than 5% of their income for gas but only 14% of all households (23% of rural households) face a gas bill higher than 10% of their income. At this price, a need-oriented compensation scheme based on the 5%-threshold for urban households and 10% for rural households (who use gas also for heating) will require transfers of only about UAH 640 m. Accordingly, the slight affordability issue under an average household price of 440 UAH/tcm could rather easily be managed. Obviously, social concerns did not provide a significant justification for the reduction of household gas prices back to UAH 339 in November.

Table 5
Affordability for private households at different gas prices

Gas price, UAH/tcm	**339**		**440**		**500**		**900**	
Threshold	5%	10%	5%	10%	5%	10%	5%	10%
- Share of households with gas expenditures above threshold -								
Urban households	**9%**	0%	**19%**	2%	**26%**	3%	**65%**	21%
Rural households	49%	**11%**	65%	**23%**	71%	**30%**	83%	**68%**
Total	32%	6%	46%	14%	52%	19%	75%	47%
Compensation payments up to threshold level								
Threshold	5%	10%	5%	10%	5%	10%	5%	10%
- Compensation payments (m UAH) to eligible households (urban 5% & rural 10%) -								
to urban households	50.2		157.7		261.1		1763.8	
to rural households		146.4		482.4		803.7		5032.5
Total	196.6		640.0		1064.8		6796.3	

Source: Derzhkomstat household budget survey, own calculations

The assessment is different if gas prices are further increased. For example, if gas were equally priced at the wholesale level so that the import price determines opportunity costs for using domestically extracted gas, the agreed import price of 2007 of 130 USD/tcm (656 UAH/tcm) would imply a household price of at least 900 UAH/tcm.[12] In this case, 75% of all households would have to spend more than 5% of their income and 47% even more than 10%, with a significantly stronger negative impact on rural households. Compensating all eligible households would now require almost UAH 7 bn.[13] Although this amount as such is not dramatically high it can be doubted that Ukraine has the necessary institutional infrastructure in place to quickly and efficiently redistribute such a sum to poor households. Instead, what is required is a pragmatic pricing system for households, which satisfies all of the three conditions mentioned at the beginning of this section (investment incentives for domestic industry, incentives to save energy for households, social affordability).

3.2.2 Alternative bloc tariff scheme

In principle, differentiating prices based on consumption levels as suggested by the CMU is a suitable way for improving the pricing system while ensuring affordability for poor households. However, as discussed above, the scheme approved by the CMU combines very low prices with rather generous consumption thresholds and hence, fails to set appropriate incentives for industries as well as for households. Moreover, it still requires that domestically extracted gas is exclusively sold to private households. Instead, what is required is to build the pricing scheme upon more cost-oriented price levels by setting more restrictive thresholds for low-price consumption so that only the poorest households receive significant benefits. At the same time,

[12] Based on an industry price of 886 UAH/tcm as estimated in Table 1.
[13] For all calculations we have assumed that (short run) gas demand remains price inelastic.

substantially higher prices are needed for additional consumption levels in order to set stronger incentives for domestic gas distribution and in particular allow for equal treatment of gas at the wholesale level. Finally, the pricing scheme must be completed by a system of transfers to households (in order to keep their gas bills below affordability thresholds) and industries (to cover losses from sales below costs).

In practice, many different specifications are possible to construct a pricing scheme along those lines. To provide a concrete example we have calculated the impacts of the following two-bloc pricing system:

- Annual gas consumption of up to 1.5tcm costs 500 UAH/tcm;
- Annual gas consumption above 1.5tcm costs 900 UAH/tcm;
- Compensations to industry for gas delivered at 500 UAH/tcm to ensure an effective supply price of 900 UAH/tcm (under the guidance of NERC); and
- Compensations for households with a share of gas expenditures above 5% (urban) or 10%, respectively, of their disposable household income.

While lots of other combinations of specific thresholds and prices are possible this suggestion appears to be a good compromise as it provides

- sufficient incentives for investments to gas distributors and suppliers by ensuring compensation up to a full cost-covering price for all supplies;
- sufficient incentives for energy saving to gas consumers by charging the full price on higher consumption levels; and
- affordable gas supplies to all households through direct compensation.

A differentiation by rural and urban households, or households with and without access to direct heating is not foreseen in order to reduce administrative requirements and to avoid possibilities for misuse. Also, a differentiation for metered and unmetered consumption is not suggested. Instead, all unmetered consumers are simply charged an average price over all households that are connected after the “last meter”.

The specific impact of this scheme is demonstrated in Table 6. Despite the high target price of 900 UAH/tcm only 26% of urban and 43% of rural households face gas bills above their respective threshold levels. At the same time, total compensation payments of about UAH 9.6 bn are required, of which the largest part (UAH 7.9 bn) is paid to the industry and about UAH 1.7 bn are required as direct compensation to households.[14]

Table 6
Impact of alternative bloc tariff scheme

	Share of households with expenditures above threshold	**Compensation to**	
		Industry	Households
Urban households (5%)	26%	2 862	252
Rural households (10%)	43%	5 021	1 445
Subtotal		7 883	1 697
Total		9 581	

Source: Derzhkomstat household budget survey, own calculations

Since the target gas price is set at 900 UAH/tcm the financial amounts necessary for compensating suppliers and consumers (UAH 9,6 bn) are directly comparable – and significantly

[14] For comparison, in Table 5 we calculate that with single price of 900 UAH/tcm 65% of urban and 68% of rural households face gas bills above their respective thresholds.

higher – than those calculated for the same price in Table 5 (UAH 6.8 bn). While this demonstrates the impact of the still not accurate targeting (all households benefit equally from lower prices for consumption of up to the 500cm or 1800cm thresholds) the advantage is that a significant part (UAH 7.6 bn.) could be distributed directly in a well-established and rather transparent institutional environment.[15]

3.2.3 Further necessary steps

Despite its advantages, our recommended pricing scheme is not a long-run solution! Rather, further price increases are inevitable since even the increased import price in 2007 is still far from internationally competitive levels and hence, also wholesale market prices will continue to increase strongly.[16] In turn, higher wholesale prices will increase transfer payments to household and industries which can only be managed by lowering minimum consumption levels and increasing prices. Nevertheless, what our suggestion delivers is a grace period of about 1-2 years during which further steps necessary to reduce the level of household demand can be undertaken. Above all, such further steps should aim at ensuring separate billing of individual consumers together with the technical opportunities to reduce consumption levels. Hence, measures should focus on:

- Installation of gas metered for every connected household; and
- Activities to improve energy efficiency, including awareness campaigns, improvement of isolation in residential buildings, investments to reduce losses from distribution, financial support for investments (small- and medium-scale) in increased energy efficiency etc.

Moreover, the government should re-assess the current affordability threshold for utility bills to households of 20% as this seems to be set at a rather low level, and thus favors social concerns too much relative to economic considerations and budget constraints. Instead, affordability of all utility services should be analyzed along the lines presented in this paper for the case of gas. Based on such a study, realistic and acceptable thresholds should be set which present a well-balanced compromise between economic, budgetary and social considerations.

For all those programs, Ukraine's government would be well-advised to work closely together with international donors and finance organizations in order to benefit from cheap investment funds as well as from additional expertise.

Summary

Against the background of rising gas prices and huge investment needs in domestic production we recommend to not continue the past policy of securing low consumer prices at any cost. As we have repeatedly argued, this policy diminishes the economic position of the industry in general and in particular, provides little incentives for investments. Moreover, obligatory sales of domestic gas to households at prices below wholesale market levels runs counter Ukraine's intention to reduce its import dependency by stimulating domestic gas extraction. Finally, as long as gas prices are kept on low levels consumers have no incentive for a more rational use of gas.

The pricing scheme which the CMU recently approved does not improve the situation. In particular, it still foresees obligatory sales of domestic gas to household at low prices while setting generous consumption thresholds within which the low prices are applied. Consequently, the scheme fails to provide a sustainable solution. Rather, such a solution should be designed around three key requirements: sufficient incentives for investments, sufficient incentives for

[15] NERC already redistributes significant cash flows in the electricity sector on the basis of rather transparent formulas. This had a significant positive impact on the payment discipline in the electricity sector.

[16] In a separate paper we estimate an economically justified price at about 277 USD/tcm (Ukrainian Gas Imports: Towards secure and economically reasonable transactions. GAG Advisory Paper V12, http://www.ier.kiev.ua/English/papers/papers_eng.phtml).

energy saving and affordability of gas to households in need. After an assessment of affordability of gas at different price levels we provide a pragmatic solution along those lines, where consumption up to a relatively tight threshold level is charged with a somewhat lower price while any additional volumes are priced at a fully cost-covering price which is consistent with the overall wholesale market. In addition, the scheme is completed by transfers to industries for securing cost covering operations as well as to those households for which the gas bill exceeds the relevant threshold level.

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Authors: FP and AC

Lector: RG