ENERGY COOPERATION BETWEEN THE EU, THE LITTORAL STATES OF THE BLACK & CASPIAN SEAS AND THEIR NEIGHBOURING COUNTRIES

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ACTIVITY COMPLETION REPORT

ITS Technical Assistance to Kazakhstan in the field of Energy Statistics in the extension period (Feb. 2015 – Jan. 2016)

(CWP.07.KZ, CWP.10.KZ)

INOGATE Technical Secretariat and Integrated Programme in support of the Baku Initiative and the Eastern Partnership energy objectives

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List of acronyms

AM	Armenia
AZ	Azerbaijan
BY	Belarus
CCs	INOGATE Country Coordinators
CEs	INOGATE Country Experts
CNG	Compressed Natural Gas
CSK	Committee on Statistics under the Ministry of National Economy of the Republic of Kazakhstan
CWP	Country Work Plan
DSO	Distribution System Operator
EaP	Eastern Partnership
ECT	Energy Community Treaty
ECS	Energy Community Secretariat
EnC	Energy Community
EEIs	Energy Efficiency Indicators
ENP	European Neighbourhood Policy
ESAP	Energy Statistics Action Plan
ESN	Energy Statistics Network
EU	European Union
GE	Georgia
HPP	Hydro Power Plant
ITS	INOGATE Technical Secretariat
IEA	International Energy Agency
KZ	Kazakhstan
KY	Kyrgyzstan
MCM	Million Cubic Meters
MD	Moldova
MOE	Ministry of Energy
NGO	Non-government Organisation
NPP	Nuclear Power Plant
NSI	National Statistical Institute
NSS	National Statistical Service
PCs	INOGATE Partner Countries
RWP	Regional Work Plan
RES	Renewable Energy Sources
SSC	State Statistical Committee
TA	Technical Assistance
TJ	Tajikistan
TM	Turkmenistan
TPP	Thermal Power Plant
TSO	Transport System Operator
UA	Ukraine
UZ	Uzbekistan

1 PART 1 – EUROPEAN COMMISSION

1.1 Background

Assignment Title:	**ITS Technical Assistance to Kazakhstan in the field of Energy Statistics in the extension period (Feb. 2015 – Jan. 2016)**
Country and Dates:	TA delivered remotely and during a workshop on Energy Efficiency Indicators held in Minsk on 22-24 September (RWP.12)
Beneficiary Organisation:	Committee on Statistics under the Ministry of National Economy of the Republic of Kazakhstan (CSK), Ministry of Energy (MOE)
Beneficiary Organisation - key contact persons – name and e-mail address:	See list of key persons and their contact details in Annex 2.4.1
Deliverables Produced:	• Update of the methodology for data collection from households • Report on institutional framework for energy system planning • Activity Completion Report for activity CWP.07.KZ and CWP.10.KZ • Final Assessment Report
Expert Team Members:	• Mr Nicolas Brizard, Key Expert for Energy Statistics • Ms Alenka Kinderman Lončarević, Senior Non Key Expert for Energy Statistics • Mr Tomasz Trus, Junior Expert for Energy Statistics

1.2 Essence of the Activity

Kazakhstan is one of the nine INOGATE PCs that have agreed upon an Energy Statistics Action Plan (ESAP) with ITS. Kazakhstan beneficiaries have worked actively to implement the ESAP during 2012-2016. The overarching objective of the Technical Assistance to Kazakhstan started in 2012 was to improve its energy statistics systems and to increase the capacity of the National Statistical Service to collect and compile energy statistics harmonised with EU and international standards.

The main objective of activity CWP.07.KZ carried out during the extension period (February 2015-February 2016) was to assist the beneficiary organisations with the implementation of a tailor-made model for the compilation of energy efficiency indicators in the household and industry sectors. For this task, ITS Experts have developed a methodology for the collection of data in the household and industry sectors and a template for the compilation of energy efficiency indicators. The objective of activity CWP.10.KZ was to assist Kazakhstan improve the use of energy statistics for evidence-based energy policy.

Activity CWP.07.KZ and CWP.10.KZ were implemented for the most part during regional workshops on the calculation of energy efficiency indicators (RWP.12) and the use of energy statistics for energy planning (RWP.14) to which Kazakhstan was invited to participate and partly through remote assistance provided during the preparation and follow-up phases of the workshops.

It should be noted that ITS did not organise on-site missions to Kazakhstan in 2015-2016.

1.3 Key Findings

Overview

The role of the Committee on Statistics (CSK) is to prepare energy statistics. Statistics are generated using a statistical survey (form 1-FEB) which provides all necessary data for the compilation of the Energy Balance. CSK produces an annual energy balance, based on which the GDP energy intensity index is calculated. The energy balance published by CSK follows international standards since 2014. In addition, CSK submits the five joint IEA/Eurostat/UNECE questionnaires to the IEA every year.

Overall, energy statistics in Kazakhstan are quite advanced and of good quality.

Energy Efficiency Indicators

In Kazakhstan, the development of Energy Efficiency Indicators is still in its infancy despite the wealth of data currently available. CSK does not calculate disaggregated energy efficiency indicators due to the lack of corresponding data but computes annually the energy intensity of GDP. The time series for this indicator starts in 2010 and is available both for the Republic of Kazakhstan as a whole and its regions.

However, following ITS recommendations, it was decided to introduce the calculation of energy efficiency indicators in 2016. The work on Energy Efficiency Indicators strictly speaking has only just begun and the responsibility for their development falls under the Department on Energy Supervision of the Ministry. The working group on energy statistics will be used to coordinate the work on energy efficiency indicators.

Kazakhstan is to follow the guidelines recommended by the IEA and introduce this task into the national practice of the Republic of Kazakhstan. The successful implementation of a full-fledged Energy Efficiency Indicators system is one of the most complex tasks as far as energy statistics are concerned. It requires significant work and time (often several years) as well as the clarification of the role and responsibilities of various stakeholders. Key basic recommendations for the establishment of such a system are provided in the annex of this report (see annex 2.4.2.).

During the regional workshop on Energy Efficiency Indicators in Minsk, Kazakhstan was provided with adequate methodologies, tools and models to develop data collection strategies for the residential and industry sectors with the view to calculate appropriate energy efficiency indicators in these sectors. ITS and IEA experts also introduced the key concepts and objectives underlying the development of energy efficiency indicators including data requirements, data collection methodologies, calculation methodologies, modelling methodologies, etc.

Kazakhstan representative have received ready-to-use Excel based models developed by the Energy Institute Hrvoje Požar (EIHP). These models have been explained in great detail during the workshop and can be used by CSK and other relevant stakeholders to develop their own system of energy efficiency indicators. These models are compatible with international best practices and in particular the IEA and ODYSSEE methodologies. They were also given IEA material: a well-established Excel template for the compilation of energy efficiency indicators and several high quality handbooks on the topic in the Russian language.

Survey on energy consumption in the household sector

A survey on energy consumption in the household sector is a prerequisite for the collection of sufficiently disaggregated data. In 2015, ITS experts provided technical assistance to Kazakhstan in the preparation of a questionnaire to be used for a survey on energy consumption in the household sector. The results of this survey are expected to be fully available in 2016 or 2017 and are a key input in the development of a pilot for EEIs in the household sector. These results will also help improve the quality of the energy balance.

Use of energy statistics for evidence based energy planning

Currently, various state bodies use data from the fuel and energy balances to develop scenarios of the energy sector development. In terms of energy modelling, MARKAL is used to develop the concept of transition towards a «Green economy». Overall, Kazakhstan lacks a fully integrated energy planning approach that considers all fuels and energy flows in the economy and in particular the demand side. It has been reported to ITS that the coordination between the different bodies in charge of energy planning and policies is taking place but is deemed very time consuming.

1.4 Ownership and Benefits of the Activity

Technical Assistance provided by ITS	Actions undertaken by the NSI
• Assistance to Kazakhstan in the preparation of a survey on energy consumption in the household sector (questionnaire design) • Models for the calculation of EEI in the household sector delivered and training for their use provided to Kazakhstan beneficiaries • Prepared a report on institutional framework for evidence-based energy planning • Prepared a list of recommendations for priority follow-up activities for the short-term and the medium-term • Kazakhstan representatives also participated in complementary activities: the Seminar on the use of energy statistics in energy planning (June 2015, Chisinau, Moldova) and the ESN meeting (in November 2015, Tbilisi, Georgia)	• CSK is currently working on the design of a survey of final energy consumption in the household sector. The survey is to be launched in 2016. Results are expected in 2016/2017. • CSK and other stakeholders initiated work on the development of energy efficiency indicators in 2016.

1.5 Challenges Faced

CSK produces comprehensive, advanced and good quality energy statistics and energy balances. Kazakhstan has also proved its ability to improve its inter-agency cooperation so as to meet the various challenges and tasks it faced in the field of energy statistics.

Therefore, Kazakhstan has the necessary potential to develop good quality energy efficiency indicators and evidence-based energy policies and measures provided it adapts further its inter-agency cooperation framework.

Currently, Kazakhstan lacks disaggregated data at the level of the final energy consumption but it is working on this issue starting with the household sector.

1.6 Recommendations

ITS experts deem Kazakhstan able to embark on more demanding tasks such as the development of sectoral energy consumption surveys and the calculation of disaggregated energy efficiency indicators. Available statistics also gives Kazakhstan the ability to develop further energy analytics and modelling in order to enhance evidence-based policy making.

ITS experts make the following specific recommendations to Kazakhstan with the aim to improve further the quality of their energy statistics, to start the implementation of a system for the calculation of energy efficiency indicators and to improve the use of energy statistics for energy planning purposes.

- CSK should start the preparation of comprehensive surveys of final energy consumption in key sectors of the economy (industry, services, transport and agriculture) in order to collect disaggregated consumption data by end-use or sub-sectors. CSK should make sure that these surveys on final energy consumption are conducted on a regular basis (e.g. every 4 or 5 years);
- Using disaggregated consumption data collected through surveys, Kazakhstan should start the modelling and calculation of Energy Efficiency Indicators;
- Kazakhstan is invited to follow the general recommendations for the development of Energy Efficiency Indicators given during the Minsk workshop in September 2015 (see annex 2.4.2.);
- The Ministry of Energy should set up a task force or working group on Energy Efficiency Indicators to develop and implement a system for the calculation of energy efficiency indicators and ensure that they are used to support and monitor energy efficiency policies and measures with facts and data;
- Relevant agencies and in particular CSK and the Ministry of Energy should appoint and train expert staff (engineers and statisticians) responsible for the data collection, modelling and compilation of Energy Efficiency Indicators. The same should be done for energy system modelling;
- The good situation with regards to inter-agency cooperation in the field of energy statistics should be extended to the field of energy efficiency indicators and energy planning in order to ensure that official statistics are used and developed to support evidence-based energy policies and measures. This institutional setup could be formalised in a Memorandum of Understanding which clearly defines the roles and responsibilities of each agency/stakeholder
- In addition, CSK should consider the following tasks in the near future:
    - Develop a quality reporting system;
    - Develop monthly statistics (in comparison to annual energy statistics, monthly statistics are much simpler to collect and process; they only require the implementation of quick short-term monthly activities and the availability of expert staff).

1.7 Impact Matrix

1.7.1 Impact assessment by ITS experts (2012-2016)

The table below shows, for selected ESAP indicators, a summary of the progress made by Kazakhstan since 2012 in the field of energy statistics.

Kazakhstan: Key ESAP Indicators 2012-2016

Indicator	Sept. 2012	Feb. 2016	Observations
Legal framework in place			
Available methodology for EB			
Energy statistics plans in place at NSI			
# of Energy Statisticians (at NSI)	3	5	
# of trained gov. staff in last year	3	16	Additional TA received through World Bank
Stakeholder meetings			Stakeholders regularly consulted
Household energy survey			Survey under development, planned for 2016
EB follow international standards			In place since 2014
IEA/Eurostat/UNECE questionnaires	(0)	(5)	Submission started in 2014
Monthly Statistics			Not in ESAP
Energy Price Statistics			Not in ESAP
Energy Efficiency Indicators			Under development, planned for 2016
Official statistics used for planning			Work in progress

Source: ITS Experts

1.7.2 Impact assessment by the main beneficiary (2012-2016)

Impact assessment of the INOGATE project according to CSK

Key areas of impact	Impact level (1 to 5 scale)	Comment
Improvement of interagency cooperation	**4**	ITS experts gave recommendations on the role of key stakeholders in the system of energy statistics and stressed the need to attract new stakeholders as well as to keep them abreast of new developments (new data requirements, methodologies). The Government of Kazakhstan has implemented these recommendations.
Harmonisation of the Energy Data Collection System with international standards (Eurostat, IEA, UN…)	**4**	ITS experts provided advisory support on energy balance and its harmonization with international standards (Eurostat, IEA, UN Statistics Division). These recommendations were implemented by CSK in 2014
Improvement of the quality of energy balances and the 5 joint questionnaires	**4**	ITS experts provided assistance in the completion of the five joint IEA/Eurostat/UNECE questionnaires). In addition, expert advice and materials from INOGATE seminars were used to write the guidelines for fuel and energy balances in Kazakhstan.
Development of energy efficiency indicators	**4**	ITS experts provided advice on the calculation of high level indicators and indicators by economic activity (residential, services, commercial, industry and transport). They explained data requirement (e.g. macroeconomic data for final consumption in industry sub-sectors, other non-energy statistics).
Improvement of public dissemination of energy statistics, energy balances, etc.	**4**	Thanks to ITS Expert advice, CSK expanded its range of energy efficiency indicators and published these indicators in the statistical compilation "Energy balance" journal in 2015
Use of statistics in energy policy and decision-making	**4**	Knowledge sharing increased in particular on the calculation of energy efficiency and renewable energy sources indicators
Overall impact	**4**	Knowledge exchange and cooperation with ITS experts and with colleagues in the region (allowed by INOGATE seminars) had a high impact and influence on our work.

Source: ITS, Baseline Monitoring Interviews with INOGATE beneficiaries, January 2016

2 PART 2 – BENEFICIARIES

2.1 Executive Summary (English)

The role of the Committee on Statistics (CSK) is to prepare energy statistics. Statistics are generated using a statistical survey (form 1-FEB) which provides all necessary data for the compilation of the Energy Balance. CSK produces an annual energy balance, based on which the GDP energy intensity index is calculated. The energy balance published by CSK follows international standards since 2014. In addition, CSK submits the five joint IEA/Eurostat/UNECE questionnaires to the IEA every year. Overall, energy statistics in Kazakhstan are quite advanced and of good quality.

In Kazakhstan, the development of Energy Efficiency Indicators is still in its infancy despite the wealth of data currently available. CSK does not calculate disaggregated energy efficiency indicators due to the lack of corresponding data but computes annually the energy intensity of GDP. The time series for this indicator starts in 2010 and is available both for the Republic of Kazakhstan as a whole and its regions.

However, following ITS recommendations, it was decided to introduce the calculation of energy efficiency indicators in 2016. The work on Energy Efficiency Indicators strictly speaking has only just begun and the responsibility for their development falls under the Department on Energy Supervision of the Ministry. The working group on energy statistics will be used to coordinate the work on energy efficiency indicators.

Kazakhstan is to follow the guidelines recommended by the IEA and introduce this task into the national practice of the Republic of Kazakhstan. The successful implementation of a full-fledged Energy Efficiency Indicators system is one of the most complex tasks as far as energy statistics are concerned. It requires significant work and time (often several years) as well as the clarification of the role and responsibilities of various stakeholders. Key basic recommendations for the establishment of such a system are provided in the annex of this report (see annex 2.4.2.).

During the regional workshop on Energy Efficiency Indicators in Minsk, Kazakhstan was provided with adequate methodologies, tools and models to develop data collection strategies for the residential and industry sectors with the view to calculate appropriate energy efficiency indicators in these sectors. ITS and IEA experts also introduced the key concepts and objectives underlying the development of energy efficiency indicators including data requirements, data collection methodologies, calculation methodologies, modelling methodologies, etc.

Kazakhstan representative have received ready-to-use Excel based models developed by the Energy Institute Hrvoje Požar (EIHP). These models have been explained in great detail during the workshop and can be used by CSK and other relevant stakeholders to develop their own system of energy efficiency indicators. These models are compatible with international best practices and in particular the IEA and ODYSSEE methodologies. They were also given IEA material: a well-established Excel template for the compilation of energy efficiency indicators and several high quality handbooks on the topic in the Russian language.

A survey on energy consumption in the household sector is a prerequisite for the collection of sufficiently disaggregated data. In 2015, ITS experts provided technical assistance to Kazakhstan in the preparation of a questionnaire to be used for a survey on energy consumption in the household sector. The results of this survey are expected to be fully available in 2016 or 2017 and are a key input in the development of a pilot for EEIs in the household sector. These results will also help improve the quality of the energy balance.

Currently, various state bodies use data from the fuel and energy balances to develop scenarios of the energy sector development. NURIS (Nazarbayev University Research and Innovation System) uses the MARKAL model to develop energy and climate scenarios. Kazakhstan is probably the most advanced INOGATE PC in terms of energy modelling.

Conclusions and recommendations

ITS experts deem Kazakhstan able to embark on more demanding tasks such as the development of sectoral energy consumption surveys and the calculation of disaggregated energy efficiency indicators. Available statistics also gives Kazakhstan the ability to develop further energy analytics and modelling in order to enhance evidence-based policy making.

ITS experts make the following specific recommendations to Kazakhstan with the aim to improve further the quality of their energy statistics, to start the implementation of a system for the calculation of energy efficiency indicators and to improve the use of energy statistics for energy planning purposes.

- CSK should start the preparation of comprehensive surveys of final energy consumption in key sectors of the economy (industry, services, transport and agriculture) in order to collect disaggregated consumption data by end-use or sub-sectors. CSK should make sure that these surveys on final energy consumption are conducted on a regular basis (e.g. every 4 or 5 years);
- Using disaggregated consumption data collected through surveys, Kazakhstan should start the modelling and calculation of Energy Efficiency Indicators;
- Kazakhstan is invited to follow the general recommendations for the development of Energy Efficiency Indicators given during the Minsk workshop in September 2015 (see annex 2.4.2.);
- The Ministry of Energy should set up a task force or working group on Energy Efficiency Indicators to develop and implement a system for the calculation of energy efficiency indicators and ensure that they are used to support and monitor energy efficiency policies and measures with facts and data;
- Relevant agencies and in particular CSK and the Ministry of Energy should appoint and train expert staff (engineers and statisticians) responsible for the data collection, modelling and compilation of Energy Efficiency Indicators. The same should be done for energy system modelling;
- The good situation with regards to inter-agency cooperation in the field of energy statistics should be extended to the field of energy efficiency indicators and energy planning in order to ensure that official statistics are used and developed to support evidence-based energy policies and measures. This institutional setup could be formalised in a Memorandum of Understanding which clearly defines the roles and responsibilities of each agency/stakeholder

- In addition, CSK should consider the following tasks in the near future:
  - Develop a quality reporting system;
  - Develop monthly statistics (in comparison to annual energy statistics, monthly statistics are much simpler to collect and process; they only require the implementation of quick short-term monthly activities and the availability of expert staff).

2.2 Краткий обзор (на русском языке)

Роль Комитета по статистике (КС) состоит в подготовке энергетической статистики. Статистика создается при помощи проведения статистического обследования (форма 1-ТЭБ), которая предоставляет все необходимые данные для составления энергетического баланса. Комитет по статистике создает ежегодный энергетический баланс, на основе которого рассчитывается индекс энергоемкости ВВП. Начиная с 2014 г. энергетический баланс, публикуемый КС, соответствует международным стандартам. Кроме того, КС ежегодно направляет в МЭА пять совместных вопросников МЭА/ Евростата / ЕЭК ООН. В целом, энергетическая статистика в Казахстане хорошего качества и вполне развита.

В Казахстане разработка показателей энергоэффективности (ПЭЭ) все еще находится на этапе становления, несмотря на огромное количество имеющихся в настоящее время данных. КС не рассчитывает детализированные показатели энергоэффективности в связи с отсутствием соответствующих данных, однако ежегодно вычисляет энергоёмкость ВВП. Динамические ряды этого показателя начинаются с 2010 г. и имеются как для Республики Казахстан в целом, так и по регионам.

Тем не менее, в соответствии с рекомендациями ITS, было решено ввести расчет показателей энергоэффективности в 2016 году. Строго говоря, работа над показателями энергоэффективности только началась, и ответственность за их разработку возложена на Департамент энергетического надзора Министерства. Для координации работы над показателями энергоэффективности будет использоваться Рабочая группа по энергетической статистике.

Казахстан должен следовать руководству, рекомендованному МЭА, и внедрить эту задачу в национальную практику Республики Казахстан. Успешная реализация полноценной системы показателей энергоэффективности является одной из самых сложных задач в энергетической статистике. Она предполагает значительный объем работы и времени (зачастую несколько лет), а также уточнение ролей и обязанностей различных заинтересованных сторон. Основные базовые рекомендации по созданию такой системы приведены в приложении к данному отчету (см. Приложение 2.4.2.).

В ходе регионального семинара по показателям энергоэффективности в Минске, Казахстану были предоставлены соответствующие методики, инструменты и модели для разработки стратегий сбора данных в бытовом и промышленном секторах для расчета соответствующих показателей энергоэффективности в этих секторах. Эксперты МЭА и ITS также представили основные концепции и цели, лежащие в основе разработки показателей энергоэффективности, включая требования в отношении данных, методик сбора данных, расчета, моделирования и т.д.

Представители Казахстан получили готовые к использованию модели на основе таблиц Excel, разработанные Институтом энергетики им. Хрвое Пожара (EIHP). Эти модели подробно объяснялись в ходе семинара, и могут использоваться КС и другими соответствующими заинтересованными сторонами для разработки их собственной системы показателей энергоэффективности. Эти модели совместимы с образцами передового международного опыта и, в частности, с методиками МЭА и ODYSSEE. Казахстану были также предоставлены материалы МЭА: надёжно отработанный шаблон Excel для составления показателей

энергоэффективности и нескольких высококачественных справочников по данной теме на русском языке.

Обследование энергопотребления в бытовом секторе является предпосылкой для сбора достаточно детализированных данных. В 2015 году эксперты ITS предоставили техническую помощь Казахстану в подготовке вопросника, который предполагалось использовать для обследования энергопотребления в бытовом секторе. Ожидается, что результаты этого обследования будут полностью доступны в 2016 или 2017 году и будут ключевым вкладом в развитие экспериментального проекта по ПЭЭ в бытовом секторе. Эти результаты будут также способствовать повышению качества энергетического баланса.

В настоящее время различные государственные органы используют данные топливно-энергетических балансов для разработки сценариев энергетического развития. NURIS (система исследований и инноваций Университета Назарбаева) использует модель MARKAL для разработки энергетических и климатических сценариев. Казахстан является, вероятно, самой передовой Страной-партнером INOGATE с точки зрения энергетического моделирования.

Выводы и рекомендации

По мнению экспертов ITS, Казахстан способен приступить к осуществлению более сложных задач, таких как разработка отраслевых обследований энергопотребления и расчета детализированных показателей энергоэффективности. Имеющиеся статистические данные также позволяют Казахстану проводить дальнейший энергетический анализ и моделирование для повышения качества политических решений, основанных на использовании фактических данных.

Эксперты ITS дают следующие конкретные рекомендации Казахстану с целью дальнейшего повышения качества энергетической статистики страны, внедрения системы расчета показателей энергоэффективности и улучшения использования энергетической статистики для целей энергетического планирования.

- КС должен начать подготовку комплексных обследований конечного энергопотребления в ключевых секторах экономики (промышленность, услуги, транспорт и сельское хозяйство) с целью сбора детализированных данных о потреблении по видам конечного использования или по подсекторам. КС должен удостовериться, что эти обследования конечного энергопотребления проводятся на регулярной основе (например, каждые 4 или 5 лет);
- Используя детализированные данные о потреблении, собранные в ходе обследований, Казахстан должен начать моделирование и расчет показателей энергоэффективности;
- Казахстану предлагается соблюдать общие рекомендации по разработке показателей энергоэффективности, предоставленные в ходе семинара в Минске в сентябре 2015 года (см. Приложение 2.4.2.);
- Министерству энергетики следует создать целевую или рабочую группу по показателям энергоэффективности для разработки и внедрения системы расчета показателей энергоэффективности, и обеспечить их использование для поддержки и мониторинга политики и мер по энергоэффективности за счёт фактов и данных;

- Соответствующие учреждения и, в частности, КС и Министерство энергетики должны назначать и проводить обучение специалистов (инженеров и специалистов по моделированию), отвечающих за сбор данных, моделирование и составление показателей энергоэффективности. То же самое необходимо сделать и для моделирования энергетической системы;
- Благоприятную ситуацию в отношении межведомственного сотрудничества в области энергетической статистики следует распространить на сферу показателей энергоэффективности и энергетического планирования с целью обеспечения того, что официальные статистические данные используются и разрабатываются для поддержки энергетической политики и мер, основанных на фактических данных. Эта институциональная структура может быть закреплена в Меморандуме о взаимопонимании, в котором четко определены роли и обязанности каждого учреждения / заинтересованной стороны;
- Кроме того, в ближайшем будущем КС следует рассмотреть следующие задачи:
  - Развитие системы отчетов о качестве;
  - Развитие ежемесячной статистики (по сравнению с годовой энергетической статистикой, ежемесячные статистические данные гораздо проще собирать и обрабатывать, для этого необходима только реализация быстрой краткосрочной ежемесячной деятельности, а также наличие компетентного персонала).

2.3 Main Report

This section of the report provides some guidance on the development of energy efficiency indicators including data collection methodologies and procedures, modelling techniques and the calculation of indicators.

2.3.1 Preparation of the questionnaire to be used for the household energy survey

ITS experts reviewed the questionnaire drafted by CSK for their household energy survey. The draft questionnaire was deemed excellent. It is detailed enough and covers all the data requirements that are necessary for the calculation of energy consumption by end-use (cooking, heating, hot water, etc.) and energy efficiency indicators.

ITS experts suggested preparing an Interviewer Manual that describes all the fuels and technologies specified in the questionnaire and providing training to interviewers and controllers. It was also recommended that CSK conduct a pilot survey on a small sample of households in order to test the questions. Also, the measurement units for each fuel should be specified (e.g. measurement unit for quantities of consumed fuel wood should be m3).

Also, ITS recommended that the questionnaires should be structured around the following household categories:

- Two types of dwellings: (i) family houses and (ii) apartments
- Three types of heating equipment: (i) centrally heated households from district heating systems, (ii) centrally heated households using their own private boiler and (iii) heating based on individual stove (including heat pump).

2.3.2 Calculation of Energy Efficiency Indicators for the residential sector

Overview of the EIHP model used for the calculation of EEI in the household sector

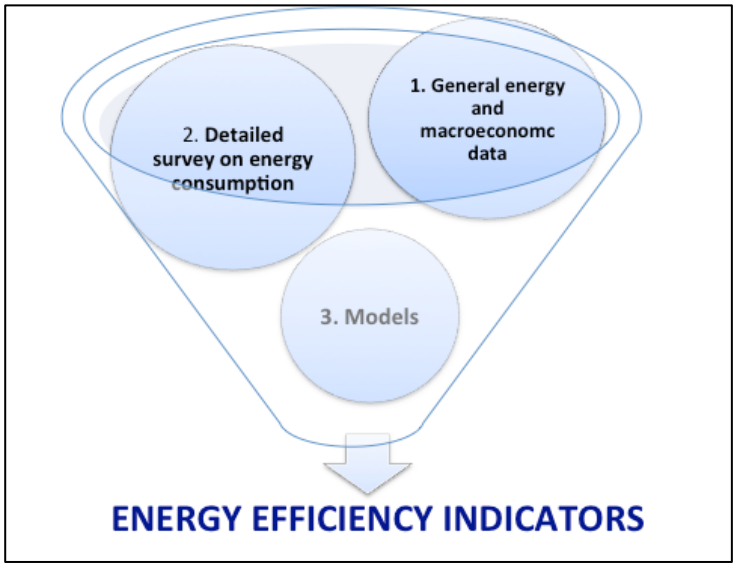
Kazakhstan beneficiaries have received a MS Excel model for the calculation of energy efficiency indicators in the residential sector that was developed by the EIHP (model 1). Kazakhstan beneficiaries are encouraged to make use of this model when they start using the results of their national household energy consumption survey and start developing their energy efficiency indicators system.

The main purpose and aim of the EIHP Model is to assist users in the compilation of data collected through the mean of surveys on energy consumption and to calculate the final energy consumption by end-uses in households. In the household sector, end-uses are as follows:

(i) Heating,
(ii) Hot water,
(iii) Cooking,
(iv) Cooling,
(v) Electrical Appliances and Lighting

Model 1 is complementary with the EIHP model proposed for the compilation of Energy Efficiency Indicators (Model 2). It can also provide direct inputs to the IEA template, the EU Odyssee-Mure database or the EC Model for the M&V of Energy Efficiency Indicators. It is recommended that the compilation of EEIs in Kazakhstan should follow the process described in the chart below. This recommendation is based on the experience of drawn from ITS' technical assistance missions conducted in 2013 and 2014 in a number of INOGATE PCs.

Proposed process for the compilation of EEIs in INOGATE PCs



Source: ITS Experts

Model 1 for the calculation of Energy Efficiency Indicators in the household sector is based on the results from a survey. The structure and contents of the model are shown in the table below.

Contents of the EIHP model for the calculation of the Final Energy Consumption in households

I- GENERAL ENERGY STATISTICS DATA

1. **Energy Balance**
   - Table 1. Households - Final Energy Consumption in natural units
   - Table 2. Households - Final Energy Consumption in energy units (TJ)
   - Table 3. Calorific values of the fuels
2. **Data on Demography and Households**
   - Table 1. Population size, thousand persons
   - Table 2. Number of households, thousand
   - Table 3. Average size of households
   - Table 4. Number of **living** units - dwellings
   - Table 5. Number of living units - dwellings which are permanently occupied by households

II - RESULTS FROM SURVEY

3. **Households by types of dwellings and technologies and appliances in use**
   - Table 1a. Number of households by type of living units, technology for heating and by energy products used as main source for heating
   - Table 2. Number of households by type of living units, technology for heating and by energy products used for hot water production
   - Table 3. Distribution of the households according to the type of living units, technology for heating and by energy products used for cooking
   - Table 4. Distribution of the households according to the type of living units, technology

Regarding Section I of the model (General Energy Statistics Data), the main prerequisite for the calculation of the final energy consumption (FEC) by end-use is to collect correct and consistent data on the total final energy consumption in the household sector. At the end of the modeling phase, the results from the survey will be compared and calibrated to the total FEC by sector (e.g. residential) as shown in the energy balance.

Concerning statistics on population and households, it is important to consider the following definitions:

- Population – total number of persons living permanently in a country
- Household – consists of one or more persons living in the same dwelling and sharing food, and living accommodation. A household may consist of members of a single family or some other groupings of people.
- Dwelling – self-contained “housing units” permanently used by one or several households (Dwellings should be distinguish from “living units” used for other purposes).

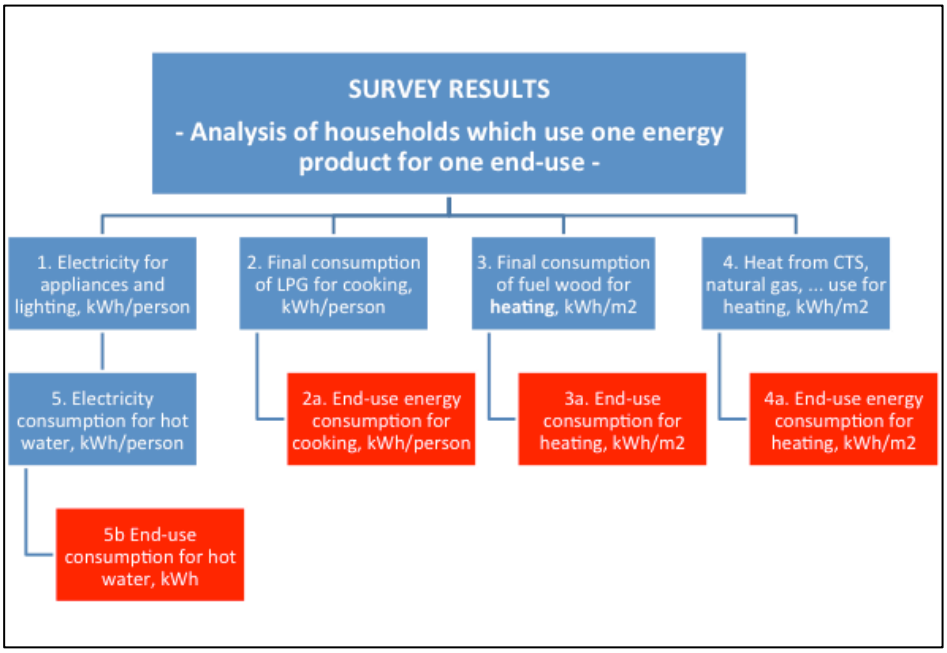
Section II of the model deals with the statistical analysis needed to calculate the main results from the energy survey. The analysis is based on the compilation of results for households that use one form of energy only (e.g. natural gas) for one specific end-use (e.g. cooking).

The model also explains how to calculate the values for the cases when one household uses more than one energy products for one end-use.

The modelling of useful energy and final norms for end-use consumption comes next. In this context, modeling means finding the values which simulate the theoretical/expected values based on statistical methodologies by using iterative approximations and expert estimates and conclusions. The following USEFUL and FINAL consumption end –use norms should be calculated and assumed for energy consumptions in households:

- Heating – kWh/m2 of heated surface area
- Hot Water – kWh/person
- Cooking – kWh/person
- Cooling – kWh/m2 of cooled surface area
- Non-thermal - kWh/person

Modeling process for the calculation of useful and final norms for end-use consumption



Source: ITS Experts

Key definitions:

- Final Energy Consumption (FEC): measures only the final amount of energy used by end-use equipment.
- Useful Energy Consumption (UEC): measures the final amount of heat available for use excluding losses in end-use equipment. The UEC depends on the energy efficiency of a given appliance (η). The UEC is needed for the calculation of equivalents of end-use consumption for different energy forms used for same purpose.
- UEC = η * FEC

Calculation of Energy Efficiency Indicators for the industry sector

Model 2 ("Model for Monitoring and Valorisation of Energy Efficiency Indicators: Top-down Indicators of Energy Savings») can be used by Kazakhstan to calculate key energy efficiency indicators in all consumption sectors and particularly in the industry sector.

The EIHP developed this Model based on the European Commission's *Recommendations on measurement and verification methods in the framework of Directive 2006/32/EC on energy end-use energy efficiency and energy savings*.

The model includes the calculation of 24 of Energy Efficiency Indicators for households, services, transport and industry and that of Energy Efficiency Indicators in each consumption group are split in two categories:

- preferred indicators (P);
- main indicators (M).

The model also includes additional formulas for the calculation of energy savings for the reference period.

2.4 Annexes

2.4.1 Key contact persons

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2.4.2 Recommendations for the development of Energy Efficiency Indicators given during the Minsk workshop (RWP.12)

Recommendation 1: Develop and use energy efficiency indicators to design and implement evidence-based energy efficiency policies and measures

INOGATE PCs should use energy and energy efficiency indicators as important tool for future policy developments. Energy Efficiency Indicators have a very high practical value for policy design and monitoring of energy efficiency policies and measures. They should be given a high priority and an appropriate legal and institutional framework.

Recommendation 2: Set priorities and adopt a gradual approach to developing Energy Efficiency Indicators

INOGATE PCs should adopt a gradual approach to the calculation of Energy Efficiency Indicators. PCs should prioritise their efforts and address first the highest energy consumption sectors. In principle, PCs should first start with the collect of the data and the calculation of energy efficiency indicators in the residential and industry sectors. The transport and services sectors are also very important but data collection is significantly more challenging and demanding. Also, it makes sense to start with aggregated indicators and expand gradually more disaggregated indicators at sector level as shown in the pyramid of indicators. This expansion should be driven by data opportunities and the public/political interest for a specific sector or issue.

Recommendation 3: Establish an appropriate legal and institutional framework to develop Energy Efficiency Indicators

The development of a comprehensive and long lasting system of Energy Efficiency Indicators requires dedication and sustained efforts from a large number of stakeholders (NSIs, Ministries, Energy Efficiency Agencies, Energy regulators, energy companies, Universities and research centres, NGOs, etc.). Energy data tend to be scattered across many sectors and organisations. Good data are often available at National Statistics Institutes, line ministries and agencies but accessing them is a difficult and a slow process. INOGATE PCs should define clearly the responsibilities of various stakeholders in the collection of data and the compilation and dissemination of indicators. Because data collection involves many parties, there should be a practical and efficient platform for inter-agency cooperation and coordination (e.g. Energy Efficiency Working Group or Energy Statistics Working Group). Secondary legislation or other institutional arrangements (e.g. MoUs) can provide a strong legal basis and help establish the legitimacy of the agencies in charge of data collection, compilation or dissemination. It should be noted that it is not possible for NSIs to collect all the energy and activity data needed to create all Energy Efficiency Indicators.

Recommendation 4: Develop and launch detailed energy consumption surveys in the household, services and transport sectors

Several INOGATE PCs have launched energy consumption surveys in the residential sector. Where this is not yet the case, INOGATE PCs should launch detailed energy consumption surveys in order to collect data on final energy consumption by end-use (space heating, space cooling, water heating, lighting, cooking, appliances) in households. Similar surveys should also cover the services and transport sectors. PCs will then be in the position to develop disaggregated energy efficiency indicators. This data will also contribute to improve greatly the accuracy of final energy consumption estimates in energy balance of the country.

Recommendation 5: Keep abreast of methodological developments and best practices

The international methodological framework for energy efficiency indicators is not fully mature yet. International standards, although quite advanced, are still under development. INOGATE PCs should take part

actively in the work on "Best practices" in the field of energy efficient indicators.

Recommendation 6: Allocate sufficient financial and human resources to the development and dissemination of Energy Efficiency Indicators

Energy Efficiency Indicators are a crosscutting activity that requires both statistical expertise and a good knowledge of energy efficiency programmes and technologies. INOGATE PCs should train NSI's and other Agencies' staff appropriately in data collection methods (e.g. survey design, sampling…) and analytics (compilation, analysis and interpretation of Energy Efficiency Indicators).

Recommendation 7: Dissemination of Energy Efficiency Indicators

Dissemination is key to gain traction and support. At a national level it is important to work and communicate with the users of data and energy efficiency indicators. INOGATE PCs should ensure that users are encouraged to provide their feedback. Energy Efficiency Indicators should be published regularly and made accessible to the broader public.