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OVERVIEW OF BENCHMARKING SYSTEMS IN EU COUNTRIES IN WATER & WASTEWATER AND DISTRICT HEATING SECTORS

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REPORT

Overview of benchmarking systems in EU countries in water & wastewater and district heating sectors

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Executive summary

1. Overview of benchmarking systems in EU countries in water & wastewater and district heating sectors (thereafter - Report) aims to **provide assistance** national regulatory institution of Ukraine at **establishing utility benchmarking system** by providing information on the best international practices for utility benchmarking systems in EU countries.
2. The report outlines the **variety of Key Performance Indicators** used in different countries and **enables** decision makers **to choose** the ones **best reflecting situation** of the country.
3. As a general summarizing comment, it is to be said that key performance indicators are used for several purposes.
4. Regulators use the KPIs to **introduce efficiency in the market** generally and into activities of market participants individually, that has no real competitive pressure, and do it on solid grounds – utilities are driven by profits interest just like in competitive market would.
5. Regulators as well use KPIs to make market overview reports and thus **increase transparency of the market**, at the same time incentivizing utilities to strive for higher achievements – publicity and renomé is the driver for utilities in this case.
6. **Better service to consumers** is possible to achieve either at having respectfully developed the set of KPIs.
7. However, the international practice suggests that **the "soft objectives"** (as quality perceived by consumers) **follows after the "hard objectives"** (as technical quality or penetration) are accomplished.
8. The international cases examined and the composition of KPIs (substance of KPIs) suggest, that it is general practice to have **reporting** to regulator **once a year**, and generally it is **trusted the data provided**. In fact, utilities have little interest in supply with malicious data, since they individually can affect the average mean of KPI to an indeed limited extent, and regulator is able to choose certain methods to eliminate extreme values for more accurate reflection of the sector status. Moreover, during individual auditing sessions / **targeted review** the particular entity is examined up to primary data level, and reported data might fall under review **scope** either (this is done for a period of several years).
9. There is review conducted and comments provided on proposal for KPIs for Ukraine for water supply and sewerage sector. The generalizing comment of this part is that the **set of KPIs**

proposed/established for Ukrainian regulator shall reflect the objectives of the state/regulator **in the sector** and shall **enable measure the progress** towards achievement of these objectives.

Note

10. Since at the meeting with local experts in Kyiv at 14th October, 2015, the greatest attention was given to water supply and sewerage sector, due to the ongoing processes, the report mainly focuses on this sector either. Additional examples for benchmarking in district heating sector might be provided later, as a supplement to this report.

Concept of benchmarking and its role within the incentive based system of utility regulation

11. The Report aims at providing information on international practices for utility benchmarking systems in EU, for water and sewerage sector and district heating sector.
12. Sources of information used are provided at reference notes, however, it is to be noticed, that due to time limits there was a rigid selection made of available sources, applying criteria whether the information might practically be considered for Ukrainian situation. Greater level of detail might be additionally provided at later stages.
13. "Benchmarking - the comparison of similar processes or measures across organizations and/or sectors to identify best practices, set improvement targets, and measure progress", as is provided in Effective Utility Management Primer[1] for Water and Wastewater Utilities, by United States Environmental Protection Agency. In fact, benchmarking can be used to measure process, performance and competencies against "best practices" and the peers of the measured subject.
14. The need for and value of transparent and standardized information with which to compare utilities' performances is great to various stakeholders. Regulators are especially concerned with benchmarking tool usage since it facilitates achievement of better quality and value to consumers by regulated entities, help increase transparency and accountability of the regulated sector.
15. As World Bank puts[2], the primary objectives of benchmarking are as follows:
    - To provide a set of Key Performance Indicators (KPIs) related to a utility's managerial, financial, operational, and regulatory activities that can be used to measure internal performance and provide managerial guidance;
    - To enable an organization to compare its performance on KPIs with those of other relevant utilities, to identify areas needing improvement, to formulate and attain relevant goals as set in its activity plan.
16. Benchmarking can have form of metric benchmarking and form of process benchmarking.

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[1] EPA Effective Utility Management Primer for Water and Wastewater Utilities, http://water.epa.gov/infrastructure/sustain/upload/2009_05_26_waterinfrastructures_tools_si_watereum_primerforeffectiveutilities.pdf

[2] The IBNET Water Supply and Sanitation Performance Blue Book, World Bank, Water and Sanitation Program, https://openknowledge.worldbank.org/bitstream/handle/10986/2545/588490PUB0IBNE101public10BOX353816B.pdf?sequence=1

- *Metric benchmarking* systematically compares the *performance* of particular utility against other similar utilities, and tracks performance of that particular utility over period time. Metric benchmarking is most powerful when carried out over time, tracking year-to-year changes in performance, using the same core set of performance indicators;
- *Process benchmarking* compares the effectiveness of utility's *processes and procedures* against selected peers, for example, billing and collection; if comparison reveals one utility's system to be more effective or efficient than the others, the underperforming entity can adopt and internalize those processes and procedures as appropriate.

17. The performance indicator constitutes the mix of both types of benchmarking. Indicators are quantitative, comparable measurements of a specific type of activity or output.
18. However, benchmarking practices as from perspective of regulation in general and for regulatory institution in particular, enables to develop a powerful and targeted mechanism for regulatory pressure upon utilities to increase efficiency of their activities and as a result deliver greater value for consumers along to other side objectives that might have place (related to environmental goals, for example). In fact, tool of benchmarking used by regulator enables to potentially reach the same or comparable results in the industry as competition would (to mimic discipline set by competition market) – pressing for efficiency, especially at those market which, for variety of reasons, are monopolistic ones and effective competition has not taken place yet or is not even planned in foreseeable future. Benchmarking - from perspective of a regulator - enables to introduce "virtual competition" among active entities in the case of real competition is absent in the industry. Under this "virtual competition" pressure, entities in fact compete with each other for costs even if they do not compete for consumers/sales in real local territories served.
19. Benchmarking or yardstick competition is able to provide a regulator with information on efficient CAPEX and OPEX levels and to reduce the informational rents experienced by regulated utility otherwise. Results of benchmarked efficient CAPEX and OPEX are later used by regulator to set pricing decisions:
    - Determining factor x at price-cap regimes, or
    - Determining efficiency objectives at rate-of-return regulatory regimes.
20. Benchmarking or yardstick competition is able to provide a regulator with comparable and transparent information of how regulated entities perform.

21. As for utilities, benchmarking is a solid instrument to (i) assess self-performance and focus on shortcomings, providing strategic business planning baseline; (ii) facilitate financial assistance; (iii) refer in the case of advocacy needed.
22. As for other stakeholders, for example, political and public sector stakeholders, benchmarking is able to serve properly for comparative assessment of territories, regions, industries and for providing strategic planning baseline.
23. The process of benchmarking cycle consists out of several steps: (i) organizing benchmarking team / deciding on "project owners", (ii) develop and clarify benchmarking objectives, (iii) select benchmarking methodology, (iv) collect data, (v) verify data, (vi) perform data analysis, (vii) conduct sensitivity test, (viii) derive results and present, (ix) conclude on measures to improve performance.
24. The ordinary process shall be followed to the possible extent. However, in practice, some deviations from the recommended sequence might be inevitable, and in the case practical approach can be followed – when perfect option is not feasible, it's better to have some option rather than no option.
25. With thus, it is to be stated, that benchmarking can successfully be used as an integral part of regulatory system, including regulatory area of costing and pricing decisions – yardstick competition will provide solid data on each entity's activity results, costs, quality of processes and procedures, and gaps to be possibly achieved by every entity at every area measured over distinct period of time.
26. The most remarkable characteristic of benchmarking, from the regulatory point of view, is that this tool can be applied continuously (tracking same indicators during years), but also at diversifying scope (introducing new indicators), thus provide efficiency gains and improvement potentials almost endlessly. Just like in competitive market.
27. It has to noticed, that introducing of benchmarking practices in regulatory regime is associated with changes of administrative burden, and regulated entities might raise the issue.

Benchmarking practice in UK, England and Wales, by Ofwat. Drinking Water Supply and Sewerage Utilities

28. Ofwat conducts regulation towards 32 companies in England and Wales[3], which provide services to 50 million household and non-household consumers. Regulated utilities include:
    - 10 regional companies providing both drinking water and sewerage services; respective regional monopoly boundaries fixed at privatization in 1989 with possibility to apply for new areas. Each company has between 1.2 million and 8.5 million customers; some of their customers receive both water and sewerage services, while others receive only sewerage services from them and receive water services from another company;
    - 9 regional companies providing water services only; respective regional monopoly for water supply based on boundaries that were fixed at privatization in 1989. Each company has between 2000 and 3.1 million customers; all of their customers receive sewerage services from another water and sewerage company;
    - 5 local companies providing either water or sewerage services or both; respective local monopoly for their services based on boundaries that were set when they were appointed, and there is possibility for these companies to apply to vary their appointments to cover new areas. Each company has up to around 1700 customers; some of their customers will receive both water and sewerage services, but others will receive water or sewerage services from another company. Locally appointed companies have the same powers and responsibilities as the regional water and sewerage and water only companies, and Ofwat ensures that customers are no worse off under a locally appointed company than they would be under the regional monopoly supplier;
    - 8 water supply licensees offering water services to large use customers. These companies can access an appointed water company's supply system to supply water and sewerage services to eligible premises. They can then compete with the appointed water companies to serve large customers, and Ofwat does not directly regulate the prices for those companies but rather ensures usage of market forces to benefit consumers and environment.
29. The companies under regulation by Ofwat annually publish range of information falling into three categories of performance, i.e. Risk and compliance statement, Key performance indicators, and Annual regulatory accounts. This information is aimed to report to consumers on how regulated

[3] Official OfWat website: https://www.ofwat.gov.uk/industryoverview/today/watercompanies

utilities are performing and to help Ofwat in determining whether there is any risk to consumers' interest and a necessity to Ofwat to intervene.

30. Not later than July 15 Risk and compliance statement[4] shall be published and a signed copy delivered to Ofwat, via email. Ofwat expects the utilities consider their readiness to meet obligations and consumer expectations, adequacy of their internal processes and systems to identify and mitigate risks. The risk and compliance statement shall provide a confirmation that the utility has sufficient financial and management resources available for at least the next 12 months to meet their obligations as a water undertaker; a confirmation that transactions with associated companies are at arm's length (except where agreed by Ofwat) with no cross subsidy occurring; a confirmation that contracts entered into with associated companies include requirements concerning the standard of service to be provided, to ensure the utility is able to meet its obligations as a water undertaker; a confirmation that if a special administration order were to be made, the utility would have available sufficient rights and assets (other than financial reserves) to enable a special administrator to manage the affairs, business and property of its regulated activities; an explanation on links between the standards of performance we achieve and directors' and senior executives' pay. Website links to some examples of Risk and compliance statements are provided in reference note[5].
31. Not later than July 15 Key performance indicators[6] shall be published (annual publications are obligatory, and utility might choose either) and a signed copy delivered to Ofwat, via email. A utility might choose a more frequent basis rather than obligatory annual publishing, and it might choose publishing additional indicators[7] along to the established ones. Four high-level areas of indicators are established and achievements / results of utilities are evaluated as green – amber – red (respectively positive – medium - lagging). The key performance indicators serve *inter alia* during the price review cases. The four high-level areas of key performance indicators are the following:
    - Customer experience high-level area, with three indicators present: (i) Service incentive mechanism (SIM), (ii) Internal sewer flooding, (iii) Water supply interruptions;

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[4] Risk and compliance statement guidance
http://www.ofwat.gov.uk/regulating/compliance/reportingperformance/riskcompliance/prs_webriskcompprintable.pdf

[5] Affinity Water https://stakeholder.affinitywater.co.uk/docs/Risk-Compliance-Statement-2014.pdf ; United Utilities Water http://corporate.unitedutilities.com/documents/UUW_Risk_and_Compliance_Statement_2014.pdf; South Staffs Water http://www.south-staffs-water.co.uk/publications/about_us/South_Staffs_Water_Risk_and_Compliance_2013-14.pdf

[6] Key performance indicators guideline
http://www.ofwat.gov.uk/regulating/compliance/reportingperformance/kpi/prs_web_kpiprintable.pdf

[7] Dwr Cymru Welsh Water http://www.dwrcymru.com/_library/2014/Performance_report_201314.pdf ; Thames Water http://www.thameswater.co.uk/tw/common/downloads/aboutus-financial/TWUL-March-2015_signed.pdf ; United Utilities http://corporate.unitedutilities.com/kpi-2014.aspx

- Reliability and availability high-level area, with six indicators present: (i) Serviceability of water non-infrastructure, (ii) Serviceability of water infrastructure, (iii) Serviceability of sewerage non-infrastructure, (iv) Serviceability of sewerage infrastructure, (v) Leakage, (vi) Security of Supply Index (SoSI);
- Environmental impact high-level area, with five indicators present: (i) Greenhouse gas (GHG) emissions, (ii) Pollution incidents (sewerage), (iii) Serious pollution incidents (sewerage), (iv) Discharge permit compliance, (v) Satisfactory sludge disposal;
- Financial high-level area, with four indicators present: (i) Post-tax return on capital; (ii) Credit rating, (iii) Gearing, (iv) Interest cover.

The key performance indicators, their description and calculation instructions are provided in Table #1 "The key performance indicators monitored by Ofwat" below.

32. Not later than July 15 Annual Regulatory Accounts shall be submitted to Ofwat, for the financial year ending March 31, inter alia for publishing. Some examples can be found in reference note[8]. In practice, this report includes Financial reporting either. Accounting separation information[9] shall be supplied to Ofwat on annual basis, as a part of obligation to supply Regulatory Accounts.
33. Key Performance Indicators can be attributed with ranking of green (positive), amber (medium) and red (lagging). The explanation on which cases (at numerical expression) is provided, and can be found in the Table #1 below either.
34. After collection and publication of relevant supplied reports, Ofwat develops "A spreadsheet for companies' performance data", which discloses comparative information on every indicator for every utility, and which is downloadable from Ofwat website[10].

[8] Affinity Water https://stakeholder.affinitywater.co.uk/docs/AWL-annual-report-2014v3.pdf ; Bristol Water http://www.bristolwater.co.uk/wp/wp-content/uploads/2014/07/BW-Regulatory-accounts-v1.1_with-AR.pdf ;

[9] Anglian water http://www.anglianwater.co.uk/_assets/media/Accounting_Separation_Methodology_2014.pdf ; Northumbrian Water https://www.nwl.co.uk/_assets/documents/NWL_Accounting_Separation_statement_13-14_FINAL.pdf ; Wessex Water http://www.wessexwater.co.uk/uploadedFiles/Corporate_Site/Performance/Annual%20review%20and%20accounts%202014.pdf

[10] Information of utilities performance, including the "Spreadsheet for companies' performance data" https://www.ofwat.gov.uk/regulating/casework/reporting/rpt_los2013-14performance

Table #1. **The key performance indicators monitored by Ofwat**[11]

Indicator	Definition	Measure and ranking	Calculation
Customer experience indicators			
Service incentive mechanism (SIM)	The level of customer concern with company service and how well the company deals with them	Score Green if ≥ 50 Amber if between 50 and 40 Red if ≤ 40	Methodology for composite indicator is provided: http://www.ofwat.gov.uk/regulating/aboutconsumers/sim/pap_tec20110126sim.pdf https://www.ofwat.gov.uk/regulating/aboutconsumers/sim
Internal sewer flooding	Number of incidents of internal sewer flooding for properties that have flooded within the last ten years	Number of incidents G/A/R n.a.	All the flooding incidents are counted, internal and external, for the last 10 years, including those caused by severe weather.
Water supply interruptions	Number of hours lost due to water supply interruptions for three hours or longer, per property served	Hours per total properties served G/A/R n.a.	Number of hours lost per property served in the year with supply interruption greater than three hours (disrespecting reasons); property served is the number of connected properties for water supply.
Reliability and availability indicators			
Serviceability of water non-infrastructure Serviceability of water infrastructure Serviceability of sewerage non-infrastructure Serviceability of sewerage infrastructure	Assessment of the recent historical trend in serviceability to customers, as measured by movements in service and asset performance indicators.	Green is Stable / Improving Amber if Marginal Red if Deteriorating	The company makes a judgment about the overall serviceability in each sub-service and updates the serviceability status as one of the following {Stable ... Deteriorating}.
Leakage	The sum of distribution losses and supply pipe losses, including any uncontrolled losses between the treatment works and the customer's stop tap, non-including internal plumbing losses.	Mega liters a day (Ml/day) Green – if utility met / exceeded annual target; no concerns regarding ability to meet next year Amber - if utility failed to meet annual target or concerns on ability to meet next year	2 methods under choice: 1) the minimum night flow (flows into District Metered Areas in the early hours of the; once the company has deducted an allowance for legitimate use, it classifies the remainder as leakage), or 2) the integrated flow (estimates all the components

[11] More detailed description and references are provided at https://www.ofwat.gov.uk/regulating/compliance/reportingperformance/kpi/publishing

		Red – if utility failed to meet annual target, and it had negative impact on SoSI or concerns on ability to target meet next year	of the water balance except leakage, and assumes that the difference between distribution input and water used is leakage).
Security of Supply Index (SoSI)	The extent to which a company is able to guarantee provision of its levels of service for restrictions of supply, under scenario of dry year and scenario of peak demand.	Index score Green – if utility met / exceeded annual target; no concerns regarding ability to meet next year Amber - if utility failed to meet annual target or concerns on ability to meet next year Red – if utility utility failed to meet annual target, and has concerns on ability to target meet next year	Available headroom = WAFU (water available for use) (Ml/d) + bulk imports (Ml/d) – bulk exports (Ml/d) – dry year distribution input (Ml/d). The index is based on the difference between the available headroom and the target headroom in each zone.
Environmental impact indicators			
Greenhouse gas (GHG) emissions	Measurement of the annual operational GHG emissions of the regulated business	Kilo tons of carbon dioxide equivalent (ktCO2e); Change % in comparison with the last price review Green – if performance ≥ 10% target, set at last price review Amber – if performance less 10% target, set at last price review, with reasonable expectation to report green next period Red – if performance less 10% target, set at last price review, with no reasonable expectation to report green next period	annual operational net GHG emissions, with established restrictions
Pollution incidents (sewerage)	The total number of pollution incidents (cat. 1-3) in a calendar year emanating from a discharge or escape of a contaminant from a sewerage company asset.	# of incidents per 10,000km of sewer Green – if performance is more than 0.5 standard deviations below industry average for ’08-‘10 Amber – if performance is more than 0.5 standard deviations below and 1 standard deviation above industry average for ’08-‘10 Red - if performance is greater than 1 standard deviation above industry average for ’08-‘10	The total number of pollution incidents (cat. 1 - 3) per 1,000 km of sewer length for which a sewerage company is responsible in a calendar year

Serious pollution incidents (sewerage)	The total number of serious pollution incidents (cat. 1-2) in a calendar year emanating from a discharge or escape of a contaminant from a sewerage company asset	# of incidents per 10,000km of sewer Green – if performance is more than 0.5 standard deviations below industry average for '08-'10 Amber – if performance is more than 0.5 standard deviations below and 1 standard deviation above industry average for '08-'10 Red - if performance is greater than 1 standard deviation above industry average for '08-'10	The total number of pollution incidents (cat. 1 - 2) per 1,000 km of sewer length for which a sewerage company is responsible in a calendar year
Discharge permit compliance	Performance of sewerage assets to treat and dispose of sewage in line with the discharge permit conditions imposed on sewage treatment works	Percentage (%) Green – if performance is more than 0.5 standard deviations below industry average for '08-'10 Amber – if performance is more than 0.5 standard deviations below and 1 standard deviation above industry average for '08-'10 Red - if performance is greater than 1 standard deviation above industry average for '08-'10	(B-A)/B * 100 where: A - # of discharges confirmed failing in calendar year; and B - # of discharges on register during calendar year (in force).
Satisfactory sludge disposal	Companies determine their own definitions of satisfactory sludge disposal; as a minimum, Ofwat expects companies to comply with any legal obligations	Percentage (%) Green – if 100% satisfactory sludge disposal Amber – if less than 100% but greater than 98% satisfactory sludge disposal Red – if less than 98% satisfactory sludge disposal	100 x (C- D)/C where: C - total sewage sludge disposed of measured in thousand tones of dry solids; D –t otal sewage sludge disposed of which cannot be confirmed as complying with the Safe Sludge Matrix and other relevant regulations to be considered satisfactory
Financial indicators			
Post-tax return on capital	Current cost operating profit less tax as a return on regulatory capital value	Percentage (%) G/A/R n.a.	Appointed current cost operating profit less current tax divided by the average regulatory capital value
Credit rating	The company's ability to comply with its license requirement to maintain an investment grade credit rating	Assessment from rating agencies G/A/R n.a.	The company would submit a certificate stating its rating with all the agencies with which it is a client; they subsequently submit

			information when this rating changes – including a change in outlook
Gearing	Traditionally financed companies – net debt as a percentage of the total regulatory capital value at the financial year end; OR Structured companies – as defined by company financial covenants	Percentage (%) G/A/R n.a.	Traditionally financed companies – net debt as a percentage of the total year end regulatory capital value; OR Structured companies – as defined by company financial covenants
Interest cover	Traditionally financed companies - adjusted interest cover and FFO/interest; OR Structured companies - adjusted interest cover or PMICR as required within the financial covenants. For reporting purposes - the lower of the interest cover ratios	Ratio G/A/R n.a.	Traditionally financed companies – as stated within the financial performance and expenditure report; OR Structured companies – as defined by company financial covenants

35. Initial approximate situation as for performance of individual utility is seen from the visual presentation of the utilities as well, as provided in Picture #1 below.

Picture #1. **Performance reporting in Ofwat website**

Company	Companies' published performance	Links to companies' published data					
		Key indicators	Risk and compliance statement	Regulatory accounts	Upstream services data	Upstream services commentary	Accounti methodol
Anglian		Key indicators and risk and compliance statement		Regulatory accounts	Upstream services data	Upstream services commentary	Accounting methodolog
Dŵr Cymru		Key indicators	Risk and compliance statement and regulatory accounts		Upstream services data and commentary		Accounting methodolog
Northumbrian		Key indicators and risk and compliance statement		Regulatory accounts	Upstream services data and commentary		Accounting methodolog
Severn Trent		Key indicators and risk and compliance statement		Regulatory accounts	Upstream services data	Upstream services commentary	Accounting methodolog
South West		Key indicators, and risk and compliance statement and regulatory accounts			Upstream services data and commentary, and accour methodology statement		
Southern		Key indicators and risk and compliance statement		Regulatory accounts, upstream services data and commentary, and a methodology statement			
Thames		Key indicators	Risk and compliance statement and regulatory accounts		Upstream services data and commentary		Accounting methodolog
United Utilities		Key indicators	Risk and compliance statement	Regulatory accounts	Upstream services data and commentary		Accounting methodolog
Wessex		Key indicators and risk and compliance statement		Regulatory accounts	Upstream services data and commentary		Accounting methodolog

36. Ofwat is following the approach that the utilities are responsible for measuring and reporting on their performance, including the areas where their performance is poor and what they are doing to set performance right. Monitoring / analyzing the information provided by utilities, and using other sources of information, Ofwat decides whether there is a further need to investigate or take any action to address or prevent harm or loss to customers. If there is potential case, investigation is started; underperformance by utilities is addressed with obligation to reduce prices in future, increase investment in services, to pay penalties to state budget by Ofwat.
37. With the set of Key Performance Indicators monitored and published, in the context of competitive market development, Ofwat places significant emphasis on quality provided to consumers and perceived by consumers, in drinking water supply and sewerage.

Benchmarking practice in Bulgaria, by NCC. Drinking Water Supply and Sewerage Utilities

38. Energy and Water Regulatory Commission of Bulgaria (KEVR) conducts regulation of drinking water supply and sewerage under Law of 2005, with last amendments of 2014.
39. KEVR performs monitoring for over 60 entities, engaged in drinking water supply and sewerage sector. However, due to technical issues of form filling, some data on sector indicators is derived from smaller number of entities, going sometimes as low as 34 entities.
40. In Bulgaria there is exploited 73.626 km of drinking water network and 9.726 km of sewerage network, technically covering 99.3% of population[12]. While operators sell 950 mln.m^3 of water at inlet meters, invoiced water makes up to 359 mln.m^3; despite amount of invoiced water has tendency of increasing, however, the level of so-called "non-revenue water" remains at the average level of 61%, with great variation among individual entities. KEVR states a significant increase in average number of accidents at all points of the systems, with again great variation of numbers at individual entities' level. Metering remains a challenge for Bulgarian water and sewerage sector – 33% of water is metered at the water extraction points, and 55% of water is metered at delivery places[13]; number of inlet water meters is increasing, however, too slow. Automated systems installed range to 85% in the water supply systems on average, however there is reported automated management systems at 45% water pump stations and 31% at other elements of water supply chain, therefore KEVR considers the issue requesting further investigation. Investment during the 2010-2012 period was directed to drinking water supply chain at the level of 70% and to sewerage chain remaining 29%.
41. As of 2010, KEVR monitors indicators of drinking water and sewerage quality[14]. The list of quality indicators is provided in the table #2. "Key Performance Indicators for quality of drinking water supply and sewerage utilities in Bulgaria" below.
42. Publishing of indicators is on annual basis since 2010. Publishing takes place for every entity monitored, which allows to assess dynamics of any utility in question of its quality performance, however, general overview of the whole set of utilities against any particular indicator is missing, at

[12] Comparative analysis of Water supply and sewerage Sector, 2014 http://www.dker.bg/PDOCS/analiz-vik-za-2012.pdf
[13] местах населения
[14] Can be found on KEVR webpage, http://www.dker.bg/page3bg.php?P3=71&OID=73

least publicly. KEVR provides overview of the entire industry performance, without breaking utilities to groups[15] (no ranging).

43. As KEVR provides in its "Comparative analysis of Water supply and sewerage Sector, 2014" report[16], "the information will be used when considering business development plans activities that Water Supply and Sewerage operators are to submit to the State Commission for Energy and Water Regulation".
44. However, since KEVR states several, that some references or values not entirely reflect the status of indicator observed, or operators might have made some technical errors at supplying data, the activity of data collection and monitoring performance of the sector by KEVR might be considered as being at calibration stage.

Table #2 "Key Performance Indicators for quality of drinking water supply and sewerage utilities in Bulgaria"

1. Water services coverage level	1.1. Population having access to water supply services (#) to Total number of population in the territory served by utility (#)
2. Drinking water quality	2.1. Samples meeting regulatory requirements (#) to Total number of samples for physic-chemical and radiological indicators (#) 2.2. Samples meeting regulatory requirements (#) to Total number of samples for microbiological indicators (#)
3. Continuity of water supply	3.1. Number of people affected by disruption of water supply (#) to Total population served by utility (#) 3.2. Number of planned interruptions of water supply, removed within prescribed period (#) to Total number of planned interruptions of water supply (#)
4. General water losses in water supply system	4.1. Water supplied, m^3 4.2. Billed water, m^3 4.3. Lost water, m^3 4.4. Lost water (m^3) to Water supplied (m^3)
5. Failures in the water supply system	5.1. Number of accidents in water transmission network (#) to Length of water transmission network (km) 5.2. Number of accidents in water distribution network (#) to Length of water distribution network (km) 5.3. Number of water consumers recorded with accidents (#) to Total number of water consumers served by utility (#) 5.4. Number of accidents in water pump stations (#) to Number of water pump stations (#)
6. Pressure in the water supply system	6.1. Number of water consumers with pressure lower than legally required (#) to Total number of population in the territory served by utility (#)

[15] http://www.dker.bg/PDOCS/analiz-vik-za-2012.pdf

[16] Comparative analysis of Water supply and sewerage Sector, 2014 http://www.dker.bg/PDOCS/analiz-vik-za-2012.pdf

	6.2. Number of water consumers with pressure higher than legally required (#)to Total number of population in the territory served by utility (#)
7. Sewerage services coverage level	7.1. Population using sewerage service (#) to Total number of population in the territory served by operator (#)
8. Sewerage quality	8.1. Samples meeting regulatory requirements (#) to Total number of samples for quality indicators (#) 8.2. Annual amount of sewerage processed (m^3) to Projected capacity of sewerage processing plant (m^3)
9. Failures of sewerage system	9.1. Number of sewerage consumers recorded with accidents (#) to Total number of sewerage consumers served by utility (#) 9.2. Number of accidents in sewerage network (#) to Length of sewerage network (km)
10. Flood affected area ratio	9.1. Area affected by sewerage floods (m^2) to Total area drained area (m^2)
11. Performance scorecard	11.1. Employees engaged in water supply services (#) to Total number of water supply consumers served by utility (#) 11.2. Employees engaged in sewerage services (#)to Total number of sewerage consumers served by utility (#) 11.3. Accidents to employees (#) to Total number of employees engaged in water supply and sewerage activities (#) 11.4. Number of meters installed at water sources (#) to Total number of water sources used (#) 11.5. Number of inlet water meters installed (#) to Number of multi-apartment buildings served by operator (#) 11.6. Total number of meters installed at water consumers (#) to Total number of water supply consumers served by utility (#) 11.7. Total number of meters inspected (#) to Total number of meters installed at water consumers (#) 11.8. Number of employees attended qualification / training (#) to Total number of employees engaged in water supply and sewerage activities (#) 11.9. Number of water supply pump stations with local automation system (#) to Total number of water supply pump stations (#) 11.11. Number of water supply processing plants with automated management system (#) to Total number of water supply processing plants (#) 11.12. Number of sewerage pump stations with local automation system (#) to Total number of sewerage pump stations (#) 11.13. Number of sewerage processing plants with automated management system (#) to Total number of sewerage processing plants (#)
12. Financial performance indicators	12.1. Operating expenses (Lv) to operating income (Lv) 12.2. Expenses for remuneration and benefits (Lv) to Operating expenses (Lv) 12.3. Operating expenses (Lv) to Total number of employees (#) 12.4. Operating expenses (Lv) to Total quantity of water supplied (m^3) 12.5. Operating expenses (Lv) to Quantity of water billed (m^3) 12.6. Electricity consumption (kWh) to Quantity of water billed (m^3) 12.7. Expenses for electricity consumed (Lv) toOperating expenses (Lv) 12.8. Consumer debt / uncollected revenue Lv) to Operating income (Lv)
13. Response to consumer complaints, in written	13.1. Number of consumer written complaints, responded within 14 days (#) to Total number of consumer complaints (#)
14. Connection of new users to the water and sewerage system	14.1. Number of consumers connected to drinking water supply system within 30 days after requesting (#) to Total number of requests to connect to drinking water supply system (#)

	14.2. Number of consumers connected to sewerage system within 30 days after requesting (#) to Total number of requests to connect to sewerage system (#)
15. Human resources	15.1. Number of employees engaged in water supply activities (#) to Number of consumers using drinking water supply (#) 15.2. Number of employees engaged in sewerage activities (#) to Number of consumers using sewerage services (#)

Benchmarking practice in Lithuania, by NCC. Drinking Water Supply and Sewerage Utilities

45. NCC provides regulation for 78 entities, supplying drinking water a nd sewerage. The regulated entity supply drinking water and sewerage services to 98% of consumers. Small entities (additionally some 250 entities) are not regulated by NCC, and there is general objective for further consolidation; the objective is prescribed in the relevant law (version of 2014) for the sector. There are no intentions for competition in this sector in Lithuania.
46. In 2014, amount drinking water sold constituted 94 mln.m^3, amount sewerage handled constituted 90 mln.m^3. Dynamics of both segments is increasing.
47. Composition of consumers is as follows: in 2014, there were 982.635 residential consumers served, and 34.586 other consumers served. The structure of sales is different as follows: residential consumers were supplied with 55% of drinking water and 51% of sewerage out of total respective amounts; the rest amount goes to other consumers.
48. Key performance indicators are established in special legal act by NCC[17], which *inter alia* provides:
    - Set of Key Performance Indicators for every activity, with explanation to every Indicator and relevant formula (if formula is applicable for the case),
    - Procedure of data supply by utilities to NCC,
    - Estimation and evaluation procedure of indicators,
    - Procedure of publication of comparative indicators.
49. All the regulated by NCC utilities are distributed into 5 groups. Annual amount of sales is the Ranking factor for Group. The residing of individual entities to groups is published on the website of NCC. Below there is provided a schematic system of distribution of utilities to groups, in Table #3 "Distribution of drinking water supply and sewerage utilities into groups for benchmarking purposes in Lithuania" below, with number of utilities residing in each cell. In NCC website, individual names of the utilities residing is provided.

[17] "Description of comparative analysis for activities of drinking water supply and sewerage", as of 2011.

Table #3. **Distribution of drinking water supply and sewerage utilities into groups for benchmarking purposes in Lithuania**

Groups established for drinking water supply and sewerage sector		**Number of utilities per group**
I group	Annual sales at 7.501 thousand m^3 and more	3 utilities
II group	Annual sales from 1.501 to 7500 thousand m^3	5 utilities
III group	Annual sales from 901 to 1500 thousand m^3	11 utilities
IV group	Annual sales from 501 to 900 thousand m^3	12 utilities
V group	Annual sales 500 thousand m^3 or less	17 utilities

50. The Key Performance Indicators collected, monitored and later applied in the relevant processes of price setting/review are the ones as the table #3 "Key Performance Indicators for drinking water supply and sewerage utilities in Lithuania" provides below. It is to be noticed, that explanations to relevant indicators are provided in the aforementioned legal act.
51. NCC yearly estimates the values of comparative indicators, takes relevant formal (legal) decision and published in the website values of comparative indicators annually before July 1st.The published information entails numerical expression of every indicator, derived for every group of utilities (provided in table #3 above).
52. It is to be noticed, that those entities that are engaged in drinking water supply and sewerage along to other activities[18], are not included into comparative indicators' numerical value.

Table #4 "Key Performance Indicators for drinking water supply and sewerage utilities in Lithuania"

Indicator	**Formula**	
1. Electricity consumption indicators		
1.1. Electricity consumption water to extract and lift 100 m (kWh/m³/100)	$ES_{vt} = \frac{EE_{vt}}{Q_{vp} \times H_{vg,vp}/100}$,	EE_{vt} – electricity used for water extraction and lifting, kWh; Q_{vp} – quantity of lifted water, m^3; H_{vgvp} – average weighted height of water to be lifted in wells and lifting stations, m
1.2. Electricity consumption to process water (kWh/m³)	$ES_{vr} = \frac{EE_{vr}}{Q_{vr}}$	EE_{vr} – electricity used for water processing, kWh; Q_{vr} – quantity of water processed, m^3
1.3. Electricity consumption sewerage to collect and lift 100 m (kWh/m³/100)	$ES_{ns} = \frac{EE_{ns}}{Q_{ns} \times H_{ns}/100}$	EE_{ns} - electricity used for sewerage collection, kWh; Q_{ns} – quantity of sewerage run through sewerage pumps m^3;

[18] In other words, comparative indicators reflect the respective values only of those utilities, to whom drinking water supply and sewerage activity is the only one.

		H_{ns} – average weighted height of sewerage to be lifted in sewerage pumping stations, m.
1.4. Electricity consumption sewerage to process (kWh/tona) (sludge excluded)	$ES_{nv} = \frac{EE_{nv}}{(U1-U2)\times Q_{nv}\times 1000}$	EE_{nv} – electricity used for sewerage processing, kWh; U1 – pollution of incoming sewerage, as of BOD7[19], mg/l; U2 – pollution of outgoing sewerage, as of BOD7[20], mg/l; Q_{nv} – quantity of processed sewerage, thou m^3
2. Personnel indicators		
2.1. General labor intensity index, ratio	$DI_{vg,vr,vp,ns,nv,dt,pv} = \frac{ND}{FD}$	ND – normative number of employees engaged in activities of water extraction, processing, distribution, sewerage collection, processing, sludge processing, sales, persons; FD – factual number of employees engaged in activities of water extraction, processing, distribution, sewerage collection, processing, sludge processing, sales, persons
2.2. Labor intensity at water extraction index, ratio	$DI = \frac{NPVDi}{FPVDi}$	NPVDi - normative number of employees engaged in activity i, persons; FPVDi - factual number of employees engaged in activity i, persons; i – relevant activity, as follows – water extraction, water processing, water distribution, sewerage collection, sewerage processing, sludge processing, sales.
2.3. Labor intensity at water processing index, ratio		
2.4. Labor intensity at water distribution index, ratio		
2.5. Labor intensity at sewerage collection index, ratio		
2.6. Labor intensity at sewerage processing index, ratio		
2.7. Labor intensity at sludge processing extraction index, ratio		
2.8. Labor intensity at sales activity index, ratio		
2.9. Value of outsource contracts per normative employee at water extraction, EUR	$PV_{vg} = \frac{PSi}{NDi}$	PS_i – expenses of outsource contracts in relevant activity, thou EUR; ND_i – normative number of employees engaged in relevant activity, persons; i - relevant activity, as follows – water extraction, water processing, water distribution, sewerage collection, sewerage processing, sales
2.10. Value of outsource contracts per normative employee at water processing, EUR		
2.11 Value of outsource contracts per normative employee at water distribution, EUR		
2.12. Value of outsource contracts per normative employee at sewerage collection, EUR		

[19] BOD7 – basic oxygen demand norm - 350 mgO_2/l.
[20] BOD7 – basic oxygen demand norm - 350 mgO_2/l.

2.13 Value of outsource contracts per normative employee at sewerage processing, EUR		
2.14. Value of outsource contracts per normative employee at sales, EUR		
2.15. Normative number of employees of main activities per admin employee, ratio	$ADI = \frac{NPVD}{FAD}$	NPVD - normative number of employees engaged in main activities, persons; FAD – factual number of admin employees, persons
2.16. Average salary for an employee of main activities, EUR	$DU_{vid} = \frac{DU/12 \times 1000}{FPVD}$	DU – factual annual salary budget / fond for the main activities, EUR; FPVD - factual number of employees engaged in main activities, persons
3. Costs for maintenance / repair works		
3.1. Share of total maintenance / repair works costs at water extraction activity per one pump used in water extraction, EUR	$RDV_{vg} = \frac{RDS_{vg}}{VGS}$	RDSvg – total maintenance / repair works costs at water extraction activity, EUR; VGS – number of pumps used in water extraction activity
3.2. Share of total maintenance / repair works costs at water processing activity per one equipment used in water processing, EUR	$RDV_{vr} = \frac{RDS_{vr}}{VRĮ}$	RDS_{vr} – total maintenance / repair works costs at water processing activity, EUR; VRĮ – number of equipment units used in water processing, i.e. individual technological equipment (filters for removal iron, disinfection, aeration, etc.)
3.3. Share of total maintenance / repair works costs at water distribution activity per one kilometer of underground water network with water lifting pumps, EUR	$RDV_{vp} = \frac{RDS_{vp}}{VT \times (1 + VPS')}$	RDS_{vp} – total maintenance / repair works costs at water distribution activity, EUR; VT – length of underground water network, km (technological pipes are excluded); VPS' – share of water lifting pumps per one kilometer of underground water network
3.4. Share of total maintenance / repair works costs at sewerage collection activity per one kilometer of sewerage network with sewerage lifting pumps, EUR	$RDV_{ns} = \frac{RDS_{ns}}{NT \times (1 + NPS')}$	RDS_{ns} - total maintenance / repair works costs at sewerage collection activity, EUR; NT – length of sewerage water network, km (technological pipes are excluded); NPS' - share of sewerage lifting pumps per one kilometer of sewerage network
3.5. Share of total maintenance / repair works costs at sewerage processing activity per one equipment used in sewerage processing, EUR	$RDV_{nv} = \frac{RDS_{nv}}{NVĮ}$	RDS_{nv} - total maintenance / repair works costs at sewerage processing activity EUR; NVĮ – number of equipment units used in sewerage processing, i.e. individual technological equipment (sand traps, cesspools, aeration reservoirs, etc.)
4. Costs of outsource contracts for services and works indices		

4.1. Share of costs of outsource contracts for services and works at water extraction activity per one water extraction pump, EUR	$PDV_{vg} = \frac{PDS_{vg}}{VGS}$	PDS_{vg} – costs of outsource contracts for services and works at water extraction activity, EUR; VGS - number of pumps used in water extraction activity
4.2. Share of costs of outsource contracts for services and works at water processing activity per one water processing equipment, EUR	$PDV_{vr} = \frac{PDS_{vr}}{VRĮ}$	PDS_{vr} - costs of outsource contracts for services and works at water processing activity, EUR VRĮ – number of equipment units used in water processing, i.e. individual technological equipment (filters for removal iron, disinfection, aeration, etc.)
4.3. Share of costs of outsource contracts for services and works at water distribution activity per one kilometer of underground water network with water lifting pumps, EUR	$PDV_{vp} = \frac{PDS_{vp}}{VT \times (1 + VPS')}$	PDS_{vp} - costs of outsource contracts for services and works at water distribution activity, EUR; VT – length of underground water network, km (technological pipes are excluded); VPS' – share of water lifting pumps per one kilometer of underground water network
4.4. Share of costs of outsource contracts for services and works at sewerage collection activity per one kilometer of sewerage network with sewerage lifting pumps, EUR	$PDV_{ns} = \frac{PDS_{ns}}{NT \times (1 + NPS')}$	PDS_{ns} - costs of outsource contracts for services and works at sewerage collection activity, EUR; NT – length of sewerage water network, km (technological pipes are excluded); NPS' - share of sewerage lifting pumps per one kilometer of sewerage network
4.5. Share of costs of outsource contracts for services and works at sewerage processing activity per one equipment used in sewerage processing, EUR	$PDV_{nv} = \frac{PDS_{nv}}{NVĮ}$	PDS_{nv} - of costs of outsource contracts for services and works at sewerage processing activity, EUR; NVĮ – number of equipment units used in sewerage processing, i.e. individual technological equipment (sand traps, cesspools, aeration reservoirs, etc.)

53. Key performance indicators are reported by utilities on yearly basis, and supplied to NCC via post or email. Special electronic system[21] for data submission was launched early in 2015, for testing, however, it will take some time before it operates to full extent; the final objective at launching the electronic system for data submission was to reduce administrative burden and give up paper forms for utilities, but also to speed up process of analysis of the data and release partially resources of regulator away from this activity to other areas. Utilities have obligation to start supplying information via electronic system since January 1st, 2016.

[21] Called DSAIS, available on www.regula.lt

54. The “Rules on information supply by regulated entities to NCC” foresee supply of information by an entity within 4 months after ending of financial year.
55. Validation of the information supplied by entities is conducted in several forms: (i) comparing supplies on multiyear basis, and when serious deviations arrive, asking the entity to explain; (ii) at long-term price review, variety of documents shall be supplied upon request of NCC, and some of the documents are copies of primary invoices; (iii) comparison to reporting to national tax office is conducted; (iv) independent audit review of information supplied to NCC is mandatory, with new law as of 2014.
56. Key performance indicators are monitored by NCC and used for several purposes:
    - for drinking water supply and sewerage sector transparency increase – estimates on comparative indicators at every group are published, thus allowing all interested stakeholders to monitor dynamics of KPIs and potential increase in efficiency of regulated utilities individually and all the sector in general;
    - for higher efficiency introduction in prices for drinking water supply and sewerage services – to make objective and challenging efficiency targets for individual utilities while setting long-term prices and calibrate some of the targets at price review.
57. The Key Performance Indicators collected, monitored and later applied in the relevant processes of price setting/review are the ones as the above table #4 “Key Performance Indicators for drinking water supply and sewerage utilities in Lithuania”. NCC yearly estimates the values of comparative indicators, takes relevant formal (legal) decision and published in the website values of comparative indicators before July 1st.

Benchmarking practice in US. Drinking Water Supply and Sewerage Utilities

58. In the United States, the Environmental Protection Agency, through its Office of Ground Water and Drinking Water, regulates drinking water under the Safe Drinking Water Act, through two processes mainly: Identifying contaminants to regulate, and Developing a subsequent regulation.
59. WaterEUM[22] initiative, conducted by 6 six associations representing the U.S. water and wastewater sector together with United States Environmental Protection Agency , suggests using 10 Attributes of Effectively Managed Water Sector Utilities, and divide these attributes into measures, as shortlisted in the Table #5 "Indicators of Effectively Managed Water Sector Utilities" below.
60. Practical application of the 10 attributes and measures in US is presented in greater detail at "Performance Benchmarking for Effectively Managed Water Utilities, 2014" by Water Research foundation[23].

Table #4. **Indicators of Effectively Managed Water Sector Utilities, suggested by EPA[24]**

Attributes	**Measures**	**Description and examples of indicators**
1. Product Quality	1.1. Product quality regulatory compliance	Water product quality compliance, particularly with regards state statute/regulations and permit requirements. Might be measured quality of all related products (drinking water, bio solids, etc.) as well as operational requirements (number of sewer overflows, etc.). Examples: *- Drinking water compliance rate,%,* *- Wastewater treatment effectiveness rate,%,* *- Number, type, and frequency of "near (compliance) misses"*
	1.2. Product quality service delivery	Delivery of product quality service based on utility established objectives and service level targets. It focuses on non-regulatory performance targets. Examples: *- Drinking water flow and pressure, %,* *- Fire suppression water flow and pressure, %,* *- Service interruptions, %,* *- Water quality goals met/not met,* *- Sewer backups, amount and %,* *- Sewer overflows, number per 100 miles,* *- Water reuse, amount and %,* *- Bio solids put to beneficial use, %.*

[22] WaterEUM - Water Effective Utility Management.
[23]Performance Benchmarking for Effectively Managed Water Utilities, by Water research Foundation, Report 4313b: http://www.waterrf.org/PublicReportLibrary/4313b.pdf
[24] Based on Effective Utility Management Primer for Water and Wastewater Utilities, http://water.epa.gov/infrastructure/sustain/upload/2009_05_26_waterinfrastructures_tools_si_watereum_primerforeffectiveutilities.pdf

2. Customer Satisfaction	2.1. Customer complaints	Complaint rates experienced by the utility, with individual quantification of customer service and core utility service complaints. Number of complaints per 1,000 customers per reporting period. Examples: *- Customer service complaint rate,* *- Technical quality complaint rate.*
	2.2. Customer service delivery	Track how often the utility meets the desired service levels (established on internal objectives and customer input), helping the utility to determine how well customer needs are being satisfied. Examples: *- Call responsiveness, %,* *- Error-driven billing adjustment rate, %,* *- Service start/stop responsiveness, %,* *- First call resolution, %.*
	2.3. Customer satisfaction	Measure customer satisfaction immediately after service provision or use a periodically performed, more comprehensive customer satisfaction survey. Examples: *- Overall customer satisfaction, % of positive/negative responses, on requested areas.*
3. Employee and Leadership Development	3.1. Employee retention and satisfaction	Measures a utility's progress toward developing and maintaining a competent and stable workforce, including utility leadership. Examples: *- Employee turnover rate, %, including voluntarily, retirement, experience turnover,* *- Employee job satisfaction, %, on selected areas.*
	3.2. Management of core competencies	Assesses the utility's investment in and progress toward strengthening and maintaining employee core competencies. Examples: *- Presence of job descriptions and performance expectations, Y/N,* *- Training hours per employee,* *- Certification coverage, %,* *- Employee evaluation results,* *- Presence of employee-focused objectives and targets, Y/N.*
	3.3. Workforce succession preparedness	Assesses long-term workforce succession planning efforts to ensure critical skills and knowledge are retained and enhanced over time; focus on preparing entire groups for needed workforce succession. Examples: *- Key position vacancies, time/year,* *- Key position internal/external recruitment, %,* *- Long-term succession plan coverage, %.*
4. Operational Optimization	4.1. Resource optimization	Examines resource use efficiency, including labor and material per unit of output or mile of collection/distribution system. Examples: *- Customer accounts per employee,* *- Chemical use per volume delivered/processed,* *- Energy use per volume delivered/processed,* *- O&M cost per volume delivered/processed.*
	4.2. Water management efficiency	Assesses drinking water production and delivery efficiency by considering resources as they enter and exit the utility system. Examples: *- Production efficiency,* *- Distribution system water loss,* *- Meter function, %.*
5. Financial Viability	5.1. Budget management effectiveness	Measures short-term and long-term aspects. Examples: *- ST Revenue to expenditure ratio,*

		- ST O&M expenditures ratio to total budget, *- ST Capital expenditures to total capital budget,* *- ST Debt ratio,* *- LT Life-cycle cost accounting, Y/N.*
	5.2. Financial procedure integrity	Assess the presence of internal utility processes to ensure a high level of financial management integrity. Examples: *- financial accounting policies and procedures in place, Y/N,* *- annual audit, Y/N,* *- deficiencies and weaknesses reduced from previous audits, Y/N*
	5.3. Bond ratings	Considered in light of other factors. Examples: *- Bond rating changed recently? Why?*
	5.4. Rate adequacy	Consider its rates relative to factors such as external economic trends, short-term financial management, and long-term financial health. Examples: *- How rate changes compare currently and over time with the inflation rate and the Consumer Price Index?* *- is there a rate stabilization reserve to sustain operations during cycles of revenue fluctuation, in addition to 60- (or 90-) day operating reserves?*
6. Infrastructure Stability	6.1. Asset inventory	Measures a utility's efforts to assess assets and asset conditions, as the first steps towards building a comprehensive asset management program. Examples: *- Inventory coverage, %,* *- Condition assessment coverage, %*
	6.2. Asset (system) renewal / replacement	Assesses asset renewal/replacement rates over time. Examples: *- Asset renewal/replacement rate, %, units,* *- Asset (system) renewal/replacement rate, %, expenditures.*
	6.3. Water distribution / collection system integrity	Quantifies the number of pipeline leaks and breaks. Examples: *- Leakage and breakage frequency rate, %, for water,* *- Collection system failure rate, %, sewerage.*
	6.4. Planned maintenance	Both preventive and predictive maintenance. Examples: *- Planned maintenance ratio by hours, %,* *- Planned maintenance ratio by cost, %.*
7. Operational Resiliency	7.1. Recordable incidents of injury or illnesses	Shows the relative level of injuries and illnesses and help determine problem areas and progress in preventing work-related injuries and illnesses. Examples: *- Total recordable incident rate, #/hours.*
	7.2. Insurance claims	Examines the number, type, and severity of insurance claims to understand insurance coverage strength/vulnerability. Examples: *- Number of insurance claims,* *- Severity of insurance claims.*
	7.3. Risk assessment and response preparedness	Examines whether utilities have assessed their all-hazards (natural and human-caused) vulnerabilities and risks and made corresponding plans for critical needs. Examples: *- Emergency Response Plan (ERP), coverage and preparedness,* *- Process in place for identifying and addressing system deficiencies.*
	7.4. Ongoing operational resiliency	Assesses a utility's operational reliability during ongoing/ routine operations. Examples: *- Uptime for critical utility components on an ongoing basis, %.*
	7.5. Operational resiliency under emergency conditions	Assesses the operational preparedness and expected responsiveness in critical areas under emergency conditions. Examples:

		- *Power resiliency, hours, days,* - *Treatment chemical resiliency, hours, days,* - *Critical parts and equipment resiliency, longest current period,* - *Critical staff resiliency,* - *Treatment operations resiliency, %,* - *Source water resiliency.*
8. Community Sustainability	8.1. Watershed-based infrastructure planning	Addresses utility efforts to consider watershed-based approaches when making management decisions affecting infrastructure planning and investment options. Examples: - *Alternative, watershed-based approaches to align infrastructure decisions employed? variety*
	8.2. Green infrastructure	"Green infrastructure" includes both the built and natural/unbuilt environment. Utilities may promote source water protection and conservation "green infrastructure" approaches in support of water conservation (e.g., per capita demand reduction) and water quality protection objectives. Examples: - *approaches and opportunities explored, Y/N,* - *procedures to promote green approaches in place, N/Y*
	8.3. Greenhouse gas emissions	Understand and reduce individual contributions to area GHG emissions. Examples: - *net yearly emission of CO2, N2O, CH4, HFCs, PFCs.*
	8.4. Service affordability	Consumers' ability to pay for water services. Examples: - *Bill affordability, %,* - *Low-income billing assistance program coverage, %.*
9. Water Resource Adequacy	9.1. Water supply adequacy	Assesses short-term and long-term water supply adequacy and explores related long-term supply considerations. Examples: - *Short-term water supply adequacy,* - *Long-term water supply adequacy.*
	9.2. Supply and demand management	Explores whether the utility has a strategy for proactive supply and demand management in the short and long terms. Examples: - *developed a source water protection plan, Y/N,* - *demand management/demand reduction plan, Y/N,* - *demand scenarios account for changes in rates, Y/N, etc.*
10. Stakeholder Understanding and Support	10.1. Stakeholder consultation	Addresses utility actions to reach out to and consult with stakeholders about utility matters, including utility goals, objectives, and management decisions. Examples: - *identify stakeholders, conduct outreach, and actively consult with stakeholders about utility matters, Y/N,* - *actively consider and act upon stakeholder input, Y/N*
	10.2. Stakeholder satisfaction	Addresses stakeholder perceptions of the utility. Surveys employed. Examples: - *Overall satisfaction, %,* - *Responsiveness, %,* - *Message recollection for outreach programs targeted to specific stakeholder groups, %, etc.*
	10.3. Internal benefits from stakeholder input	Addresses the value utility employees believe stakeholder engagement has provided to utility projects and activities. Examples: - *ratio of utility projects or activities where stakeholders participated and/or provided input, %,* - *Overall value added, %.*

	10.4. Comparative rate rank	Depicts how utility rates compare to similar utilities (e.g., utilities of the same type (drinking water, wastewater) that are similar in terms of geographic region, size of population served, etc.). Examples: *- Typical monthly bill for the average household as a percentage of typical monthly bills for similar area utilities.*
	10.5. Media/press coverage	Captures media portrayal of the utility (newspaper, TV, radio, etc.) in terms of awareness, accuracy, and tone. Examples: *- Amount of coverage,* *- Media coverage tone,* *- Media coverage accuracy.*

Benchmarking possibilities during transitory period. Drinking Water Supply and Sewerage Utilities

61. Under initiative of the Word Bank, Water and sanitation Program, there developed a worldwide online system IBNET[25] for benchmarking water and sewerage entities globally.
62. The objective of the IBNET "is to support access to comparative information that will help to promote best practice among water supply and sanitation providers worldwide and eventually will provide consumers with access to high quality, and affordable water supply and sanitation services". The value that a regulator can get from using the IBNET tool is "Regulators can ensure that customers get value, and providers have incentives to perform"; and of a significant importance, a regulator presenting data from IBNET system might enable "Governments can monitor and adjust sector policies and programs", thus facilitating positive changes in the sector.
63. IBNET sets a core set of indicators and provides definition for every indicator; provides a system to supply data and use the information collected.
64. The table #6 "IBNET indicators for water and sewerage sector globally" below presents the indicators that are monitored and benchmarked in the system. All the indicators fall within 12 categories, and some indicators go all alone, while some other go as partial indicators or explaining indicators of higher range.

Table #6. **IBNET indicators for water and sewerage sector globally**

#	**Indicator**	**Description**	**Unit**
I. Service Coverage			
1.1.	Water Coverage	Population with access to water services (either with direct service connection or within reach of a public water point) as a percentage of the /total population under utility's nominal responsibility	%
1.2.	Water Coverage – Household Connections	Sub-set of 1.1	%
1.3.	Water Coverage – Public Water Points	Sub-set of 1.1	%
2.1.	Sewerage Coverage	Population with sewerage services (direct service connection) as a percentage of the total population under utility's notional responsibility	
II. Consumption Production			

[25] IBNET tool is downloadable via http://www.ib-net.org/en/texts.php?folder_id=100&L=1&S=2

3.1.	Water production	Total annual water supplied to the distribution system (including purchased water, if any) expressed by • population served per day and • connection per month	Liters/person/day
3.2.	Water production		m3/conn /month
4.1.	Total Water Consumption	Total annual water sold expressed by population served by • Population served per day • connection per month	Liters/person/day
4.2.	Total Water Consumption		m3/conn /month
4.3.	Residential Consumption	Shows the split of total water consumption into four customer type categories	%
4.4.	Industrial / commercial Consumption		
4.5.	Consumption by Institutions & others		
4.6.	Bulk treated supply		
4.7.	Residential Consumption	Shows the average water consumption per person per day by customer category	Liters/person/day
4.8.	Residential Consumption – connections to main supply		
4.9.	Residential consumption - public water points		
III. Non-revenue water			
6.1.	Non-revenue water	Difference between water supplied and water sold (i.e. volume of water "lost") expressed as a percentage of net water supplied	%
6.2.	Non-revenue water	Volume of water "lost" per km of water distribution network per day	m3/km/day
6.3.	Non-revenue water	Volume of water "lost" per water connection per day.	m3/conn/day
IV. Metering practices			
7.1.	Metering level	Total number of connections with operating meter/ total number of connections, expressed in percentage	%
7.2.	% sold that is metered	Volume of water sold that is metered/ Total volume of water sold, expressed in percentage	%
V. Network performance			
9.1.	Pipe Breaks	Total number of pipe breaks per year expressed per km of the water distribution network	breaks/km/yr.
10.1.	Sewer System Blockages	Total number of blockages per year expressed per km of sewers	blockages/km/yr.
VI. Cost & Staffing			
11.1.	Unit Operational Cost Water and Wastewater (W&WW)	Total annual operational expenses / Total annual volume sold	US$/m3 sold
11.2.	Unit Operational Cost Water and Wastewater	Total annual operational expenses / Total annual water produced	US$/m3 produced
11.3.	Unit Operational Cost – Water only	Annual water service operational expenses / Total annual volume sold	US$/m3 sold
11.4.	Operational Cost Split - % Water	Split of the total cost into water and wastewater	%
11.4.	Operational Cost Split - % Wastewater		%

11.6.	Unit Operational Cost – Wastewater	Annual wastewater operational expenses / Population served	US$/WW pop served
12.2.	Staff W&WW/'000 water and wastewater connections	Total number of staff expressed as per thousand connections	#/'000 W&WW conn
12.1.	Staff Water /'000 Water connections		#/'000 W conn
12.2.	Staff Wastewater/'000 Wastewater connections		#/'000 WW conn
12.4.	Staff W&WW/'000 W&WW pop served	Total number of staff expressed as per thousand people served	#/'000 W&WW pop served
12.3.	Staff Water/'000 Water pop served		#/'000 W pop served
12.6.	Staff Wastewater/'000 Wastewater pop served		#/'000 WW pop served
12.7.	Staff % Water		%
12.8.	Staff % Wastewater		%
13.1.	Labor Costs vs Operational Costs	Total annual labor costs (including benefits) expressed as a percentage of total annual operational costs	%
13.2.	Electrical Energy Costs as percentage of Operational Costs	Annual electrical energy costs expressed as a percentage of total annual operational costs	%
14.1.	Contracted-out service costs as percentage of operational costs	Total cost of services contracted-out to the private sector expressed as a percentage of total annual operational costs	%
VII. Quality of service			
15.1.	Continuity of Service	Average hours of service per day for water supply	Hrs/day
15.2.	Customers with discontinuous supply	The percentage of customers with a water supply that is discontinuous during normal operation	%
15.3.	Quality of water supplied: nr of tests for residual chlorine	The number of tests carried out on samples taken from the distribution system, as a % of the number required by the standard that applies. This may exceed 100% NB: Operational samples, or any others that were not taken to check compliance with the standard, are excluded	% of # required
15.4.	Quality of water supplied: samples passing on residual chlorine	The percentage of samples tested for residual chlorine that pass the relevant standard	%
16.1.	Complaints about W&WW services	Total number of W&WW complaints per year expressed as a percentage of the total number of W&WW connections	% of W&WW conn
17.1.	Wastewater – at least primary treatment	Proportion of collected sewage that receives at least primary treatment, i.e. involving settlement with the intention of removing solids, but not biological treatment. Both lagoon and mechanical treatment can be included, where appropriate	%
17.2	Wastewater primary treatment only	Proportion of collected sewage that receives primary treatment only, i.e. involving settlement with the intention of removing solids, but not	%

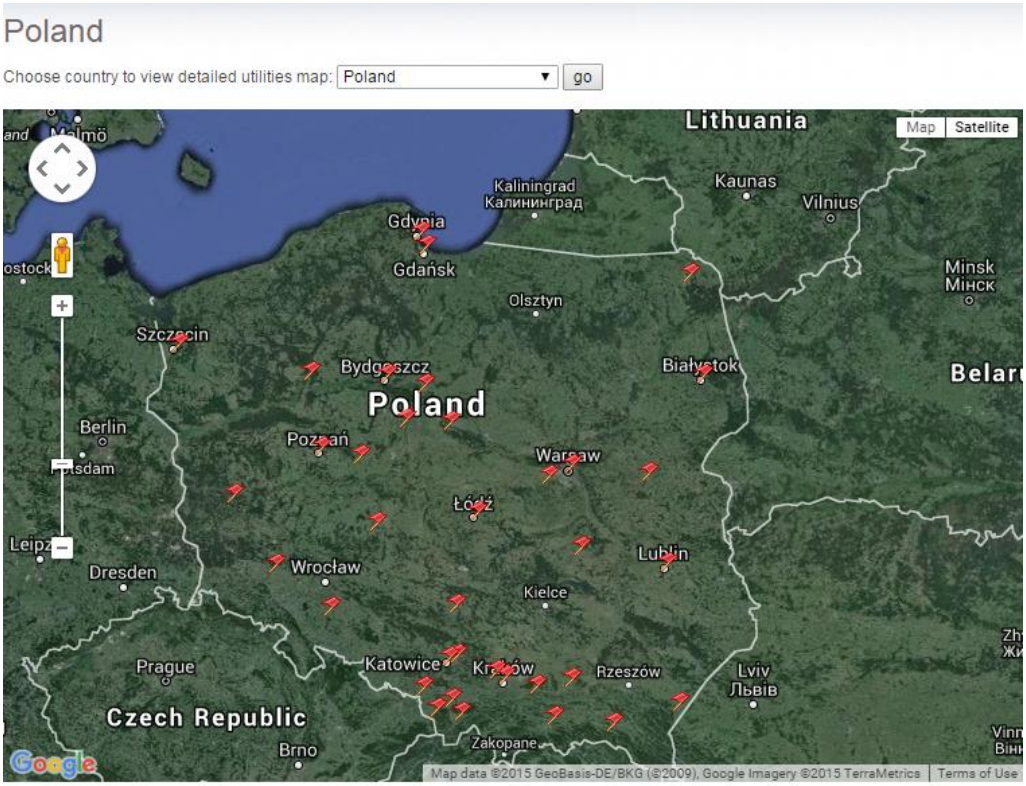
		biological treatment. Both lagoon and mechanical treatment can be included, where appropriate	
17.3.	Wastewater secondary treatment or better	Proportion of collected sewage that receives at least secondary treatment, i.e. removing oxygen demand as well as solids, normally biological. Both lagoon and mechanical treatment can be included, where appropriate	%
VIII. Billings & Collection			
18.1.	Average Revenue W&WW	Total annual W&WW operating revenues expressed by annual amount of water sold and by the number of connections	US$/m3 water sold
18.2.	Average Revenue W&WW		US$/W conn./yr.
18.3.	Average Revenue – water only	Operating revenues (W only) expressed by annual amount of water sold	US$/m3 water sold
18.4.	Revenue Split - % water	Percentage split of total revenue into water and wastewater	% of total for W&WW
18.5.	Revenue Split - % wastewater		
18.6.	Water revenue – residential	Percentage split of water revenue by customer type	% of total water revenue
18.7.	Water revenue – industrial/commercial		
18.8.	Water revenue – institutions & others		
18.9	Water revenue – bulk treated supply		
18.10.	Wastewater revenue per person served	Operating revenues (WW only) expressed per person served	US$/person served
20.2.	Residential fixed component of tariff	Any fixed component of the residential tariff as a proportion of the average tariff per connection per year. Water & wastewater together, and separated if possible.	% of average bill
20.5.	Residential fixed component of tariff - water		
20.6.	Residential fixed component of tariff - wastewater		
21.1.	Ratio of industrial to residential tariff	The average charge (per m3) to industrial customers compared against the average charge (per m3) to residential customers. Water & wastewater together, and separated if possible	ratio
21.2.	Ratio of industrial to residential tariff - water		
21.3.	Ratio of industrial to residential tariff - wastewater		
23.1.	Collection Period	(Year-end accounts receivable/Total annual operating revenues) * 365	Days
23.2.	Collection ratio	Cash income / Billed revenue as a %	Cash income / Billed revenue as a %
IX. Financial performance			
24.1.	Operating Cost Coverage	Total annual operational revenues / Total annual operating costs	ratio
25.1.	Debt Service Ratio	Cash income / Debt service * 100	%
X. Assets			
27.1.	Gross Fixed Assets – water & wastewater	Total gross fixed W&WW assets per W&WW populations served	US$/W&WWpop served

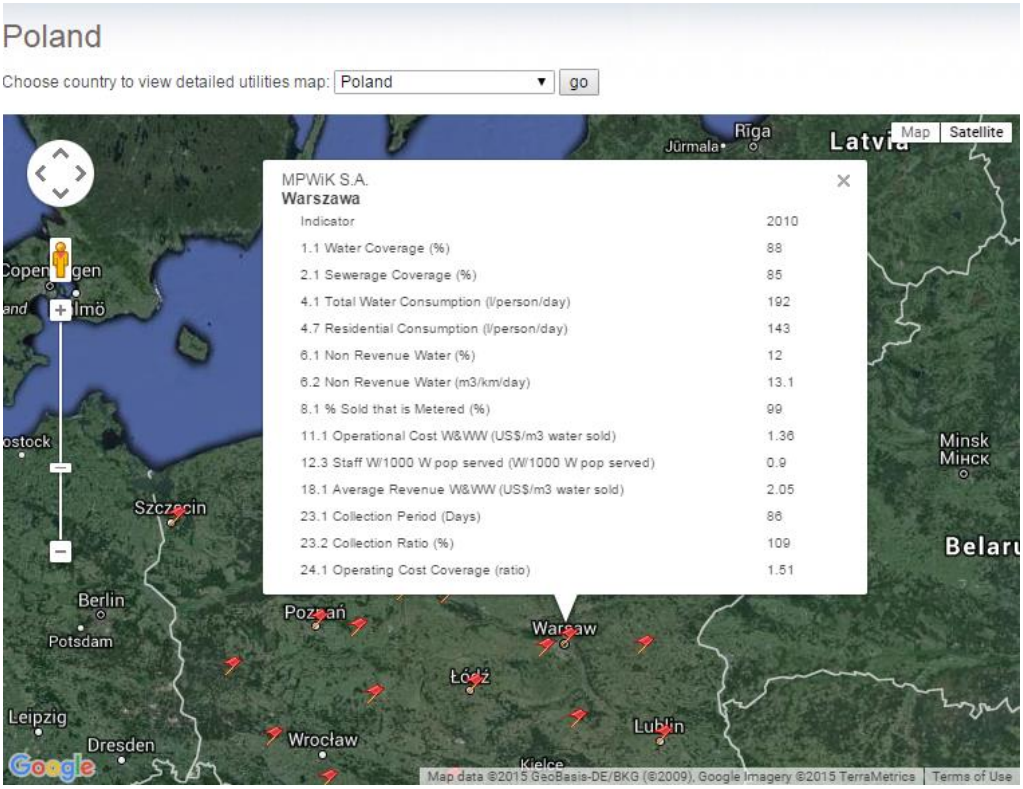
27.2.	Gross Fixed Assets - water	Total gross fixed assets per population served, separately for water (W) and wastewater (WW).	US$/W pop served
27.3.	Gross Fixed Assets – wastewater		US$/WW pop served
XI. Affordability of Services			
19.1.	Total revenues per service pop/GNI	Total annual operating revenues per population served/National GNI per capita; expressed in percentage	% GNI per capita
19.2.	Annual water bill for a household consuming 6 m^3 of water per month through a household or shared yard tap (but excluding the use of stand posts)?	Cost in local currency to a household per month of 6m3 water / Exchange rate with US$ * 12	US$/year
20.1.	Residential fixed component of tariff	Cash income / Debt service * 100	
20.3.	Residential fixed component of tariff - water	Any fixed component of the residential tariff (total amount). Water & wastewater together, and separated if possible	US$/conn./yr.
20.4.	Residential fixed component of tariff - wastewater		
20.2.	Residential fixed component of tariff	Any fixed component of the residential tariff as a proportion of the average tariff per connection per year	
20.5.	Residential fixed component of tariff - water	Water & wastewater together, and separated if possible.	% of average bill
20.6.	Residential fixed component of tariff - wastewater		
XII. Process Indicators			
P1	What best describes the utility's planning process?	A. Setting budgets for next year B. A multi-year plan that identifies targets and resources for change and improvement C. Neither of the above (Describe....)	
HR1	The management of your utility undertakes the following:	Has a skills and training strategy for all staff?	Yes / No
HR2		Has an annual appraisal and target setting system for managers?	Yes / No
HR3		Has an annual appraisal and target setting system for all staff?	Yes / No
HR4		Has a reward and recognition programme for all staff?	Yes / No
HR5		Has the ability to recruit and dismiss staff (within an agreed plan)?	Yes / No
R1	Who has general oversight of the utility's services and prices?	A. Local, regional or national government department B. Independent board of stakeholders C. Independent service & price regulator D. Other (Describe....)	
F1	What are the main sources of finance for investment?	Grants or Government transfers to the utility?	Yes / No
F2		Borrowing from International Financial Agencies (multi or bi laterals)?	Yes / No
F3		Government owned banks?	Yes / No

F4		Commercial banks or bond holders?	Yes / No
C1	Does the utility offer more than one level of service for household or shared water supplies?		Yes / No / Not applicable
C2	Does the utility offer more than one level of sanitation or sewerage service/ technology for households?		Yes / No / Not applicable
C3	Does the utility offer a flexible / amortized repayment option to spread the costs of connection to the water and/or sanitation network?		Yes / No / Not applicable
C4	See 19.2. How does the utility find out the views of its customers?		
C5.1.	Letters, telephone calls etc from customers		Yes / No
C5.2.	Inviting customers' views through radio, TV or other publicity		Yes / No
C5.3.	Questionnaire survey		Yes / No
C5.4.	Other		Yes / No (Describe...)

65. IBNET provides information on numerous countries and operators active there. It is to noticed, that in some cases the last available data might be as old as 2004, but in many cases there will be data on 2013 or 2012. The picture #2 “IBNET snapshot on Poland in general and on entity operating in Wasaw in particular” below demonstrates on example of the data available - 35 Polish water and wastewater operators are presented with data as of 2013, 2010, 2007. In other cases – for eg. Czesh Republic, there are 18 operators presented, all the data as of 2013.
66. It also worth mentioning, that not all and every indicator is present for every entity, however, taking in consideration, that the system allows compare a great number of entities within the sector, it still can serve a good service to regulators in transition.
67. The reason to mention availability of the online tool is to provide possible alternatives for consideration to relevant Ukrainian stakeholders, to encourage using benchmarking technique before “perfect data collection and monitoring system” is developed and well established in Ukraine.

Picture #2. **IBNET snapshot on Poland in general and on entity operating in Warsaw in particular**





Comments on Key Performance Indicators proposed for Ukraine.

Drinking Water Supply and Sewerage Utilities

68. The proposed indicators fall within 3 categories for drinking water supply and the same for sewerage, i.e. technical-operation indicators, financial-economic indicators, quality indicators.
69. Before starting analysis of the proposed indicators, it is worth mentioning, that benchmarking performance and putting regulatory requests for entities is closely related to objectives achievable within the regulated sector during defined period of time. Therefore, the exact selection of indicators shall enable to monitor progress in the sector towards the ultimate goal. If a certain basket of performance indicators does not allow to measure progress and facilitate towards achievement of the goals set in advance, in this case the basket shall be modified. If a certain basket of indicators allows track towards formulated goals of performance of the industry, then it shall be used for regulatory purposes.
70. This approach is applied to commenting the KPIs proposed (Annex 1).
71. KPI “Доля потерь и расходов (воды) к поднятой воде, %”:
    - will allow to measure amount of technological losses of water on its way up to certain point of the process called “Потери воды после II подъёма”;
    - It is not clear enough the exact point up to which the technological measures are amounted, however, it might be the matter of translation; in general, it KPI shall indicate clearly the point at which the measure starts and ends;
    - The wording of the formula suggests that the measurement of water losses will be conducted applying “bottom-up” approach, and summing 4 amounts of losses. It is not clear whether utilities shall report all the 4 amounts separately:
        - If this is the case, then for the sake of accurate numbers, the abilities – technical/metering and administrative – of utilities to report the accurate numbers shall be considered as well as the costs associated to ensure the aforementioned abilities; it is to be underlined, that having reported technical amounts of lost water at 4 different stages of the process enables regulator to make focused pressure and request focused efforts from utilities to improve performance exactly at the point where the most significant poor-performance is observed, while making decision on investment program of the utility in question and

accordingly pricing decision for that utility for the forthcoming period. Reported technical amounts of lost water at 4 different stages of the process enables and requests from regulating institution to engage in greater detail regulation (micro-management), thus taking more responsibility from utility towards regulatory office.

- If this is not the case, and then it is worth considering ways to simplify the detection of technical lost water up to the point in the process. The generalized number of technical loss monitored and benchmarked will enable regulator to request from utility to propose and implement the largest impact generating (the greatest savings of technical losses ensuring) measures. In this case, responsibility is shared.
- The indicator is useful when there are significant technical losses observed in the system, it is expected that the reduction of technical losses will increase efficiency of the utility in question.

72. There is not suggested a KPI, measuring commercial losses, which would enable utilities and the regulator to monitor amount of supplied and non-paid water, and take relevant measures to implement the principle "the user pays".
73. KPI "Удельный объём реализации продукции (услуг) в расчете на 1 человека", m^3/person/day:
    - this KPI shows amount of water sold to consumer, and might be considered as a candidate to serve as a basis-criteria for ranging utilities, together with other candidates to basis-criteria, for example amount of water sold/supplied to consumers yearly, etc.;
    - this KPI – technically speaking - would enable the regulator to request from utilities to increase amount of water supplied per person, and it is to be considered whether this direction is acceptable and aspired in the context of scarcity of water resources worldwide;
    - if this KPI is meant to measure progress towards installed meters in place, towards billed or paid water, towards penetration of water supply network in the community, then it is to be amended accordingly and used in collaboration with other indicators.
74. KPI "Удельные расходы электроэнергии на поданную в сеть воду", kWh/m^3:
    - the KPI allows to track energy efficiency progress and request to take measures increasing energy efficiency at water supply chain; this KPI is focused on technical part of the issue;
    - since the proposed KPI takes into account water supplied to the system, certain degree of accuracy might be potentially lost – the energy costs in every case are covered by consumers paying for water supplied to consumers, including the energy costs used to supply to the system water of technical losses. Therefore it might be considered possibility to introduce KPI measuring

energy to water supplied to consumers. Composite indicator then could reflect both energy (non)efficiency and energy waste due to (high) water losses.

75. KPI “Аварийность в расчете на 1 км сетей”, accidents/km:
    - The KPI measures number of accidents in the network system. The indicator will enable to make focused pressure to reduce number of accidents in network;
    - However, the indicator does not reflect durance of accidents, and if durance of accidents in network is of significance to Ukraine, the KPI might be considered to be supported with relevant measure;
    - The indicator does not reflect accidents in other installments (water extraction, water pump stations, etc.), and whether to measure this area depends on situation whether the area is of concern.
76. KPI “Расходы операционной деятельности в расчете на 1 м^3 объёма реализации”, grn/m^3:
    - The KPI measures operational costs’ efficiency;
    - The clarification on which exactly costs shall be measured might be provided for better accuracy – operational costs from water supply activities, most probably, administration costs included / non included, etc.
77. KPI “Уровень задолженности”, %:
    - The KPI according to explanatory note, measures the dynamics of payable bills, whether the receivables are growing/diminishing in comparison to previous period, and to which extent; the KPI shall show how active efforts of utility to collect receivables were applied in comparison to previous period;
    - However, this KPI shall potentially not indicate the level of receivables and whether the level of receivables by the end of the period constitute any financial risks to the utility’s solvency;
    - This KPI also does not indicate what is the speed of the receivables turnover, i.e. how many days it usually takes to get consumers paid, and this might be important for potential investment / bank financing / cash flows / etc.
    - It is to be drawn attention whether there are technical possibilities to separate receivables from water supplied and receivables from sewerage supplied, and if the possibilities are not in place, then consider the costs against potential value. I would recommend to track receivables measure at entire numbers for the utility and not making separation for water/sewerage services.
78. KPI “Численность персонала в расчете на 1 км сетей”, person/km:

- The KPI measures efficiency of personnel resources, and for further clarification (and accuracy of comparative data) it is potentially should be considered division between “productive personnel” per km of network and “administrative personnel” for km of network, and amendments made accordingly.

79. KPI “Уровень износа системы водоснабжения”, %:
    - The KPI measures how depreciated assets are operated by utility in question;
    - The KPI will allow to arrive at solid decisions when considering investment requests and potential inclusion into the tariff of additional CAPEX. However, for greater accuracy it might be clarified whether in this KPI included water supply assets (“productive”), with/ without administrative assets, with/without non-tangible assets.
80. KPK “Доля воды, которая не соответствует требованиям стандарта питьевой воды”, %:
    - No comments.
81. KPI “Доля потребителей, которые получают услуги по графику”, %:
    - The KPI measures share of consumers supplied at interrupted mode, which might be for different reasons; while considering the KPI under the proposed formula, it is important to know the reasons causing interruption cases, and KPI shall be designed to measure efforts to mitigate those reasons.
82. KPI “Засоренность сетей в расчете на 1 км сетей”, unit/km:
    - The usefulness of the index might depend on particular situation – whether there is intention to establish higher pricing level for higher solid waste to certain consumers (industries? to encourage them to install their own primary-processing plants?) or there is observed not-sufficient capacities of processing plants, requiring enlargement, or other characteristics might be observed. The measure shall reflect the problem and efforts to mitigate the problem.
83. KPI “Удельные расходы электроэнергии на 1 м^3 пропущенных сточных вод”, kWh/m^3:
    - the KPI allows to track energy efficiency progress and request to take measures increasing energy efficiency at sewerage; this KPI is focused on technical part of the issue;
    - since the proposed KPI takes into account the amount of sewerage processed, certain degree of accuracy might be potentially lost – the energy costs in every case are covered by consumers paying for sewerage, including the energy costs used to process the infiltrations, which probably in Ukraine is the case as well. Therefore it might be considered possibility to introduce KPI measuring energy consumption against amount of sewerage services provided to consumers.

Composite indicator then could reflect both energy (non)efficiency and energy waste due to (high) infiltrations.

84. KPI “Удельный объём реализации продукции (услуг) в расчете на 1 человека”, l/person/day:
    - The measure, again, could serve as utilities ranging basis-criteria.
    - this KPI – technically speaking - would enable the regulator to request from utilities to increase amount of sewerage per person, and it is to be considered whether this direction is acceptable and aspired, also, what potential benefits it could generate – increase in sewerage per person (?);
    - if this KPI is meant to measure progress towards installed meters in place, towards billed or paid services, towards penetration of sewerage network in the community, the KPI is to be amended accordingly and used in collaboration with other indicators.
85. KPI “Расходы операционной деятельности в расчете на 1 м3 объёма реализации”, grn/m^3:
    - The KPI measures operational costs’ efficiency;
    - The clarification on which exactly costs shall be measured might be provided for better accuracy – operational costs from sewerage activities, most probably, administration costs included / non included, etc.
86. KPI “Уровень задолженности”, %:
    - Comment is the same as for respective KPI at water supply.
87. KPI “Численность персонала в расчете на 1 км сетей”, person/km:
    - Comment is the same as for respective KPI at water supply.
88. KPI “Уровень износа системы водоотведения”
    - Comment is the same as for respective KPI at water supply.
89. KPI “Доля скинутых сточных вод без очистки”, %:
    - KPI will measure expected reduction of non-processed sewerage. In collaboration with numerical amount of non-processed sewerage this indicator will track the progress towards reducing negative environmental impacts;
    - It might be clarified with indicating the period of reporting respective numbers.
90. There potentially might be proposed KPI for measuring level of accidents at sewerage activities.
91. The set of indicators will enable to monitor performance and track potential increases in efficiency (and request increases, of course, by regulator) of the existing system of drinking water supply and sewerage. If there would be aspirations in Ukraine to expand the existing network for water supply

and for sewerage, accordingly additional indicators would be needed to measure progress towards this perspective.

92. While considering operational efficiency, it is important not to pave the way for utilities to increase total operational efficiency (looking for potential financial benefits) at the sake of technical safety, for ex., drastically reduce number of personnel at “production” activities and retain non-efficient numbers of personnel at administration, or reduce level of “depreciated assets” buying new expensive administration cars instead of installing new pipes. The KPIs shall be established with this motive in mind.
93. If there aspirations in Ukraine to install accurate metering and thus incentivize consumers to save water/sewerage, thus way reducing total costs of the system and impact on environment, some KPI shall reflect the progress towards metering installments.
94. There is no measure for affordability of services, which might be the case in Ukraine, but also, this might be important for regulator at retaining the mandate of “freedom” to settle prices at economically grounded basis. Measure on affordability would indicate whether any social programs needed to mitigate potential increases in prices.

Benchmarking practice in Lithuania, by NCC. District Heating Utilities

95. In Lithuania, there are 50 entities engaged in activity of centralized district heating (33 of them are municipal companies and 19 are private concessions) and 19 entities engaged in activity of independent heat generation (all private), that are regulated by national regulatory authority NCC. Entities are regulated by NCC in the following cases:
    - Centralized district heating entity (traditional incumbents) falls under regulation of NCC if the entity has annual sales of 10 GWh or more; when an entity has annual sales of less than 10 GWh, it is regulated by municipal authority administration;
    - Independent heat producer is regulated if (i) the entity has ever benefited from EU or other public funding, in any form, or (ii) the entity, alone or together with its affiliates in all possible forms, has a market share of 1/3 or more within the centralized district heating system of particular territory where the entity is engaged, or (iii) upon the reasoned application of the entity to NCC, market research conducted by NCC, reasoned decision issued by NCC stating that regulated prices applied by the entity, alone or together with its affiliates in all possible forms, having a market share of 1/3 or more within the centralized district heating system of particular territory where the entity is engaged, will not constitute significant difference to the entire price of that DH system comparing to applied non-regulated prices applied by the same entity.
96. In 2014, heat supplied into the networks amounted at 8.562[26] GWh, out of which 58,4% are supplied by municipal operators (33 entities) and 41,6 % by concession operators (19 entities).
97. In 2014, 19 regulated independent producers sold 1.624 GWh of heat (35% increase from 2013), and 15 non-regulated independent producers sold 1.091 GWh of heat (38% increase from 2013).
98. Structure of district heating consumers as of 2012: residential consumers 72%, business consumers 4%, public institutions 13%, other 11% (of heat sales). Total area consuming district heating was 35,3 mln.m^2 in 2012, and it has increasing dynamics.
99. Key performance indicators are established in special legal act by NCC[27], which *inter alia* provides:
    1. Set of Key Performance Indicators for every activity, with explanation to every Indicator and relevant formula (if formula is applicable for the case),

[26] The number represents incumbent entities regulated by NCC and all the independent heat producers, disrespecting whether these are regulated or not. Small local entities, regulated by municipal authorities' administrations, of less than 10 GWh annual sales, are not included into the number.

[27] "Description of comparative analysis for activities of heat production, transmission and sales, hot water supply, hot water metering devices' servicing", as of 2011.

2. Procedure of data supply by utilities to NCC,
3. Estimation and evaluation procedure of indicators,
4. Procedure of publication of comparative indicators.

100. All the regulated by NCC utilities are distributed into 5 groups and 4 sub-groups. Annual amount of heat sales is the Ranking factor for Group; and percentage of biomass in the structure of heat generation fuels used is the Ranking factor for Sub- group. The residing of individual entities to groups and sub-groups is published on the website of NCC. Below there is provided a schematic system of distribution of utilities to groups and sub-groups, in Table #7 "Distribution of utilities into groups and sub-groups for benchmarking purposes in Lithuania" below, with number of utilities residing in each cell. In NCC website, individual names of the utilities residing is provided and updated yearly.

Table #7. **Distribution of district heating utilities into groups and sub-groups for benchmarking purposes in Lithuania**

	A sub-group Natural gas constitute not less than 75% of fuels for generation	**B sub-group** Natural gas constitute less than 75% and not less than 50% of fuels for generation	**C sub-group** Natural gas constitute less than 50% not less than 25% of fuels for generation	**D sub-group** Natural gas constitute less than 25% of fuels for generation
I group Annual sales of heat at 150 GWh and more	5 utilities	2 utilities	1 utility	-
II group Annual sales of heat at less than 150 GWh and not less than 90 GWh	1 utility	1 utility	1 utility	2 utilities
III group Annual sales of heat at less than 90 GWh and not less than 50 GWh	2 utilities	1 utility	3 utilities	3 utilities
IV group Annual sales of heat at less than 50 GWh and not less than 25 GWh	4 utilities	1 utility	1 utility	8 utilities
V group Annual sales of heat at less than 25 GWh	6 utilities	-	3 utilities	7 utilities

101. The Key Performance Indicators collected, monitored and later applied in the relevant processes of price setting/review are the ones as the table #8 "Key Performance Indicators for heat production,

transmission and sales in Lithuania" provides below. It is to be noticed, that there is a separate set for indicators for hot water supply activities and a separate set of indicators for hot water metering devices' servicing activities.

102. NCC yearly estimates the values of comparative indicators, takes relevant formal (legal) decision and published in the website values of comparative indicators annually before July 1st.The published information entails numerical expression of every indicator, derived for every group and every sub-group of utilities (provided in table #7 above).

Table #8. **Key Performance Indicators for heat production, transmission and sales in Lithuania**

Indicator	Formula	
1. Technological Indicators		
1.1. Technological losses of heat in the transmission network (MWh/km)	$S_{lyg\ tn} = \frac{Q_{tn}}{IL}$	Q_{tn} – technological loss of heat, MWh/year; IL – length of transmission network, km
1.2. Comparative fuel consumption (kg_{oe}/MWh)	$S_{lyg\ kuro} = \frac{O_{kuro}}{Q_{nš}}$	O_{kuro} – amount of fuel used, tones of oil equivalent; $Q_{nš}$ – amount of heat produced in own generators & supplied to network, GWh
1.3. Comparative consumption of electricity in heat production (kWh/MWh)	$S_{lyg\ nšel} = \frac{J_{nšel}}{Q_{nš}};$	$J_{nšel}$ – electicity, consumed for heat production at own generators, MWh; $Q_{nš}$ – amount of heat produced in own generators & supplied to network, GWh
1.4. Comparative consumption of electricity in heat transmission (kWh/MWh)	$S_{lyg\ prel} = \frac{J_{prel}}{Q_{pt}}$	J_{prel} – electicity, consumed for heat transmission, MWh; Q_{pt} – amount of heat supplied to the transmission network, GWh
1.5. Comparative consumption of water for heat transmission technology needs (m^3/km)	$S_{lyg\ prvand} = \frac{J_{prvand}}{IL}$	J_{prvand} – water, consumed for heat transmission, MWh; IL – length of transmission network, km
2. Indicators of productivity		
2.1. Installed heat power of exploited equipment per person engaged in heat production (MW/person)	$DNR_{nš} = \frac{P_{nš\,inst} - P_{kg\ inst}}{DB_{nš} - DB_{kg}};$	$P_{nšinst}$ – installed power of exploited generators, MW; P_{kginst} – installed heat power of exploited cogenerators, MW $DB_{nš}$ – number of persons engaged in generation, persons (no admin); DB_{kg} - number of persons attributed to heat in cogeneration, persons.
2.2. transmission network length per person engaged in transmission (km/person)	$DNR_{pr} = \frac{IL}{DB_{pr}};$	IL – length of transmission network, km; DB_{pr} – number of persons engaged in transmission, persons (no admin);

2.3. number of consumers per person engaged in heat sales (consumers/person)	$DNR_{prd.} = \frac{A}{DB_{prd.}};$	A – number of consumers served, consumers; DB_{prd} – number of persons engaged in heat sales, persons (no admin)
2.4. number of persons engaged in heat activity per administration employee (employee/admin)	$DNR_{veikl.} = \frac{DB_{nš} + DB_{pr} + DB_{prd.}}{ADB_{š}};$	$DB_{nš}$ – number of persons engaged in generation, persons (no admin); DB_{pr} – number of persons engaged in transmission, persons (no admin); DB_{prd} – number of persons engaged in heat sales, persons (no admin); ADB_{s} – number of persons in administration.
3. Other indicators		
3.1. Average salary bruto (EUR/month)	$DU_{vid} = \frac{DU_f}{12 * DB}$	DU_f – annual salary expenses, EUR; DB - number of persons engaged in generation, transmission, sales (no admin)
3.2. Annual material expenses in generation per Installed heat power of exploited equipment (EUR/MW)	$S_{lyg\ mat\ nš} = \frac{S_{mat\ nš} - S_{rem\ nš}}{P_{nš\ inst}}$	$S_{matnš}$ – material expenses for generation activity, EUR (no admin); $S_{remnš}$ – maintenance / repair expenses for generation activity, EUR (no admin); $P_{nšinst}$ – installed power of exploited generators, MW
3.3. Annual maintenance / repair expenses in generation per Installed heat power of exploited equipment (EUR/MW)	$S_{lyg\ rem\ nš} = \frac{S_{rem\ nš}}{P_{nš\ inst}};$	$S_{remnš}$ – maintenance / repair expenses for generation activity, EUR (no admin); $P_{nšinst}$ – installed power of exploited generators, MW
3.4. Annual material expenses in transmission per length of network (EUR/km)	$S_{lyg\ mat\ pr} = \frac{S_{mat\ pr} - S_{rem\ pr}}{IL};$	S_{matpr} – material expenses for transmission activity, EUR (no admin); S_{rempr} – maintenance / repair expenses for transmission activity, EUR (no admin); IL – length of transmission network, km
3.5. Annual maintenance / repair in transmission per length of network (EUR/km)	$S_{lyg\ rem\ pr} = \frac{S_{rem\ pr}}{IL};$	S_{rempr} – maintenance / repair expenses for transmission activity, EUR (no admin); IL – length of transmission network, km
3.6. Annual admin material expenses for material expenses of generation, transmission (%)	$S_{lyg\ matveikl.} = \frac{S_{mat\ veikl.} - S_{rem\ veikl.}}{(S_{mat\ nš} + S_{mat\ pr}) - (S_{rem\ nš} + S_{rem\ pr})} \times 100;$	
	$S_{matveikl}$ – material expenses for admin activity, EUR; $S_{remveikl}$ – maintenance / repair expenses for admin activity, EUR; $S_{matnš}$ – material expenses for generation activity, EUR (no admin); S_{matpr} – material expenses for transmission activity, EUR (no admin); $S_{remnš}$ – maintenance / repair expenses for generation, EUR (no admin); S_{rempr} – maintenance / repair expenses for transmission, EUR (no admin)	

3.7. Annual admin maintenance / repair expenses for maintenance / repair expenses of generation, transmission (%)	$S_{lyg\ remveikl.} = \frac{S_{rem\ veikl.}}{(S_{rem\ nš} + S_{rem\ pr})} \times 100$	$S_{remveikl}$ – maintenance / repair expenses for admin activity, EUR (no admin); $S_{remnš}$ – maintenance / repair expenses for generation, EUR (no admin); S_{rempr} – maintenance / repair expenses for transmission, EUR (no admin)

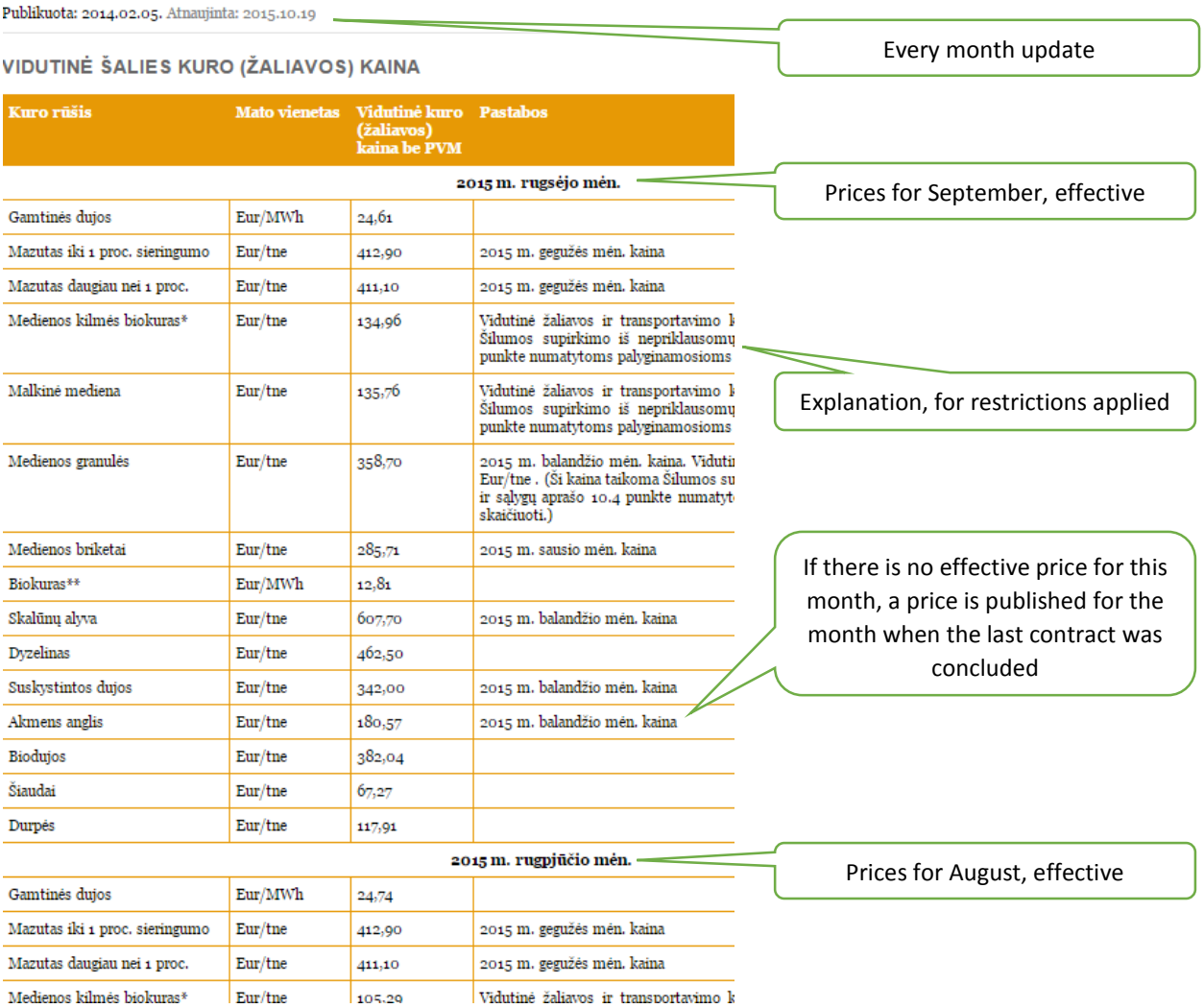
103. Key performance indicators are reported by utilities on yearly basis, and supplied to NCC via post or email. Special electronic system[28] for data submission was launched early in 2015, for testing, however, it will take some time before it operates to full extent; the final objective at launching the electronic system for data submission was to reduce administrative burden and give up paper forms for utilities, but also to speed up process of analysis of the data and release partially resources of regulator away from this activity to other areas. Utilities have obligation to start supplying information via electronic system since January 1st, 2016.

104. The "Rules on information supply by regulated entities to NCC" foresee supply of information by an entity within 4 months after ending of financial year.

105. The same Rules oblige entities to supply NCC with data on purchases of fuels for production of heat (and electricity, in case of cogeneration) – type of fuel, quantity, and price – within 20 days the next month. This data is processed by NCC, information on normalized price for different fuels for the last month is published monthly on website, and is obligatory to use by entities for the next month heating price calculation. The variety of fuels include all the fuels used in Lithuanian district heating sector, i.e. natural gas; oil with ≥ 1% sulphur; oil with < 1% sulphur; timber origin biomass (EUR/t_{oe}); firewood; pellet; briquette; timber origin biomass (EUR/MWh); shale oil; diesel; liquefied gas; coal; biogas; straw; peat. Tracking dynamics and keeping record is easy, as provided in Picture #3 below.

Picture #3. **Fuel price – indicator for substantive usage by utilities on monthly basis**

[28] Called DSAIS, available on www.regula.lt



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VIDUTINĖ ŠALIES KURO (ŽALIAVOS) KAINA

Kuro rūšis	Mato vienetas	Vidutinė kuro (žaliavos) kaina be PVM	Pastabos
2015 m. rugsėjo mėn.			
Gamtinės dujos	Eur/MWh	24,61	
Mazutas iki 1 proc. sieringumo	Eur/tne	412,90	2015 m. gegužės mėn. kaina
Mazutas daugiau nei 1 proc.	Eur/tne	411,10	2015 m. gegužės mėn. kaina
Medienos kilmės biokuras*	Eur/tne	134,96	Vidutinė žaliavos ir transportavimo k Šilumos supirkimo iš nepriklausomų punkte numatytoms palyginamosioms
Malkinė mediena	Eur/tne	135,76	Vidutinė žaliavos ir transportavimo k Šilumos supirkimo iš nepriklausomų punkte numatytoms palyginamosioms
Medienos granulės	Eur/tne	358,70	2015 m. balandžio mėn. kaina. Vidutir Eur/tne . (Ši kaina taikoma Šilumos su ir sąlygų aprašo 10.4 punkte numatyt skaičiuoti.)
Medienos briketai	Eur/tne	285,71	2015 m. sausio mėn. kaina
Biokuras**	Eur/MWh	12,81	
Skalūnų alyva	Eur/tne	607,70	2015 m. balandžio mėn. kaina
Dyzelinas	Eur/tne	462,50	
Suskystintos dujos	Eur/tne	342,00	2015 m. balandžio mėn. kaina
Akmens anglis	Eur/tne	180,57	2015 m. balandžio mėn. kaina
Biodujos	Eur/tne	382,04	
Šiaudai	Eur/tne	67,27	
Durpės	Eur/tne	117,91	
2015 m. rugpjūčio mėn.			
Gamtinės dujos	Eur/MWh	24,74	
Mazutas iki 1 proc. sieringumo	Eur/tne	412,90	2015 m. gegužės mėn. kaina
Mazutas daugiau nei 1 proc.	Eur/tne	411,10	2015 m. gegužės mėn. kaina
Medienos kilmės biokuras*	Eur/tne	105,29	Vidutinė žaliavos ir transportavimo k

106. Validation of the information supplied by entities is conducted in several forms: (i) comparing supplies on multiyear basis, and when serious deviations arrive, asking the entity to explain; (ii) at long-term price review, variety of documents shall be supplied upon request of NCC, and some of the documents are copies of primary invoices; (iii) comparison to reporting to national tax office is conducted; (iv) independent audit review of information supplied to NCC is mandatory; (v) during a year, several cases (several entities) of focused surveys are conducted by NCC.

107. Key performance indicators are monitored by NCC and used for several purposes:

- for district heating sector transparency increase – estimates on comparative indicators at every group and subgroup are published, thus allowing all interested stakeholders to monitor dynamics of KPIs and potential increase in efficiency of regulated utilities individually and all the sector in general;

- for energy market transparency increase – if investors consider which energy sector to invest, he can have prime-source objective information on the status of the heating sector, and can thus come with potentially better-grounded decision;
- for higher efficiency introduction in prices for district heating services – to make objective and challenging efficiency targets for individual utilities while setting long-term prices and calibrate some of the targets at annual price review;
- for avoiding potential manipulation with fuels' prices, when entities are mandated to change heat prices monthly by their own;
- for keeping different fuels' market open for potential suppliers and increasing competition – which finally and potentially shall guarantee district heating utilities to use the best available options in terms of value to consumer.

Annex 1.

Алгоритм расчёта ключных показателей деятельности в сфере водоснабжения и водоотведения на основе проектов обновленных форм отчетности, что подается лицензиатами НКРЭКУ

Алгоритм расчёта ключных KPI обновленный (по проектам обновлённых форм отчетности)		
Название показателя	**Ед. изм.**	**Формула расчёта**
ВОДОСНАБЖЕНИЕ		
Операционно-технические показатели		
Доля потерь и расходов (воды) к поднятой воде	%	((Расходы воды на технологические нужды до II подъёма, фактически + Потери воды до II подъёма, фактически + Расходы питьевой воды после II подъёма, фактически + Потери воды после II подъёма, фактически) / Поднятая вода, Qпод) * 100%
Удельный объём реализации продукции (услуг) в расчете на 1 человека	л/чел./ сутки	((Объем реализации централизованного водоснабжения – населению (индивидуальные жилые дома), всего + Объем реализации централизованного водоснабжения - на вводе в многоквартирный дом, всего + Объем воды для осуществления другого вида деятельности (кроме централизованного водоснабжения) – для исполнения услуг по централизованному снабжению холодной воды (с использованием внутридомовой системы)[29] / 365) *1000*1000)) / Численность населения, которому предоставляется услуга, всего
Удельные расходы электроэнергии на поданную в сеть воду	кВт·ч/ $м^3$	Общие расходы электроэнергии на водоснабжение, фактически / Подано воды в сеть (II подъем), всего
Аварийность в расчете на 1 км сетей	аварий/ км	Количество аварий на сетях водоснабжения / Общая протяжность сетей водоснабжения
Финансово-экономические показатели		
Расходы операционной деятельности в расчете	грн./ $м^3$	Расходы операционной деятельности / Объем реализации централизованного водоснабжения

[29] Этот показатель «Объем воды для осуществления другого вида деятельности (кроме централизованного водоснабжения) – для исполнения услуг централизованному снабжению холодной воды (с использованием внутридомовой системы)» пока не отражен в Форме отчетности №4 согласно проекта постановления НКРЭКУ. Но такие изменения планируются. Эта формулировка показателя может быт не окончательной.

на 1 м^3 объёма реализации		
Уровень задолженности	%	((Дебиторская задолженность по реализованным услугам на конец периода - Дебиторская задолженность по реализованным услугам на начало периода) / Стоимость реализованных услуг с начала периода) * 100% *(формула подлежит пересмотру)*
Численность персонала в расчете на 1 км сетей	чел./км	Фактическая численность персонала централизованного водоснабжения / Общая протяжность сетей водоснабжения;
Уровень износа системы водоснабжения	%	(Износ необоротных активов / Первичная стоимость необоротных активов) * 100%
Показатели качества		
Доля воды, которая не соответствует требованиям стандарта питьевой воды	%	(Объем воды, которая не соответствует требованиям государственного стандарта питьевой воды / Объем реализации централизованного водоснабжения) * 100%
Доля потребителей, которые получают услуги по графику	%	(Количество потребителей, которым предоставляется услуга по графику / Количество потребителей водоснабжения (личные счета), всего) * 100%
ВОДООТВЕДЕНИЕ		
Операционно-технические показатели		
Засоренность сетей в расчете на 1 км сетей	ед/км	Количество засоров в сети водоотведения / Общая протяжность сетей водоотведения
Удельные расходы электроэнергии на 1 м^3 пропущенных сточных вод	кВт·ч/ м^3	Общие расходы электроэнергии на водоотведение, фактически / Объем попуска сточных вод через очистные сооружения, всего
Удельный объём реализации продукции (услуг) в расчете на 1 человека	л/чел./ сутки	((Объем реализации централизованного водоснабжения – населению (на выпуске с индивидуальных жилых домов), всего + Объем реализации централизованного водоотведения - на выпуске с многоквартирных домов, всего + Объемы стоков от осуществления другого вида деятельности (кроме централизованного водоснабжения) – от исполнителя услуг по централизованному снабжению холодной воды (с использованием внутридомовой системы)[30] / 365)*1000*1000))/ Численность населения, которому предоставляется услуга, всего

[30] Этот показатель «Объемы стоков от осуществления другого вида деятельности (кроме централизованного водоснабжения) – от исполнителя услуг по централизованному снабжению холодной воды (с использованием

Финансово-экономические показатели		
Расходы операционной деятельности в расчете на 1 м^3 объёма реализации	грн./м^3	Расходы операционной деятельности / Объем реализации централизованного водоотведения
Уровень задолженности	%	((Дебиторская задолженность по реализованным услугам на конец периода - Дебиторская задолженность по реализованным услугам на начало периода) / Стоимость реализованных услуг с начала периода) * 100% *(формула подлежит пересмотру)*
Численность персонала в расчете на 1 км сетей	чел./км	Фактическая численность персонала централизованного водоотведения / Общая протяжность сетей водоотведения
Уровень износа системы водоотведения	%	(Износ необоротных активов / Первичная стоимость необоротных активов) * 100%
Показатели качества		
Доля скинутых сточных вод без очистки	%	(Объем скинутых сточных вод без очистки / Объем отведенных сточных вод, всего) * 100%

внутридомовой системы)» пока не отражен в Форме отчетности №4 согласно проекта постановления НКРЭКУ. Но такие изменения планируются. Эта формулировка показателя может быт не окончательной.