

**E energija group: ensuring transition to modern perception of efficient district heating.
Case: Akmenė region, Lithuania.**

Application The International District Energy Awards 2011



Category: Modernization of Existing District Heating Scheme Akmenė region, Lithuania

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1. Modernization of existing district heating scheme, Akmenė region, Lithuania.

The company. Akmenės energija, a member of E energija group, last year celebrated its 10th year anniversary of its successful operation as the only provider of utility services to the community in Akmenė region. The company is generating and supplying heat and hot water to the users of Akmenė district municipality since 2000, on the long-term lease contract basis with the Municipality of Akmenė region, which have chosen Akmenės energija as a qualified investor to modernize and increase the efficiency of old, inefficient and polluting the environment, soviet style district heating system.

The system. The district heating system with its constituent components that was leased in 2000 by Akmenės energija for modernization and optimization, counted from 30 to 40 years of operation and demonstrated extremely poor operation results such as the inefficiency of energy generation and huge technical losses in the system. The variety of fuel used, such as environmental polluting coal and crude oil were still used and did not correspond to the modern perception of efficient and sustainable energy production. Currently Akmenės energija, which is the only licensed district heating supplier in the region, operates 9 boiler houses.

The community and users. Now, the company is servicing the 28.3 thousand inhabitants' community of Akmenė region with district heating and hot water supply services. Naujoji Akmenė, Akmenė and Venta are the largest urban centers in the district. Living area in Akmenė, Naujoji Akmenė, Papilė and Venta totals 532,000 square meters, the district heating system covers 52% of this area.

The result. The utmost result of the investments into modernization of probably the oldest district heating network in Lithuania certify a number of key indicators, among which the decreased heat transmission losses from

45% in the beginning of modernization in 2000 down to 8,8 % this year, as well as savings of fuel and electricity in the production process, resulting in the reduction of emissions after 2010 reflects the engineering competence of the company.



Picture 1. Naujoji Akmenė boiler house

Continuity of the project. Having proved the engineering competence with the transition implemented in post-soviet district heating scheme in Lithuania, E energija group, now with the support of its shareholder, European Bank for Reconstruction and Development (EBRD), is pioneering the first private investment, remodeling the analogous type of district heating scheme in Artiomovsk, Ukraine. Based on Akmenė experience, E energija group will promote further transition from inefficient and polluting district heating to high standard, efficient district heating services, meeting the trust of the communities and businesses in the future of district heating.

2. Summary. Transition to modern perception of efficient district heating : Akmenė region, Lithuania

Having proved the engineering competence with the successfully implemented transition from inefficient and polluting district heating to high standard district heating services, meeting the trust of the communities and businesses in post-soviet district heating scheme in Lithuania, E energija group, among its current projects in Lithuania and Latvia, now with the support of it's shareholder, European Bank for Reconstruction and Development (EBRD), is pioneering the first private investment, remodeling the analogous type of district heating scheme in Artiomovsk, Ukraine.

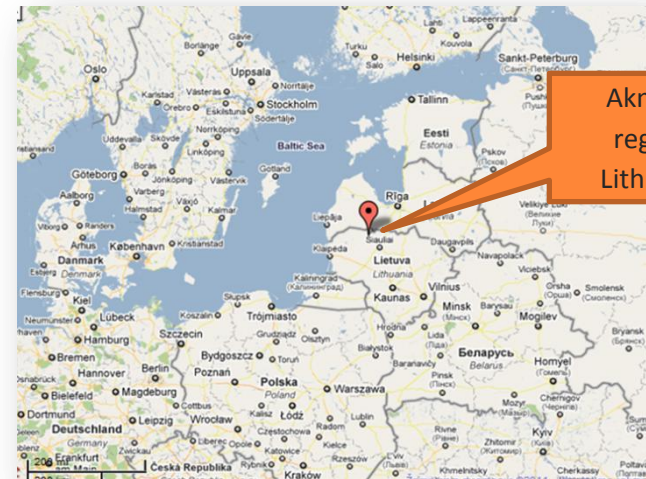
E energija group company, Akmenės energija, operating on the basis of the long-term concession contract with Akmenė region municipality, reached its aim to modernize and increase the efficiency of existing post- soviet district heating system, using contemporary energy solutions saving resources, minimizing emissions, heat generation, transmission and supply costs and will develop further solutions, such as the increase of the share of renewables in district heating.

E energija with implemented engineering and management solutions successfully challenged extremely low efficiency of the soviet style industrial district heating scheme and, after 10 years of operation in Akmenė region, can be proud with success it achieved by remodeling the system: huge savings in fuel and electricity input, losses in transmission minimized down to 8,8%, considerably lowered emissions, increased trust of the community for district heating services and a solid basis for future success of the system in the region.

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AKMENĖS RAJONO SAVIVALDYBĖ



3. The Goal: Efficient district heating scheme and sustainable energy solutions.

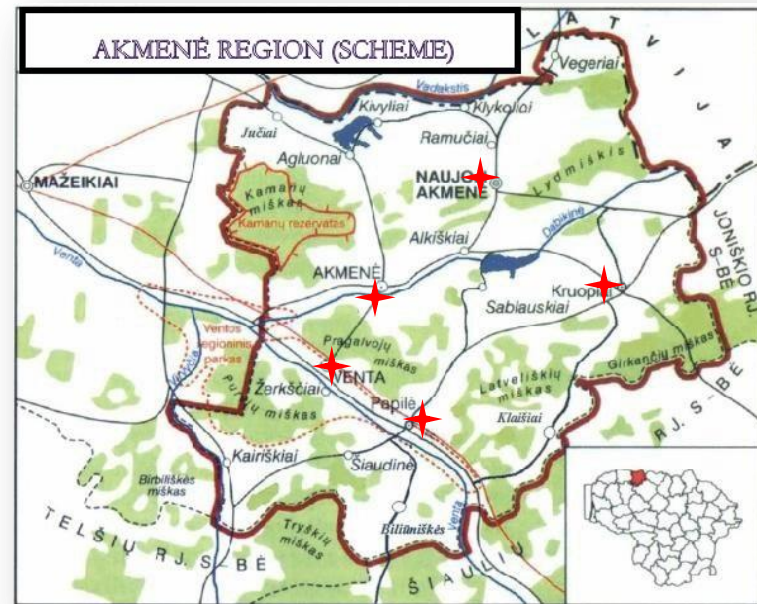
3.1. System History. Background data. The largest part of the district heating systems in Lithuania are owned by the municipalities, which attract private investments using long-term lease or concession model for the modernization and renovation of energy generation and transmission units, since state and municipal institutions are not capable to raise necessary funding for modernization and lack modern engineering competencies.

Most of the district heating systems in post-soviet countries were established disregarding the actual demands of the users, fuel costs, production efficiency and environmental sustainability. A large part of district heating networks was built based on the demands of the production units, factories, large companies and growing towns, with reserve for future growth of industry. However, most of large industries have terminated the operational activities after soviet union break up, have been optimized and changed its energy needs, since fuel costs increased dramatically and environmental requirements due to international obligations toughened.

The district heating system in Akmenė region is divided between separate units split between main settlements of the region: Naujoji Akmenė, Akmenė, Mencių, Kruopiu, Venta and Papilė, where Naujoji Akmenė and Akmenė district heating systems servicing the largest number of users heat and hot water services supplied by district heating operator. Each of the towns and settlements has separate DH subsystems operated by the same licensed operator – Akmenės energija. The production units in the systems vary from large ones, originally planned for large production and growing demands of expanding town, to small production

units for a cluster of individual and multi apartment households.

The main tasks for the investor and private operator were to eliminate key indicators, describing the deteriorating state of the district heating scheme in 2000, followed by the dissatisfaction of the users, instability of the system and danger to the future district heating services at all.



★ Layout of Akmenė region district heating schemes

3.2. Presumptions for the modernization of the district heating scheme in 2000.

Frequent accidents in the system. The district heating networks used for the transportation of heat were in the condition requiring huge costs for repairs: during 2001 the repairs were required in 20 km segment of the networks, 42 times per year the accidents occurred. The company had to allocated financial and human resources both for the detection and the repairs accidents.

Unstable and interrupted supply of services. Every accident meant that for the period of repairs the service of essential services as the heat and hot water provision in the severe climate country like Lithuania (heating season takes 5-6 months per year with temperatures occasionally dropping down to -20° C) could not be ensured and the wellbeing of the inhabitants was endangered. In December 2003 the district heating services were interrupted more than for 10 thousand inhabitants for 24 hours due to the accidents in the mains.

High level of technical losses in the networks. The pipelines in Akmenė region counted up to 40 years, most of them were over-ground type, not isolated, by inefficiency ranking Akmenė at the top inefficient district heating systems in the Lithuania. The average indicator of losses in the country in 2000 were 18,1%, while the worst Akmenė exceeded this indicator more than twice, i.e. up to 45%. Moreover huge technical losses lead to the increased fuel consumption and thus to the negative environmental impact as well.

Inefficient Fuel consumption. Before the complex of investments were implemented JSC „Akmenės Energija“ consumed 32,1% more fuel for the production of 1MWh of thermal energy than average in Lithuania.

Environmental impact. For a thousand of MWh supplied to the users before the investments into district heating modernization, JSC „Akmenės energija“ emitted by 30% more than average in Lithuania.

High district heating tariff due to high inefficiency. High losses in heat generation, transmission and supply resulted in 20% higher heat tariff for the users in the region of Lithuania with comparatively low income and the highest unemployment level in 2000.

Disconnection from district heating scheme. Disconnecting users because of low quality of services and high tariff was one of the most problematic issues to be solved, since at the beginning of the operation JSC Akmenės energija the percentage of disconnections in the region (5,6%) was leading in Lithuania. A complex of solutions for the benefit of individual users and the community was implemented during the years of operation: the reliability and the quality of the service increased, hot water services were ensured all year round, heat and hot water meters installed, web-based customer service system, allowing customers to follow their consumption and the invoices was introduced.

3.3. Remodeling the existing district heating scheme. Naujoji Akmenė case.

History: System Status in 2000.

The heat generating boiler houses with the total capacity of 105 MW (water) and 30t/h (steam) and the equipment in Naujoji Akmenė scheme were installed back in 1951 and were intended both for the needs of cement factory and district heating of the town. At the time JSC Akmenės energija took over the operation of district heating in Akmenė region, the capacity exceeded the demands of the users by 3 times, seasonal efficiency coefficient of the boiler house was around 81%. The heat was supplied to 295 586 sq.m. of heated households of the users, all heat substations (310 units) were not renovated, only 4 of them automated, heat meters were installed only to 25% of the users, the hot water was not supplied during summer months, pipelines counted from 10 to 40 years with losses amounting to 29%, with total losses in heat transmission reaching up to 45%.



A Change: Status in 2011.

In order to increase the efficiency of district heating scheme, Akmenės energija implemented a complex of solutions. With reference to the density and type of the users and the layout of the district heating networks, diversifying the optimum demands of the users, the heating scheme of Akmenė region was divided into separate districts with the aim to install modern and efficient heat generation units closer to the users and thus minimize losses in all three constituents in the district heating system: heat generation, transmission and supply to the end user. Naujoji Akmenė town reflects the result of how complex engineering solutions aided to reach the functioning of a district heating scheme conforming to the best standard of efficiency in accordance to modern requirements: efficiency coefficient in energy generation up to 102%, technical losses 8,8%, automated boiler houses and heat substations, telemetry, heat metering and client service support.



Picture 3. The newly built boiler house.

3.4. Engineering solutions 2000 – 2011 (1)

Naujoji Akmenė and Akmenė towns. Key engineering solutions implemented Akmenės energija 2000 – 2011:

2001: a new 5,75 MW boiler house was built in Ramučiai district. The boiler house is fully automated, working without supervising personnel. The boiler house generates heat for the households of Ramučiai inhabitants, hospital, sanatorium and several public administration buildings.

2002: reconstructed and automated Stadiono boiler house in Akmenė town. After the reconstruction, advanced and smart telemetry energy management is used, remote boiler house supervision and control is enabled, thus ensuring the optimum performance of the boiler house and quality of services to the users.

2002 – 2003: group boiler houses were closed and automated centralized heat substations were built for the users, including with the hot water preparation closer to the users and thus closing hot water pipelines, decreasing losses in the hot water supply networks and improving the quality of services to the inhabitants. After the installation of individual heat substations the users are able to regulate the hot water supply services, save energy and enjoy essential hot water supply services in the households all year round not only during the heating season as previously.

2003: automation introduced in Ligoninės boiler house in Akmenė town, following the automation and remote management programme of the boiler houses.

2004: “Žalgiris” boiler house was built: its a new central boiler house of Naujoji Akmenė town with the capacity of 16,6 MW. The boiler house is fully automated, working without supervising personnel. Fuel – natural gas. Efficiency reached: from 102%. After the boiler house was built the district heating systems was no longer using old and inefficient cement factory boiler house (204,55 MW), the efficiency of which far exceeded

the demands of the system.

In addition Kruopiai and Papilė boiler houses were reconstructed thus enabling efficient and fuel saving heat generation even in remote settlements of Akmenė region.

2000 – 2011: the company changed 89% of the pipelines in the town with new cased underground pipelines, thus increasing the reliability of the heating networks, completely eliminating the risk of accidents and termination of services to the users, minimizing technical losses down to 8,8% and increasing the efficiency of heat supply through the reduction of fuel consumption for the generation of heat. In 2006 JSC “Akmenės energija” received a 50% co-financing from the EU Structural funds as the goals of the project corresponded with the state established priorities for the co-financing of the projects, i.e. the increase of efficiency, decrease technical losses, save fuel, nature, use modern technologies for energy generation, transmission and supply, set the basis for future reliably and cost effective utility services, thus increasing the quality of living for the communities and attractiveness of the region both for the business and for the society.

2011: EU co-financed project for the reconstruction of Žalgiris boiler-house and adaptation for using local biofuel (wood waste). The project shall have its environmental effect through the decrease of CO2 emissions and district heating tariff right after its completion, i.e. for the heating season starting October 2011.

3.4. Modernization of the scheme 2000 – 2011.



Picture 4. Boiler house equipment in 2000.



Picture 6. New boiler house



Picture 5. Status of heat transmission networks during reconstruction.

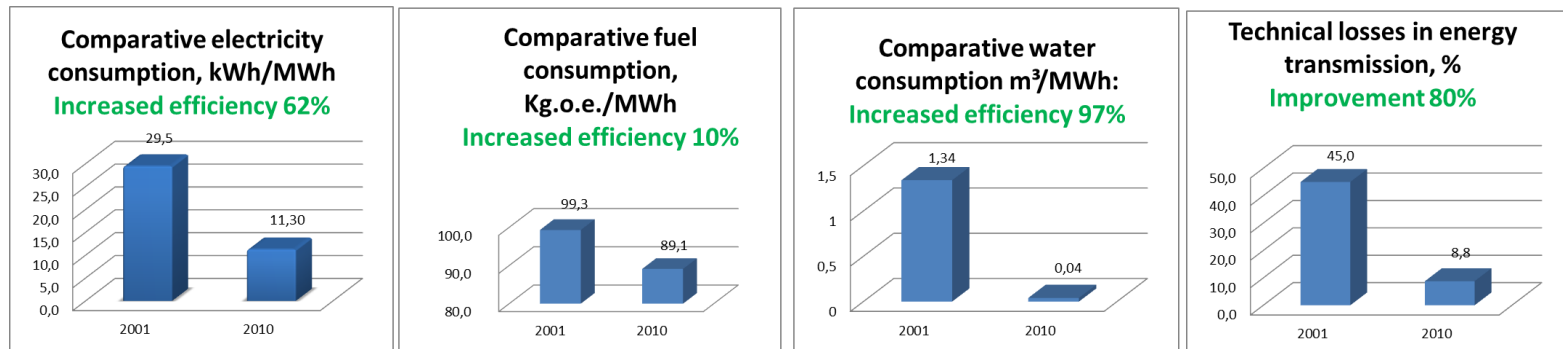


Picture 7. Pipeline reconstruction in 2006.

4. A difference: efficiency and saving of resources in energy generation.

The investments that have been made by E energija group in Akmenė and the implemented engineering solutions resulted significantly on the savings of resources used in energy generation and the efficiency in the production. The best evaluation can be seen from the reconstruction of Naujoji Akmenė district heating scheme, as the largest share of heat consumption and modernization works were done in this town. Regarding the resources save some influence of decreased consumption of heat and hot water can be evaluated as well, due to the disconnection of users from the system and reduced demands from the industrial users. However, Akmenės energija 10 years of operation considerably reduced the use of resources for heat and hot water generation, transmission and supply. The results reached in Akmenė are the milestones for E energija district heating companies in Lithuania and Latvia operating the same type or post soviet district heating schemes. Moreover, E energija group striving to transfer its engineering and management experience to Ukraine, where district heating with analogous structure is the prevailing source of heat energy in the communities and the remodeling of schemes would lead to even higher scale efficiency results, since currently district heating in Ukraine is amongst the least developed and most inefficient and pollutant in the world.

The results reached through complex modernization of Naujoji Akmenė district heating scheme prove that systematically modernized district heating schemes can be efficient, cost and resource effective and, moreover serve as a convenient and reliable services for the communities.



5. The future: Introducing the renewables for up to 70% of heat generation.

This spring the project in Naujoji Akmenė district heating scheme will further continue with a reconstruction of the boiler house under the project “Reconstruction of Žalgirio boiler house for the use of renewables”. The project was partially co-financed by EU Structural funds. Currently all heat generated in Akmenė and Naujoji Akmenė towns is generated using natural gas as a fuel, the price of which, increased drastically during the last decade, thus increasing the heat tariff and expenditures for heating bill in the households.

Moreover, it is important to note, that Lithuanian energy companies is currently highly dependent on the priced development from the only gas supplier from Russia. The introduction of renewables and diversification of fuel used for energy generation is among top priorities in the State Energy Strategy, therefore the application for the reconstruction of the boiler house was approved by the Ministry of Economy and the EU aid granted.

The project became very important due to the constant rise in gas prices, when during recent years it increased approx. 4,6 times. The price for bio fuel, due to the increase of the bio fuel market itself, have stabilized and is currently 40 %

lower than the import price of natural gas. Whereas the heat supply in centralized way is produced only from natural gas, the increase of fuel prices had a detrimental effect on the company because the increase in production costs required the increase of energy prices for the users, which had a negative effect on the company's competitiveness, compared with other heat energy choices available for the clients. Currently the heat for Naujoji Akmenė is produced from two boiler houses, with the total capacity of 26,3 MW.

After the implementation of the project, where the 5 MW biofuel boilers will be installed Akmenės energija will differentiate the use of fuel for energy generation, since for heat generation the company will be able to use up to 70% of local biofuel (wood chips) thus being able to choose both cost effective and useful fuel input for the user in terms of price, positive environmental impact reducing CO2 emissions by 5,5 tones per years, creating new job places for the community.

6. Investment into sustainable future.

The project of introducing the renewables in the heat production in Akmenė falls both under the State strategy and under the corporate values of E energija group companies as it was the first in Lithuania that has started the investments into flexible mechanism specified by Kyoto protocol such as Joint Implementation (JI), Clean Development Mechanisms (CDM) and Voluntary Emissions Reduction projects abroad.

E energija takes part in the projects that are implemented in relation to global environmental policies specified by the Kyoto protocol. E energija directly contributes to the decrease greenhouse gases emissions by increasing the effectiveness in the processes of energy generation and.

The implementation of the project will also positively contribute to the environmental issue. After the project 70 % (approx. 25 GWh) of energy will be produced using local bio resources. The remaining necessary heat will be produced using natural gas. Such solution would **5.500 t.** less CO₂ emissions, and during the estimated 16 years' period will constitute **88.000 t.** CO₂ savings.

Striving to contribute to the development of a modern sustainable energy concept, E energija finances and implements projects which, despite energy efficiency benefits, contribute to the minimization of negative environmental impact as well. The savings after the remodeling of the district heating scheme in Naujoji Akmenė already can be said as reducing the CO₂ emission by 55682 tones and NO_x by 17908 tones.



7. Benefits to the community and users. Client service.

District heating is primarily oriented to the needs of the community where it's located and its end user. Having a wide reserve for the flexibility and up-to-date technology solutions, by state and local governments district heating is still promoted as the most efficient and convenient form heat generation and supply for the user.

Akmenės energija solutions implemented during the decade of its operation in Akmenė district and challenging to remodel probably the worst district heating scheme in terms of efficiency, demonstrated the change that can be achieved with community, local government and private engineering company systematically working towards the solution of overcoming the identified deficiencies of the system. The solutions implemented and the results achieved will primarily serve for the benefit of the community and people of Akmenė, namely:

- Akmenė region will have modern and efficient district heating scheme with optimum capacities for current needs;
- Basis for sustainable development of the community;
- The fuel choice will be ensured depending on the availability and cost of resources;
- Users have full year hot water services;
- The heat and hot water metering is ensured;
- Possibilities to regulate and save;

In addition with the development of internet and increased number of internet users in the regions, Akmenės energija in 2010 launched a package of internet services for the district heating users. Now the users are able to receive e-invoices, compare the heat and hot water consumption, prices, declare the consumption and pay using web based platform even travelling or living abroad, receive up-to-date information regarding changes in the laws, prices and other related information.

The informational website and customer service portal can be found at www.e-vac.lt



8. E energija: Why the achievements under this project are important for district heating?

The remodeling of Naujoji Akmenė district heating scheme, the increased efficiency in heat generation, transmission and supply, saving of resources and minimizing emissions prove that the soviet type schemes like they were originally designed in Akmenė region and are still of a prevailing type in many towns in Lithuania, Latvia and Ukraine, can be made effective and conforming to the modern energy generation standards with district heating schemes, designed for sustainable future of the cities. E energija has the experience and the competence, while the proven results encourage us to continue further and invite other cities with district heating schemes to pursue for the result that makes a change now and in the future.

The achievements in the modernization of Naujoji Akmenė district heating scheme and the reflection on the environment and society demonstrate the governing values and ideas of all E energija group companies, working in district heating and B2B sector in Lithuania, Latvia and Ukraine, namely striving to reach the following synergies alongside their business line :

- Encourage the development and implementation of environmentally friendly energy generation technologies and pursue for additional environmental benefit from energy related activity;
- Support the implementation of international environmental standards and initiatives in the countries of operation;
- Undertake initiatives to promote greater environmental responsibility in countries and areas of activity;
- Monitor and assess the consumption of resources for energy production and encourage investments which positively influence the environment;
- Promote carbon trading as an effective tool for emission reductions and participate in carbon credit trade markets;
- Follow regulatory standards and recommendations for sustainable development applicable for energy sector;
- Innovate in district heating;

Facts for considering: Currently Ukraine continues to be one of the least energy efficient countries in the world and has the greatest emissions level per unit of GDP among CIS countries. An inventory estimated that total emissions from Ukraine in 2002 were 487 million tons of CO₂ equivalent (the corresponding figure for 2001 was 482 million tons, and for 2004 -425 million tons of CO₂ equivalent). This results in a per capita emission of 10 tons of CO₂ equivalent per year. Heat supply in the buildings sector accounts for approximately 25% of all fuel consumed in Ukraine, and, therefore, there is a huge potential for energy efficiency improvement in this sector, which Ukraine wants to actively pursue. Source: <http://www.undp.org.ua/> .

If E energija success case in Akmenė was repeated in Ukraine, millions tons of CO₂ emissions would be saved!

9. Support by Akmenė community: the letter from the Mayor of Akmenė Municipality



AKMENĖS RAJONO SAVIVALDYBĖS MERAS

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Reg.No. MS-79

30/03/2011

We are writing to support JSC "Akmenės energija" application for the Global District Energy Climate Awards for 2011 with the modernization of Akmenė district heating scheme, which was implemented by the company starting from its work as the operator of Akmenė district heating services in 2000.

I believe that the investments and energy solutions implemented by the company will benefit for the community of Akmenė region, since during 10 years of operation in our region the company made smart investments into remodeling of old and inefficient district heating scheme, which already now demonstrate big saving of resources and efficiency of heat and hot water production.

Municipality of Akmenė district, as the owner of the district heating system and responsible for the organization of proper services to the inhabitants in the region is primarily interested in the investments that will be beneficial to its community in the long-term, which we believe that JSC "Akmenės energija" already ensured and will do further steps to ensure the most efficient heat generation and supply to our inhabitants and organizations working in the region.

We consider that the scope of investments done by the company itself and its competence both attracting co-financing to the modernization of our system from EU Structural funds and the technical solutions implemented will be beneficial for the municipality as the owner of the district heating systems in terms of its increased value and stability and for our community in terms of reliability and cost effectiveness of the system in the future.

We believe that the success of this private and public partnership will also contribute to the attractiveness of Akmenė region for future private investments.

Sincerely Yours,
Mayor of Akmenė District Municipality

Vitalijus Mitrofanovas