

Đ³ l³ ëï ³ ÝÇ í »ñ³ ϳ Ý· Ýí áỗ ¿Ý»ñ· »ï Çϳ lǨ ;Ý»ñ· ³ Ëݳ láŌáñĀl³ Ý ÑCÙݳ ¹ñ³ Ù Áݹ· nÏí³Í¹åñáóÝ»ñÇ ç»éáñóÙ³Ýí»ñ³µ»nŪ³É

ĐáốÉÇË 2011Ã. **July 2011**

î»Õ»Ï³. Cñ ø³Õ³ù³ÛCÝ c»éáõóÙ³Ý ĺñ³. ñáõÙ

Bulletin on schools heating involved in UHP project

Armenia Renewable Resources and Energy Efficiency Fund















2Úê Đ2Ø2ðàôØ.

س Õ³ ù³ ŪÇÝ ç»éáōóÙ³ Ý Í ñ³ · ñÇ βñç³ Ý³ Ï Ý»ñáōÙ ³ ſ³ ñï ſ »É
» Ý ° ñ '' 3 Ý ù³ Õ³ ùÇ '' Ù³ ñ½» ñÇ 120 ¹ å ñáoÝ» ñáōÙ ç»éáōóÙ³ Ý
³ β˳ ï ³ ÝùÝ» ñÁ: Đ³ Ϳ³ ëï ³ ÝÇ ſ » ñ³ ϳ Ý · Ýſ áÕ
¿Ý» ñ · » ï Çϳ ŪÇ '' ¿Ý» ñ · ³ Ëݳ IáŌáōĀIJ³ Ý ÑÇÙݳ ¹ ñ³ ÙÁ,
Đ³ Ϳβ³ ëï ³ ÝÇ Đ³ Ýñ³ å » ï áoĀIJ³ Ý '' Đ³ Ù³ β˳ ñѳ ÜÇÝ ´³ ÝÏ Ç
ýÇݳ Ýë³ ſ áñÙ³ Ùµ Çñ³ ϳ ݳ óſ áŌ Ø³ Ō³ ù³ ŪÇÝ ç»éáōoÙ³ Ý
ſ ñ³ · ñÇ βñç³ Ý³ ÏÝ» ñáoÙ, 2005-2011ĀĀ. Áݳ oùáōÙ
Çñ³ ϳ ݳ oñ »É ¿ 120 ѳ Ýñ³ Ï ñó ϳ Ý ù³ Ō³ ù³ ŪÇÝ ¹ å ñáoÝ» ñÇ
ç»éáōoÙ³ Ý Ñ³ Ù³ ϳ ñ · »ñÇ ʿ I³ Āë³ IJ³ Ï Ý»ñÇ, ³ ñï ³ ùÇÝ ''
Ý» ñß» Ýù³ ŪÇÝ ç»éáōoÙ³ Ý o³ Ýo» ñÇ Ý³ ˳ · [Ù³ Ý '' ϳ éáōóÙ³ Ý,
CÝāå »ë ݳ '' ; Ý» ñ · ³ Eݳ IáŌáōĀIJ³ Ý ³ ß˳ ï ³ ÝùÝ» ñ: ¾c 3

°ñ¨³ÝǨ Ù³ñ½»ñÇ 120 ¹åñáóÝ»ñÇó 14 ¹åñáóÝ»ñáōÙ Çñ³Ï³Ýóí »É »Ý ¿Ý»ñ. ³Ëݳ láÕáōÃĴ³Ý³ß˳ï ³ÝùÝ»ñ:

¸åñáoÝ»ñáoù ¿Ý»ñ·³ Ëݳ láŌáoĀl³ Ý ÙÇçáo³ éáoÙÝ»ñÇ Çñ³ ï³ Ý³ où³ ݳ ñ¹láoÝùáoù ¿Ý»ñ·³ ëå³ éù³ Ý ïñ׳ ïáoùÁ ïÝï »ë»ó ç»éáoóù³ Ý Ñ³ Ù³ ñ ͳ Ëëíáð ç»ñù³ lÇÝ ¿Ý»ñ·Ç³ lÇ Ùáï 30-50% -Á: ¾ç3

°ì þ2î 2ì °ÈÆÜ...

INSIDE THIS ISSUE:

The necessity of urban school heating program implementation in Armenia.

In Armenia urban schools were mainly heated by central heating systems. page 2

Within the scope of Urban Heating Project 120 schools from Yerevan and marzes were heated. Armenia

Renewable Resources and Energy Efficiency Fund with financial support of World Bank, within the scope of Urban Heating Project, from 2005 to 2011 completed heating system establishment works (design and construction of boiler houses, establishment of external and inter-building heating systems as well as implementation of energy efficiency activities) in 120 urban schools. page 3

From 120 schools in Yerevan and marzes involved in the project in 14 schools the energy efficiency activities were implemented. As a result of energy efficiency activities implementation the energy efficiency savings for heating were decreased by 30-50 %. page 3

And Much More...

Đ3 ||3 ë; 3 YÇ (»ñ3 | 3 Y. Y(á0 ¿Y»ñ. »; Ç | 3 ||Ç " ¿Y»ñ. 3 Ē Y3 ||á0áōA||3 Y ÑÇÙÝ3 1ñ3 Ù ù º ñ "3 Ý ä éák||3 Ý 1 Ýñu3 Ýóù ; áôÝ 32

ù. °ñ¨³ Ý, äéáßĺ³ Ý 1 Ýñμ³ Ýóù, ï áôÝ 32 Ñ»é..` (+374 10) 588011; ü³ ùë.` (+374 10) 541732 雉.÷áĕï .` **info@r2e2.am,** ì »μ-Ĭ³lù` **www.r2e2.am** Armenia Renewable Resources and Energy Efficiency Fund 32, 1 Iane Proshyan Str., Yerevan, Armenia tel: (+374 10) 588011; fax: (+374 10) 541732 e-mail: info@r2e2.am

website: www.r2e2.am



 Đ3 | 3 ë ; 3 Ý Ç
 Ñ 3 Ý ñ 3 å » ; á ō Ā | 3 Ý
 ù 3 Ō 3 ù 3 l Ç Ý
 ¹ å ñ á ó Ý » ñ Á,

 ÑÇ Ù Ý 3 ï 3 Ý á ô Û
 Ç » é á ô ó Û 3 Ý
 ½ Ç Ý
 µ Ý 3 ï 3 í 3 l ñ » ñ á ô Û ; ê 3 ï 3 l Ŷ;

 Ï » Ý ï
 ñ á Ý 3 Ó î 3 Í
 Ç » é á ô ó Û 3 Ý
 Ñ 3 Ù 3 ï 3 ñ » ñ Ç
 Ù Ç Ç á ó á í : ê 3 ï 3 l Ŷ;

 ¿ Ý » ñ » » ï
 Ç i
 × Ý 3 Å 3 Ù Ç ï 3 ñ Ç Ý , ç » é á ô ó Û 3 Ý Ñ 3 Ù 3 ï 3 ñ » ó á ô Ù Á,
 3 B Ë 3 ï 3 Ý ù Ç
 ¹ 3 ¹ 3 ñ » ó á ô Ù Á,

 3 å 3 î » ñ 3 ï 3 Ý · Ý Ú 3 Ý
 3 Ý Ñ Ý 3 ñ Ç Ý á ô Ã l Á ô Ó Ý Å
 Ñ 3 Ý · » ó ñ » ó Ç Ý
 ¹ å ñ á ó Ý » ñ Ç

 ï 3 ñ » ñ 3 l Ç Ý
 í ï 3 Ý · 3 í á ñ ï 3 ù 3 ó Ù 3 Ý ï 3 ñ µ » ñ 3 ľ Ý » ñ Ç
 ï Ç ñ 3 é Ù 3 Ý Å;

êï »Õĺí³ĺ Çñ³ í Ç׳ Ï áõÙ, . ¾3μ3βËÙ3Ý ó3Ýó»ῆÇ ί»ῆ3Ϊ3 ∉άδοὑ3 ϒΑ΄ ... 3½3 ὑ3 ϝ3 ϝ3 ϝ0ὑ3 ϒ ί»ῆ3 ϝ3 ϒ. Υὑ3 ϒΑ иÝЗÏЗÝáÝ ½áõ ÁÝó ó. ¹åñáóÝ»ñC ÑЗÝñЗÏñÃЗÏЗÝ · áñÍ áñÝ»áñÃÛ³ Ý 3 å 3 Ñáí Ù 3 Ý. BCÝáõÃĺáõÝÝ»ñC Ϊ3 ₋ éáőóí 3 [ùÝ»ñC ·· áőlùC å3 Ñå3 ÝÙ3 Ý Ýå3 ï 3 Ïáí, 1åñáóÝ»ñC cȎáñó[]3 Ý Cň3 Ï 3 Ý3 ó[]3 Ý Ñ3 []3 ň 3 []»Ý3 3 ň1 þáñÝ3 í »ï γ́å³ï³Ï³Ñ³ñÙ³ñ ï³ñu»ñ³ÏÁ 13 μγ́зїзγ́ Ţ³Ãë³Ý»ñáí Ţ³Ñ³íáñí³ĺ, ¹åñáó³Ï³Ý ³é³ÝÓݳϳéáðNó Ϊ³Ãë³ឿ³ ΓΥνης Γ³ éáδóáδÙΥ΄; ánÁ ³å³ Ñáí áδÙ; μΎ³å³ Ñå³-Ý3 Ϊ 3 Ý ¨ ë3 ÝÇĩ 3 ñ3 -ÑÇ. Ç»ÝÇÏ ï »ë3 ÝÏθáōÝÝ»ῆÇó Ù3 ùáōñ,

Ϊ³ é³ í ³ ñáõÃĺ³ Ý ¨ ØCc³ ½. ³ ĺCÝ ¼³ ñ. ³ óÙ³ Ý ÀÝÏ »ñ³ ÏóáõÃĺ³ Ý ÙCc 20.07.2005Ã-CÝ TÝùí 3 [8ø3 Õ3 ù3 llCÝ c»éáñól)3 Ý [ñ3 · ñC ½౩ñ. ౩óÙ౩Ý [౩ñ]Ç Ñ౩Ù౩Ó౩∭Ү౩. ñǦ Ñ౩Ù౩Ó౩∭Ү, Đ౩∭౩ёï ౩ÝÇ í»ñ³Ï³Ý. ÝíáÕ ¿Ý»ñ∙ »ï ÇϳÛÇ ¿Ý»ñ. ³ Ëݳ ĴáÕáõÃĴ³ Ý $\tilde{N}C\tilde{U}\dot{Y}^3$ $\tilde{I}\tilde{n}^3$ $\tilde{U}\dot{A}$ 2005-2011 $\tilde{A}\tilde{A}$. $\tilde{C}\tilde{n}^3$ \tilde{I}^3 \dot{Y}^3 $\acute{o}\tilde{n}$ » \acute{e} ; \tilde{g}^3 \tilde{O}^3 \tilde{u}^3 $\tilde{U}C\dot{Y}$ cȎáőóÙ³Ý Íñ³·CñÁ, áñC ßñc³Ý³ÏÝ»ñáõÙ ù³Õ³ù³ÛCÝ ï ñ³ Ù³ ¹ñí »óCÝ ¹ñ³ Ù³ ßÝáñÑÝ»ñ` ¹åñáóÝ»ñCÝ ³ß˳ïáÕ ç»éáōóÙ³Ý Ñ³Ù³Ï³ñ.»ñÇ ï»Õ³¹ñÙ³Ý í»ñ³Ï³Ý·ÝٳݷÍáí Ý»ñ¹ñáōÙÝ»ñÇ "¹åñáóÝ»ñÇ ß»Ýù»ñÇ ϳåÇï³É c»ñٳٻÏáōë³óÙ³Ý Ñ³Ù³ñ: üÇݳÝë³íáñáōÙÇó û ï í »Éáō Çñ³ í ³ ëáōÃláōÝ áōÝ»Ý µáÉáñ ³ lÝ ù³ Õ³ ù³ lCÝ ¹åñáóÝ»ñÁ, áñáÝóáõÙ ³éϳ »Ý μ³í³ñ³ñ ï »ËÝÇϳϳÝ Ý3 Ë3. [3 ()CÝ å3 ()Ú3 ÝÝ»ñ, 3 ()1 Ãí áỗÚ Ý3 ... ; (()3 É ; 3 ñ3 [ùáỗÚ . 3½C Ù3ï 3Ï3ñ3ñÙ3ÝÑÝ3ñ3íáñáõÃÛáõÝÁ:

´ÝЗÏЗÝ . ¾½í ЗßЁЗï áÖ ç»éáōóÙЗÝ ÑЗÙЗÏЗñ. »ñÁ áōÝ»Ý Ñ»ï ¨ÜЗÉЗéЗí»ÉáōĀláōÝÝ»ñÁ, áñáÝù ¾å¾ÑáíáōÙ »Ý.

- ç»éáōóí áŐ ¹åñáóáôÙ áōëáōóÙ³Ý åñáó»ëÇ µ³ñÓñ ѳñÙ³ñ³í»ï áōÃlláôÝ (»ñ»Ë³Ý»ñÇ ³éáŌçáōÃll³Ý å³Ñå³ÝáôÙ, áōëáōóÙ³Ý ÁÝóóùÇ µ³ñ»É³íáōÙ ¨ ³é³ç³¹ÇÙáōÃll³Ýµ³ñÓñ³óáôÙ),
- Ñã Ïã Ññ¹»Ñã ͿÇÝ 3Ýí ïãÝ. áõÃͿβÝ 3ëï Çx³ÝÇ μ³ ñÓñ³ óáōÙ,
- ÙĀÝáÉáňi ³ñï³Ý»ïíáÖ³Í˳ĀÃáō ¨³ÜÉĀáōݳíáň ³½»ñÇ ïñ׳ïáōÙ (¡ïáÉá·Ç³ï³Ý³Ýíï³Ý·áōÃŊ³Ý ËݹÇñÝ»ň),
- ÝáōlÝ Ñ³ ñù³ ñ³ í »ï áōÃl³ Ý å³ lù³ ÝÝ »ñáōù ýCݳ Ýë³ Ï³ Ý Ëݳ láŌáōĀláōÝ
- ¹åñáóÇ ß»ÝùÇ »ñϳñ³ï»óáôÃlláôÝ (āç»éáôóí áŌ ß»Ýù»ñáôÙ ïáÝëï ñáôïódzÝ»ñÁ³ñ³·»Ý ß³ñùÇó ¹áôñë ³ÉCë):

The necessity of urban school heating program implementation in Armenia.

In Armenia urban schools were mainly heated by central heating systems. Due to energy crises and central heating systems disruption and the fact that central heating could not be renewed the schools started to use other methods for heating which were not save and inefficient.

In such situation, in order to rehabilitate gaz supply network, to ensure natural flow of educational processes, keeping the school buildings and equipment safe, it was considered that the most efficient way to heat the schools were using natural gaz, with construction of local boiler houses equipped with appropriate boilers. The mentioned solution was the best from environmental and sanitary-hygienic perspectives, and due to which schools could receive clear, comfortable, efficient and modern heating.

Thus, considering the importance of the mentioned issue the GoA and International Development Association in July, 2005 signed an agreement for Urban Heating Project implementation. According to the mentioned agreement the R2E2 Fund during 2005-2011 implemented Urban Heating Project, designed to increase the use of clean, efficient, safe and affordable heating technologies in urban schools. It was agreed that within the frame of the project the heating systems working with gaz will be installed in schools, existing heating systems will be rehabilitated and the schools' buildings will be insulated. In order to be involved in the project the urban schools should have appropriate technical and design settings; involving the access to gaz supply network.

Heating systems establishments in schools working with natural gaz have some important privileges, due to which it is possible to provide the followings:

- high comfort level in heated schools (children's health improvement, educational level improvement, students' progress improvement)
- increased level of fire safety
- reduces CO2 and other toxic gazes emissions (environmental safety issues)
- keeping the same comfort level, to have some financial savings
- protection of school building (not heated buildings are less protected than heated)



 \emptyset^3 $\tilde{0}^3$ \tilde{u}^3 \mathbb{I} \mathbb{I}

í»ñ³Ï³Ý. ÝíáÕ Ðз∬зёї зÝС ¿Ý»ñ·»ï ÇϳÛÇ ¿Ý»ñ. ³ Ëݳ láÕáõÃl³ Ý ÑÇÙݳ ¹ñ³ ÙÁ, Ðз∥зёї з ÝС Đ³ Ýñ³ å»ï áõÃĴ³ Ý Ðз Ùз ßЁз ñÑз ĴÇÝ тзÝÏС ýÇÝ3 Ýë3 í áñÙ3 Ùµ Çñ3 Ï3 Ý3 óí áÕ ø3 Õ3 ù3 lÇÝ ç» éáōóÙ3 Ý \tilde{I} $\tilde{n}^3 \cdot \tilde{n}$ C \tilde{B} \tilde{n} C \tilde{g} \tilde{g} C \tilde{g} C ¿ 120 ù³Õ³ù³ÜÇÝ ¹åñáóÝ»ñÇ ç»éáōóÙ³Ý Ñ³Ù³Ï³ñ »ñÇ` Ϊ³Ãë³Ĵ³ϊÝ»ñÇ, ³ñï ³ùÇÝ Ý»ñß»Ýù³ ĺCÝ c»éáõóÙ³ Ý ó³ Ýó»ñC ݳ ˳. [Ù³ Ý, ϳ éáõóÙ³ Ý ³ ß˳ ï ³ ÝùÝ»ñ, CÝãå»ë Ý3¨¿Ý»ñ. 3 ËÝ3 láÕáõÃl3 Ý 3 βË3 ï 3 ÝùÝ»ñ:

ÀݹѾÝáōň ³éپٵ 2005-2011ĀĀ. Ͼï¾ñí»É »Ý Ñ»ï¨Ü¾É ¾ß˾ï¾ÝùÝ»ñÁ

- ſ»ñ³½ÇÝſ»É
 ³½³ýÇϳóſ»É
 »Ý
 ¹ñáóÝ»ñÇ
 ï³Ãë³Į³ïÝ»ñC
- í»ñ³ ï³ Ý· Ýí»É »Ý ¹åñáóÝ»ñÇ Ý»ñùÇÝ ç»ñù³ lÇÝ ó³ Ýó»ñÁ
- í»ñ³Ï³éáōóí»É»ÝϳÃë³Ĵ³ïÝ»ñÇß»Ýù»ñÁ
- ϳéáõóí»É»ÝϳÃë³Ĵ³ïÝ»ñ
- Çñ³ ϳ ݳ Óí »É ¿ ï³ ù ç»ñÙ³ Ù³ ï³ Ï³ ñ³ ñáōÙ' óÝóáōÕ³ ñ³ ÝÇ Ï³ éáōóáōÙáí
- Çñ³ ï³ Ý³ óí »É
 »Ý
 ¿Ý»ñ. ³ Ëݳ ឿáŌ³ ï³ Ý
 ÚÇçáó³ éáōÙÝ»ñ
- ï »Õ³¹ñí »É »Ý ϳÃë³Ý»ñ

2005-2011 ĀĀ. ϳï³ñſ³ſ³ß˳ï³ÝùÝ»ňÇ ßÝáňÑÇſ ç»éáōóſ»É ; 490 280,90 ѳ½³ñ ù³é. Ù ÁݹѳÝáōň ٳϻň»ëÁ, ç»éáōóÙ³Ý ÁݹѳÝáōň [³[³ÉÁ ϳ½Ù»É ; 1715627,90 Ëáñ.Ù.: سÕ³ù³lÇݹåñáóÝ»ñÇ ç»éáōóÙ³Ý Ñ³Ù³ï³ñ. »ñÇ í»ñáj³ý. ÝÙ³Ý/ϳéáōóٳݳñ¹láōÝùáōÙ μ³ñ»É³ſí»É ï³ſ»ÉÇѳňÙ³ñ³ſ»ï ; ¹³ñÓ»É ßáōñç 57768 ³ß³Ï»ñï Ý»ñÇ áōëáōóÙ³Ýå³lÙ³ÝÝ»ñÁ:

º ñ º 3 ÝÇ Ù º ñ½»ñÇ 120 ¹ å ñáóÝ»ñÇó 14 ¹ å ñáóÝ»ñáōÙ Çñ º Ï º Ýóí »É »Ý ¿Ý»ñ · º ËÝ º láŌáōĀl)º Ý º ßË º ï · º ÝùÝ»ñ

ì »ñáÑÇßÛ³ É 120 ¹åñáóÝ»ñÇó 14-áõÙ Çñ³ ϳ ݳ óí »É »Ý ¿Ý»ñ. ³ Ëݳ láÕáõÃl³ Ý ÙÇçáó³ éáõÙÝ»ñ: 14 ¹åñáóÝ»ñÇ ÁÝï ñáõÃláõÝÁ Ϊ³Ϊ³ñí»É¿ÑÇÙÝ³¹ñ³ÙÇ ³ß˳ï³ÏÇóÝ»ñÇÏáÕÙÇó Cñ3 | 3 Ý3 óí 3 Í Ñ3 Ù3 | áÕÙ3 ÝC áõëáõÙݳ ëCñáõÃláõÝÝ»ñC ѳÙ³å³ï³ë˳Ýѳßí³ñÏÝ»ñÇ ÑÇÙ³Ýíñ³,ѳßídzéÝ»Éáí ¹åñáóÝ»ñǿݻñ. ³ËݳÛáճϳÝ Ý»ñáõÅÁ`B»ÝùÇíÇ׳ÏÁ ç»ñٳٻÏáõë³óÙ³Ýï »ë³ÝÏŮáõÝÇó í³é»ÉÇùÇͳËëÁ ç»éáőóÙ³ Ý Ñ³ Ù³ ñ, ÇÝãå»ë ݳ " c»éáõóÙ³ Ý Ñ³ Ù³ ϳ ñ. C í»ñ³ ϳ Ý. ÝÙ3 Ý



Armenia Renewable Resources and Energy Efficiency Fund with financial support of World Bank, within the scope of Urban Heating Project, from 2005 to 2011 completed heating system establishment works (design and construction of boiler houses, establishment of external and inter-building heating systems as well as implementation of energy efficiency activities) in 120 urban schools.

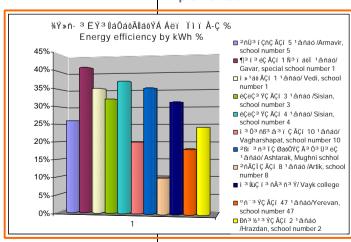
Schools were selected taking into account the costeffectiveness of the investment per student as well as social indicators; poverty level, weather and climate, geographic location, appropriate technical and design settings; involving the access to gaz supply network, water supply system and electricity.

It general, from 2005 to 2011 the following works were implemented;

- boiler houses were reequipped and connected to gaz supply network
- internal heating systems of schools were rehabilitated
- · boiler houses were rehabilitated
- · boiler houses were constructed
- hot water supply system were constructed; shower cubicles were constructed
- ennergy efficiency activiteies were implemented
- · boilers were installed

During the works implemented from 2005 to 2011, 490 280,90 square meters general surface were heated, and the general heated volume were equal to 1715627,90 cubic meters. As a result of heating systems rehabilitation/construction in urban schools for 57 768 students the educational conditions were improved; comfort level increased.

From 120 schools in Yerevan and marzes involved in the project in 14 schools the energy efficiency activities were implemented.

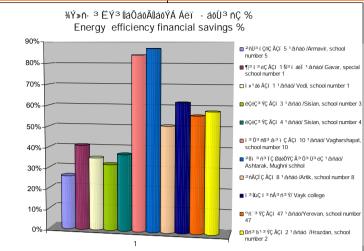


From 120 schools involved in the project in 14 schools the energy efficiency activities were implemented. The selection of 14 schools were done by Fund representatives based on the comprehensive investigations and appropriate calculations; taking into account the energy efficiency capacity of the school; the possibility of insulation of school building,



¿Ý»ñ. 3 ËÝ3 láÕ3 Ï3 Ý ÙÇçáó3 éáōÙÝ»ñÇ Çñ3 Ï3 Ý3 óÙ3 Ý ï »ËÝÇÏ3 Ï3 Ý ÑÝ3 ñ3 í áñáōÃláōÝÝ»ñÁ:

¾Ý»ñ⋅³ Ëݳ ĴáÕáõÃĴ³ Ý ÙÇcáó³ éáõÙÝ»ñ Çñ³ ϳ ݳ óÙ³ Ý ³ ñ¹láõÝùáõÙ ¹åñáóÝ»ñáõÙ Ýϳïí»É¿¿Ý»ñ∙dzÛÇ ËÝ3 láÕáõÃláõÝ, áñÁ Çñ Ñ»ñÃÇÝ ѳ Ý. »óñ»É ¿ ýÇݳ Ýể³ Ї³ Ý Ëݳ láÕáõÃlåõÝÝ»ñC: åñáóÝ»ñáĭÌ ;Ý»ñ∙ ³ Ëݳ láÕáõÃl³ Ý ÙCcáó³ éáõÝ»ñC Cñ³ ϳ ݳ óáõÙÁ ÃáõŪÉÏï³ïÝï»ëí³ĺ у́Су́з у́ёз їз у́ ÙÇçáoÝ»ñÁ áõÕÕ»É áõëáõóÙ³ Ý ³ñ¹láõݳí»ï áõÃláõÝÁ μ³ ñÓñ³ óÝáÕ ÙÇçáó³ éáñÝ»ñÇ Cñ³ ϳ ݳ óÙ³ ÝÁ:



æ»éáñóÙ³Ý Ñ³Ù³Ï³ñ·»ñÇ ſ»ñ³Ï³Ý·ÝÙ³Ý ${}_{\dot{\zeta}}$ Ý»ñ·³ËݳláðáñÃl³Ý ÙÇçáó³éáñÙÝ»ñÇ Çñ³Ï³Ý³óÙ³Ý BÝáňÑÇſ ù³Õ³ù³lÇÝ ¹åñáóÝ»ñáñÙ ¹åñáóÝ»ñáñÙ Ýϳïí»ó Ñ»ï "Ĵ³É¹ñ³Ï³Ýï »Õ³ß³ñÅ»ñÁ`

- Ý3 ËÏÇÝ ï 3 ñÇÝ»ñÇ Çñ3 í Çx3 ÏÇó å3 ñï 3 1 ñí 3 í,
 . 3 ñÝ3 Ý3 lÇÝ 3 ñÓ3 Ïáōñ 1 Ý»ñÇ Ñ3 Bí ÇÝ
 ȖÏ 3 ñ 3 Ó · [3 [ÓÙ»é3 lÇÝ 3 ñÓ3 Ïáōñ 1 Ý»ñÇ
 ï "áŌáoÃláōÝÁ Ï ñ x 3 ï í »É ¿, ÇĕÏ áā ÉñÇí 13 ë3 Å3 Ù»ñÇ
 ï "áŌáoÃláōÝÁ í »ñ3 Ï 3 Ý · Ýí »É.
- µ³ ñÓñ³ ó»É ; ѳ ϳ Ññ¹ »Ñ³ ÜÇÝ ³ Ýï ï³ Ý. áñÃܳ Ý
 ³ ëï Cx³ ÝÁ,
- Tñx³ï (»É »Ý ÙĀÝáÉáñï ³ñï ³Ý»ï (áÔ ³ ɳÃÃáō ¨
 ³ Æ Ãáōݳ (áñ · ³ ½»ñÁ
- ³í»É³ó»É¿¹åñáóÇß»ÝùÇ»ñϳñ³Ï»óáõÃlláōÝÁ
- μ³ ñÓñ³ ó»É »Ý ¹³ ë³ åñáó»ëÝ»ñÇÝ ¹åñáó³ ϳ ÝÝ»ñÇ ѳ ׳ ËÙ³ Ý όáōó³ ÝÇβÝ»ñÁ,
- áõëáõóÙ³ Ý u³ñ»É³íí»É åñáó»ëÇ N³ ñÙ³ ñ³ í »ï áôÃlláôÝÁ, ù³ ÝC áñ c»ñÙ³ ëï C׳ ÝÁ 13 ë 3 ñ 3 ÝÝ » ñáõÙ 13 ñÓ » É ¿ 18-21oC, µ 3 ñÓ ñ 3 Ý 3 Éáí 4-60C-áí` ݳ Ëáñ¹ ï³ñí³ ÙCcCÝ ѳ ßí áí cȎáõóÙ3Ý Å3Ù3Ý3Ï3ßñç3ÝÇ Ñ3Ù»Ù3ï, CëÏ ÙÇç³ ÝóùÝ»ñáõÙ, ¹³ ÑÉÇ×Ý»ñáõÙ` 16-19oC, å³ñ³.³láõÙ, áñ ݳËáñ¹ ï³ñí³ c»éáõóÙ³Ý Å3Ù3Ý3Ï3βñc3ÝáõÙ ¹ñ3Ýù ÁݹÑ3Ýñ3å»ë ã»Ý cȎáőóí »É,
- Î »ñëlëf »É
 »Ý
 3 ñï 3 13 ë3 Å3 ऐ3 ()ÇÝ
 å³ ñ³ å ऐáōÝùÝ»ñÁ
 (ëåáñï ³ ()ÇÝ, å³ ñ³ ()ÇÝ,
 Ȗ³ Åßï ³ ï ³ Ý, Ó »é³ · áñ í áōĀ()³ Ý ¨ ³ ()É);

expenditures for heating as well as technical aspects of energy efficiency actions implementation in school.

As a result of energy efficiency actions implementations in schools the serious energy savings were observed, which led to financial savings. Thus, energy efficiency activities implemented in schools will allow to direct financial savings from energy efficiency activities implementation to enlarge the number of school events' organization, which is very important for improving the

efficiency of educational process.

Due to the energy efficiency activities implementation and heating systems rehabilitation/construction works in schools the following positive changes were observed:

- the duration of winter holidays was shorten, and the duration of not full class hours was prolonged (in past winters the classes were not fully conducted and winter holidays were shorter, instead of which the spring holidays were longer)
- the fire safety level was increased
- the level of CO2 and other toxic gazes emissions were reduced emissions
- the school buildings' protection level was increased
- · school attendance level was increased
- the comfort level in schools was increased; the class temperature reached 18-21oC, it was increased in average by 4-6oC, in comparison with last winter. The temperature in corridors and hall reached 16-19oC (in last winter the corridors and hall were not heated at all)
- restarted extra curriculum classes (sport, dances, music, and other)



Àݹѳ Ýáôñ ³ éÙ³ $\grave{U}\mu$ 2005-2011ÃÃ. ÁÝó óùáô \grave{U} \ddot{I} ³ \ddot{n} î »É »Ý \ddot{N} » \ddot{I} " \mathring{J} 3 É 3 \ddot{E} 3 \ddot{I} 3 \ddot{V} \ddot{U} \ddot{V} » \ddot{N}

ì»ñ³ ϳ éáōóí »É »Ý ϳ Ãë³ Ĵ³ ï Ý»ñÇ ß»Ýù»ñÁ



ÞÇݳ ñ³ ñ³ ϳ Ý ³ ß˳ ï ³ ÝùÝ» ñÇ Çñ³ ϳ ݳ óáðÙ Construction works

ì »ñ³ ϳ Ý· Ýí »É »Ý ¹åñáóÝ»ñÇ Ý»ñùÇÝ ç»ñÙ³ ÜÇÝ ó³ Ýó»ñÁ



Ü»ñùÇÝ ç»ñÙ³ lÇÝ ó³ ÝóÇ ÙáÝi ³ ÅÙ³ Ý ³ ß˳ ï ³ ÝùÝ»ñ Internal heating systems installation works



Ü»ñùÇÝ ó³ ÝóÇ ÙáÝï ³ ÅÙ³ Ý Ñ³ Ù³ ñ µ»ñí ³ Í ç»éáióÙ³ Ý Ù³ ñï TáóÝ»ñ Radiators for internal heating system installation

In total from 2005 to 2011 the following works were conducted;

Boiler houses were reequipped and connected to gaz supply network



ÞÇÝ3 ñ3 ñ3 ï 3 Ý 3 ßË3 ï 3 ÝùÝ»ñÇ 3 í 3 ñï Construction works completed

Internal heating systems of schools were rehabilitated



3 ÑÉÇ×Ç ÙáÝi 3 Åí 3 Í Ý»ñùÇÝ ç»ñÙ3 ÚÇÝ ó3 ÝóÁ Installed internal heating systems in sport hall



Ü»ňùÇÝ ó³ ÝóÇ ÙáÝí ³ ÅÙ³ Ý Ñ³ Ù³ ñ µ»ñí ³ ĺ ç»éáióÙ³ Ý ËáŌáí ³ Ĭ Ý»ñ Pipes for internal heating system installation



γéáõóí»É»ÝϳÃë³ឿ³ïÝ»ñ



Î з Ãёз јз ï з Ý Ï з éáōóáōÙ Boiler house construction



โ 3 éáôoí 3 โ ï 3 Ãe3 ปฺ3 ï áôÝÁ ** . 3 ½Ç ï 3 กั 3 í áกปั3 Ý áô Ñ 3 ß î 3 éÚ 3 Ý ก็3 Ý áôlóÁ

Constructed boiler house and gaz regulation and metering unit

î»Õ³¹ñí»É»ÝϳÃë³Ý»ñ



ØáÝï ³ Åí ³ Í Ï ³ Ãë³ Ý»ñ Installed boilers

Boiler houses were constructed



Ĩ³éáōóí³Íï³Ãë³Ĵ³ïáōÝ Constructed boiler house



Î 3 éáôóí 3 โ ï 3 Āé3 ปิ3 ï áôÝÁ ¨ . 3 ½Ç ï 3 กั. 3 í án̈ปั3 Ý áô ѳ ß í 3 éŪ́3 Ý ѳ Ý áollóÁ Constructed boiler house and gaz regulation and metering unit

Boilers were installed



ØáÝï ³ Åí ³ Í ï ³ Ãë³ Ý»ñ Installed boilers



Æñ³ ϳ ݳ Óí »É ¿ Ï ³ ù ç»ñÙ³ Ù³ Ï ³ ϳ ñ³ ñáõÙ



î»Õ³Ï³∭³ [çñ³ï³ù³óáōóÇāï³Ãë³ Water heating boiler installed

Æñ³Ï³Ý³óí»É»Ý¿Ý»ñ.³ËݳÛáÕáõÃÛ³ÝÙÇçáó³éáōÙÝ»ñ



þÇÝ3 ñ3 ñ3 Ï3 Ý 3 ßË3 Ï 3 ÝùÝ»ñÁ ëÏ ë»£áỗó 3 é3 ç Before the construction works

Hot water supply system were constructed; shower cubicles were constructed



î »Õ³ ϳ Úſ³ ſ çñ³ ï ³ ù³ óáōóÇā ϳ Ãë³ Ý»ñ Water heating boiler installed

Energy efficiency activities were implemented



ÞÇݳ ñ³ ñ³ ï³ Ý ³ ß˳ ï ³ ÝùÝ»ñÇ ³ í ³ ñï Çó Ñ»ï á: After the construction works