Compiling RES Legislation for Kazakhstan

Report on Benefits of RES to Energy Sector in Kazakhstan
Task 2.Kyoto Protocol

Lyubov Inyutina
lyubov.inyutina@mail.ru

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List of Abbreviations

AAUs	Assigned Amounts Units
Annex 1	UNFCCC Annex I. List of countries that have committed themselves to a quantitative GHG emissions reduction target (OECD members plus most Central and Eastern European Countries)
Annex B	Refers to Kyoto Protocol Annex B, a listing of the Annex I Parties with their commitment to emissions reductions
BaU	Business as Usual
CERs	Certified Emission Reductions
CDM	Clean Development Mechanism
COP	Conference of Parties (Parties of the UNFCCC)
DNA	Designated National Authority
EU	European Union
EB	Executive Board
ERUs	Emission Reduction Units
KEGOC	Kazakhstan Electricity Governmental Operation Company
GDP	Gross Domestic Product
GHG	Green House Gases
HPP	Hydro Power Plant
IET	International Emission Trading
IRR	Internal Rate of Return
JI	Joint Implementation
JISC	JI Supervisory Committee
KAZNIIEK	Kazakh scientific Institute on Environment and Climate
KzT	Kazakhstan Tenge
KP	Kyoto Protocol
LoA	Letter of Approval
MEMR	Ministry of Energy and Mineral Resources
MARKAL	MARKal ALlcation
M&V	Monitoring and verification (refers to monitoring& verification protocol)
MOP	Meeting of Parties (Parties of the Kyoto Protocol)
Non-Annex	Countries not included into Annex 1 to UNFCCC
OE	Operational Entity
P&M	Policies and Measures
PDD	Project Design Document
RMUs	Removal Units
RPA	Renewable Power Agency
RECs	Renewable Energy Certificates
RES	Renewable Energy Sources
RK	Republic of Kazakhstan
REEEP	Renewable Energy and Energy Efficiency Partnership
TPES	Total Power Energy Supply
Track1	JI with full eligibility as Annex 1 Party (six requirements fulfilled, “like IET”)
Track2	JI with partly eligibility (three requirements fulfilled, including: Party of Protocol, registry and AAUs in place, “like CDM”)
toe	Tons of oil equivalent

UNFCCC	United Nations Framework Convention on Climate Change
UNDP/GEF	United Nations Development Program/Global Environment Facility
WB	World Bank

Content

Executive summary

The proposed mechanism introduces the renewable energy certificates (RECs), expressed in MW of generated electricity from renewable energy sources. This aims to support RES development in Kazakhstan. Project developers via tendering submit project proposals to an established national authority responsible for their approval. On closure of the tenders, the authority will select the best proposals, based on certificate price and credibility of proposal, up to the total capacity stated in the tender announcement.

On success, the developers will carry out the full development of the project with the offer of a certificate purchase contract supporting his activities. The authority will purchase RECs and pass the cost on to existing licensed electricity generators, who in turn will be obliged to purchase a share of RECs, the generator will get the value of electricity and the extra value of certificates.

The aim of the report is to define the value of Kyoto Protocol for RES development in Kazakhstan and possibilities of harmonization of proposed REC mechanism with the Protocol and to find potential synergies.

The analysis presents the following principles:

1. At present, Kazakhstan is not eligible for any of three flexible market Kyoto Mechanisms. It is unlikely that any profit can be gained in the first budget period 2008 -2012.
2. To derive any value from the Kyoto Protocol flexible mechanisms, it will be necessary for the Government to ratify the treaty. If, as expected, ratification as an Annex 1 country occurs, then the Republic of Kazakhstan will have to adopt a voluntary cap on emissions, based on a baseline year, probably 1992. In this circumstance, if it is emitting less than the baseline, it will be able to sell credits, if it is emitting more that the baseline it will be obliged either to reduce emissions or to buy carbon credits. Only in this case, but only if it does not exceed the baseline emissions, it will be able to draw value from the Joint Implementation mechanism for project finance or to be eligible under International Emission Trading (IET).
3. International Emission Trading is more attractive and does not affect project developers but it is not clear that Kazakhstan will get eligibility for IET up to 2012. By ratification of the Kyoto Protocol without quantified commitments and giving a clear statement to follow CDM Kazakhstan can sell certified emissions reductions (CERs) on the international markets. The period for carbon credits accounting will still be limited to 2012 Governance of the Protocol post 2012 remains under discussion and is uncertain.
4. Project developers may apply to Kyoto on a voluntary basis to improve the bankability of their project by seeking additional finance for carbon reduction through selling verified credits in addition to electricity and RECs. In this case the developer will bear all risks on accreditation and registration under Kyoto.
5. Project costs related to carbon value involved depend on complexity of the project. The Up-front costs of 40,000-115,000 (1-15% of ERU value) are significant and mean that an additional level of risk is imposed upon a proposed project.
6. While looking for financing the developer should remember that ERUs generated during JI project implementation represent only a minor part of project cash flow. The impact on renewable energy project internal rates of return for a range of CDM and JI projects undertaken by the World Bank at a price of $4 per ton CO_2 equivalent was 0.5–2.5% (hydro, wind) with carbon contributing about $2.00–3.40 per MWh delivered. Carbon therefore will not make a poor project commercially viable. Developers will be free to choose their own

means of developing a project, but may find it simpler and clearer to focus their efforts on RECs and to ignore the Kyoto Protocol.

7. The Renewable Power Agency may provide a number of additional functions that will be necessary if the flexible mechanisms of the Kyoto Protocol are to be used for projects on ratification. The Association may act as the Accredited International Entity for Kazakhstan and carry out the designated functions thereof.
8. Under Kyoto RECs may confirm the origin that electricity is generated from renewable energy sources for the purpose of UNFCCC and the Kyoto Protocol.
9. RECs could be converted into emission reduction units which could be sold later on international market. Eligibility requirements to Kyoto Protocol should be satisfied.
10. Share of RES could be interpreted as indicator of effective use of resources for achieving of Sustainable Development and contribute to UNFCCC.
11. Business as Usual (BaU) scenario defined with MARKAL-Kazakhstan model refers to the reference energy system development as it is. Analysis of model results show that electricity generation as part of power sector is based mostly on coal (70%), contribution of RES in BaU remains low, up to 0.2 Mtoe in 2040.
12. RES development should be introduced as a mitigation option for the purpose of the UNFCCC, independently of with/without obligation on Kyoto. According to analysis with the model the threshold of the base year emission level (probably 1992, corresponding to total emissions equal to 252.9 $MtCO_2$ in Kazakhstan) will not be achieved during 2008-2012. Obligation under Kyoto is not to exceed this threshold, see also point 2. In this case and if Kazakhstan ratifies as non-Annex 1, there is potential to sell carbon credits (CERs) under CDM, limited by 2012 for the first budget period of KP. Rules for post Kyoto are not defined and are under discussion.
13. If emissions will grow rapidly, then other options should be added, especially for the purpose of obligation, these impacts should be taken into consideration by policy makers. Analysis with the model specify that mitigation options for 5USD/tCO_2 in the power sector allows the RE capacity (mostly hydro) be present up to 2020 in the scenario, fazing other RE technologies because of high transfer prices or other barriers as not least cost option. Wind farm become competitive in the extreme cases. The scenario of cost mitigation 20 USD/tCO_2 allows the share of RE capacity could be higher in comparison to BAU or scenario with cost option of 5USD/tCO_2, but for the shorter period (up to 2008).
14. Due to uncertainties about ratification it is recommended to focus only on RECs and not to refer directly to the Kyoto Protocol in the proposed legislation, with making amendments referring to the Protocol later after its ratification.

Section 1

Increasing generating electricity from Renewable Energy Sources (RES) will help Kazakhstan to implement climate change policy by decreasing greenhouse gas emissions and to assist the global agreement- the Kyoto Protocol (KP) to the United Nations Framework Convention on Climate Change (UNFCCC). RES promotion will contribute to energy safety, network security, and sustainable development including environmental protection; and to the supply of power to remote settlements.

The proposed mechanism with renewable energy certificates (RECs) will support RES promotion on a national level. Because of capacity and type of RE projects eligible under KP (in particular small scale ones up to 15 MW) the modalities and procedures (M&P) are suitable for our attention for the purpose of our analysis on interrelation of both mechanisms.

1.1. Background on the Kyoto Protocol flexible mechanisms

The Kyoto Protocol is a global agreement to the United Nations Framework Convention on Climate Change (UNFCCC), and entered into force in February 2005. It obliges developed countries, so-called Annex 1 Countries, to reduce emissions of carbon dioxide towards the base year 1990 as quantified commitments fixed in Annex B of the Protocol.

The Protocol establishes three market-based mechanisms aimed to at achieving emissions reductions cost effectively while at the same time contributing to sustainable development, these mechanisms include:

(i) *International Emissions Trading (IET)* that allows Annex 1 Parties to engage in international trading of GHG emissions. Under the authority of individual Parties, entities will be able to trade GHG emissions (Article 17 of KP);

(ii) *Joint Implementation (JI)* which allows an Annex I Party to implement a greenhouse gas mitigation project in another Annex I country and to earn emissions credits equal to the resulting reductions (Article 6 of KP);

(iii) The *Clean Development Mechanism (CDM*), which has the dual purpose of allowing developed countries to earn emissions credits for undertaking projects that reduce emissions or enhance removals by sinks in non-Annex I countries, and of contributing to their sustainable development.

Brief review on JI. COP 7 agreed on guidelines for Article 6 projects (decision 16/CP7),adopted by COP/MOP 1; Emission Reductions Units (ERUs) are achieved by one Annex Party through projects in another such Party;

Only projects which provide emission reductions that are additional to any that would otherwise occur (additionality) can qualify for Joint Implementation. ERUs can only be issued for the crediting period 2008-2012. Projects that would have been built anyway under the proposed REC system in Kazakhstan will not be eligible for support under JI. It must be demonstrated that the additional support available from RECs is insufficient to promote the project.

JI Governance requirements: .In accordance with guidance from the Meetings of the Parties to the Kyoto Protocol (the so-called COP/ MOP), Annex 1 countries who wish to become involved in Joint Implementation projects must establish a JI Focal Point with the task of coordinating and approving project proposals on a national level, issuing Letter of Approval(LoA)).

Under the proposed renewables legislation, this body may also be the Renewable Power Agency (the RPA). If this is the case, then the role of the RPA would be greater than that suggested only for the purpose of the legislation on renewable sources.

The role of involved bodies: The role of the Joint Implementation Supervisory Committee includes the supervision of the operation, and accrediting of Accredited Independent Entities (AIEs) that perform the verification procedure, and they may request a review of a decision of the AIE. The role of AIEs includes the determination that projects conform with JI requirements, including that methodologies are appropriate and the determination of the amount of emission reductions. The key role for the Host Party includes having a designated focal point for approving projects, having determined national guidelines for approving, monitoring, and verification of projects; and it shall make information on projects publicly available in accordance with appendix B; and it shall meet participation requirements.

Country (Party) Level Participation Requirements for JI. Each participating Party must establish its national authority responsible for approving the projects and inform the UNFCCC secretariat about it. Each Party must also provide the secretariat with its national guidelines for approving JI projects to provide transparency. An Annex I Party is eligible to issue, transfer and/or acquire ERUs (Track 1 or "IET like") if it meets the following requirements as Annex I Party.

1. It is a Party to the Kyoto Protocol.
2. It has established its assigned amount. The assigned amount in the first five-year commitment period from 2008 to 2012 for Kazakhstan may be equal to 100% (or less) of its 1992 anthropogenic CO_2 equivalent emissions of GHGs times five.
3. It has in place a national system to estimate all sources of GHG emissions and removals by sinks.
4. It has in place a national registry to ensure the accurate accounting of the issuance, holding, transfer, acquisition, cancellation and retirement of ERUs, CERs, AAUs, and RMUs.
5. It submits an annual inventory of anthropogenic CO_2 equivalent emissions and removal by sinks. The annual inventory of emissions by Annex A sources/sectors must pass a quality assessment.
6. It submits the required supplementary information on its assigned amount including additions to and subtractions from said assigned amount.

If a Party meets all these 6 points, then local Accredited Independent Entity (AIE), authorized by the JI Supervisory Committee, may verify the net reductions of GHG emissions on its own and issue ERUs accordingly, this is Track 1. However, if the host Party meets only points 1, 2 and 4 of the above requirements, it operates under Track 2. In this case it must undertake the verification procedure with involving external AIE authorized by the JI Supervisory Committee ("like CDM", where AIE is authorized by CDM Executive Board).

The Verification Procedure includes two steps: Verification of the Project Design Document (PDD) before implementation, and Verification of ERUs/Registration during/*after implementation*. Project participants must submit a project design document (PDD) to an Accredited Independent Entity (AIE) for the determination.

Issuance of ERUs. ERUs may be issued and transferred by the host Party once reductions have been verified. The host Party must still, as noted above, be a Party to the Protocol, have established assigned amount and have in place a national registry for tracking the assigned amount.

JI Rules and Procedures	
	Project Design
1	Identification of project idea by project proponent and an initial evaluation of the eligibility and feasibility of developing the project as a JI project.
2	Develop Project Design Document (PDD), including a baseline and a monitoring plan. Provide documentation on analysis of environmental impacts of the project activity, and if necessary, undertake an environmental impact assessment in accordance with procedures required by the host Party. Obtain approval of the project from the Parties involved. (Completion of a project design document is not required for Track 1 JI countries.) Under JI Track 2, PDDs are to be submitted to the JI Supervisory Committee; a body to be appointed following the first Conference of the Parties/Meeting of the Parties - following entry into force of Kyoto.
3	Project proponent submits PDD, and a report on the analysis of environmental impacts to an Accredited Independent Entity (AIE) appointed by the JI Supervisory Committee.
4	The Accredited Independent Entity makes the PDD publicly available through the JI Supervisory body for 30 days, and receives comments. It seems likely that the PDD will be made available on the Supervisory Body website. Based on the comments provided by the stakeholders, the AIE will determine whether the project is eligible under JI.
5	The AIE determines whether the requirements have been met and that the PDD is complete.
6	The AIE makes the final decision publicly available through the Supervisory Committee, together with an explanation of its reasons, including a summary of comments received and a report of how due account was taken of these.
7	Possible review of the AIE's decision. If a Party involved in the project or at least three members of the Supervisory Committee requests a review, the Supervisory Committee will review the decision of the Accredited Independent Entity. The review process and subsequent decision should take no longer than 6 months after the request for review.
	Project Implementation
8	Project proponent monitors and records project activities. Based on the monitoring results, the greenhouse gas emission reductions resulting from the JI project activity can be calculated on an ongoing basis.
9	Project proponent submits monitoring results to Independent Entity. The project proponent has to contract an Independent Entity for verification of the monitoring results and the subsequent Emission Reductions Units as a result of the operation of the JI project.
10	The Independent Entity makes monitoring reports publicly available through the JI Supervisory Body.
11	Determination of whether monitoring results prove that the emission reductions have occurred, by Independent Entity, and whether the monitoring is in accordance with the approved monitoring plan. (Submitted as part of the Project Design Document.)

12	The Independent Entity makes its determination report publicly available through the Supervisory Committee, together with an explanation of its reasons.
13	Possible review by the JI Supervisory Committee (JISC). Once the Independent Entity has submitted the verification report to the JISC, there is a possibility that a review of the verification report by JISC may be requested. This can only happen when a Party or three members of the JISC request such review. If there is a request for a review of the verification report the following will occur: The JISC will decide at its next meeting or within 30 days of the request being made, whether a request has merit and whether to proceed with the review. If a review is deemed necessary, the JISC will review the decision of the Independent Entity. The JISC informs the project proponent of the outcome of the review and makes its decision and reasoning publicly available.
14	In case there is no request for review, the verification is deemed final 15 days after the date on which it was made public.
15	Issuance and registration of ERUs. This is a contractual matter between the project proponent, the ERU purchaser and the host Party. When carrying out a project in the territory of an Annex I Party, the emission reductions that will be generated as a result of the JI activity will have to be deducted from its Assigned Amount. Once the emission reductions have been verified the National Registry will need to be notified, and it will record the issuance and transfer of ERUs, and deduct the AAU equivalent from the Party's Assigned Amount. Similarly, the investor Party will register a projects approval and transfers of ERUs, and the addition of the AAU equivalent to its Assigned Amount.

Brief review on CDM. CDM Governance includes COP/MOP functions, similar to JI under Track 2, with involving the Executive Board (EB), and the designated Operational Entities (OE). Participation in CDM projects is voluntary and requires approval by Parties via Designated National Authorities (DNA) involved in the form of written confirmation- Letter of Approval (LoA). The host country will also make sure that the proposed project is consistent with its sustainable development.

Registration of CDM Projects involve Party's approval and validation by operational entities (OE) including reviews of the Project Design Document (PDD) that it received from the project participants and assessment whether the project meets all the requirements of the CDM including: being a Party of Protocol, should establish DNA for project approval by signing LoA), and contribution to sustainable development, and voluntary participation. Role of operational entities are similar to Accredited Independent Entities, AIE. If the operational entity determines a project to be valid, it shall submit a request for registration to the Executive Board. Registration will be considered complete 8 weeks after receipt of the request unless one of the Parties, or at least 3 members of the EB, request a review of the proposed CDM project. The EB will finalize their review no later than at the second meeting following the request. Acquiring carbon credits under CDM include certification and verification by OE of real emission reduction.

Issuance of CERs The Executive Board will issue CERs within 15 days of receipt of the certification report unless one of the Parties involved, or at least three members of the EB, request a review. The review process shall be completed within 30 days of the initial request. Upon receipt of the certification report, the EB will issue CERs that correspond to the reduction in emissions

achieved. After forwarding the share of CERs for administrative expenses and for the 2% adaptation levy, the EB will deposit the remaining CERs into the appropriate registry accounts as per the participant's request. The share of CERs belonging to the host will be deposited into the CDM registry (maintained by the EB), while the share of CERs belonging to the project proponent will be deposited into its account in its own national registry for saving (especially in case of "self CDM": when CERs could be generated during the project funded by project proponent of host Party only, without external investment, CERS could be sold later to Annex 1 Party according to agreement during 2008-2012).

National registry. As part of the participation requirements for the Kyoto mechanisms, all Annex I parties must establish their national registries, which is a standardized electronic database under a designated national authority to ensure the accurate accounting of the issuance, holding, transfer, acquisition, cancellation, retirement of all units and the carry-over of carbon credits-each of these emission units, namely AAUs, RMUs, CERs and ERUs shall be held in only one account in one registry at one time.

CDM Rules and Procedures[1]	
	Project Design
1	Identification of project idea by project proponent and an initial evaluation of the CDM eligibility of a project, followed by a full feasibility study.
1a	If applicable, the project proponent fills out a Project Idea Note (PIN). This for example applies when submitting a project to potential CER buyers, such as the Prototype Carbon Fund from the World Bank, the IFC Carbon Fund, the Finnish tender for small scale projects and the new carbon funds from the World Bank. Alternatively, the host Party might require the submission of a PIN as part of its approval process.
1b	If a PIN has been filled out, the respective authority (whether buyer or, host Party) will provide an opinion on the project eligibility. If the answer is positive, continue with step 2. If the opinion is negative, adjust the project idea according to the comments provided or reconsider continuation.
2	Project proponent has to carry out the following: a) Develop Project Design Document, b) Seek and apply for host Party approval.
3	Project selects and contracts an Operational Entity for validation of the proposed CDM project.
4	Project proponent submits PDD and host Party approval letter and other relevant documents to an Operational Entity.
5	The Operational Entity makes the PDD publicly available through the CDM Executive Board.
6	The Operational Entity carries out validation of the PDD, host Party approval letter and other supporting documents and submits it to the Executive Board.
7	In a case where a request for review is demanded, the Executive Board will review the

[1] based on http:www.dfait-maeci.g.c.ca/cdm-ji/review_asp

	decision of the Operational Entity.
8	Registration of the project as a CDM project with the Executive Board.
	Project Implementation
9	Monitoring of project activities by project proponent.
10	Submission of the report with monitoring results to the Operational Entity.
11	Verification of the monitoring results by an Operational Entity (OE). The OE will then certify in writing the amount of verified CERs in a certification report. The certification report has to be made publically available.
12	If there has been a request for review of the CDM certification report the Executive Board decides whether the request has merit and whether to proceed with the review.
13	If there is no request for review, the issuance of CERs shall be deemed final.

Status of Kazakhstan in Kyoto and perspectives. At present, Kazakhstan is not eligible for any of the Kyoto Mechanisms, and has the status of non-Annex 1 Country for the purpose of the UNFCCC and will only become an Annex 1 Country after KP ratification. It is expected that Kazakhstan will ratify KP, enter Annex 1, take voluntary cap to reduce GHG emissions towards 1992 and become eligible to JI and then IET. To derive any value from the Kyoto Protocol flexible mechanisms, it will be necessary for the Government to ratify the treaty and follow other requirements as described above. By ratification of KP without quantified commitments (as CDM) Kazakhstan has to give a clear signal about decision to follow CDM, then it can use its potential to sell CERs on the international market, but will be not eligible for JI or IET. If, as expected, ratification as an Annex 1 country occurs, then the Republic of Kazakhstan will have first to adopt a voluntary cap on emissions, based on a baseline year, probably 1992. In this circumstance, if it is emitting less than the baseline, it will be able to sell credits, if it is emitting more that the baseline it will be obliged either to reduce emissions or to buy carbon credits. Only in this case, but only if it does not exceed the baseline emissions, Kazakhstan will be able to draw value from JI for project finance, or to apply directly to IET.

It is now unfeasible to suggest that Kazakhstan will be able to achieve the Annex 1 qualification criteria described above. In this case if Kazakhstan ratifies Kyoto as an Annex 1 country, it will not be able to either acquire or sell ERUs in the first trading period, nor take part in any International Emissions Trading, up to 2012. Kazakhstan's only option to draw value from the Protocol will be to ratify as a non-annex country, in which case it will be able to attract project finance under the Clean Development Mechanism.

1.2 .Summary of the proposed REC system operation

From time to time the established national authority on RE projects regulation (RPA) will announce a call for tenders for renewable energy projects up to a maximum total capacity. Developers will be invited to submit project proposals with a proposed price for certificates (RECs) to be contracted with the RPA. RECs confirm the origin of electricity generated from renewable energy sources RES such as wind, water, solar and biomass and are expressed in electric capacity generated.

Developers shall do enough feasibility work on their projects to be able to make a firm proposal for certificate prices. They will also be able to sell electricity produced on the power markets. In this way the certificate price represents the difference between the market price for electricity and the price required to make the project commercially viable.

On closure of the tenders, the RPA will select the best proposals, based on certificate price and credibility of proposal, up to the total capacity stated in the tender announcement. RE generators will develop full documentation for the investment project according to existing rules, receive appropriate permissions, licenses, and approvals and source finance for the project.

On commissioning of the projects the RPA will purchase RECs under contract with the RE generator and pass the cost on to existing licensed electricity generators. Generators will be obliged to purchase a share of the total REC cost proportionate to their own annual power production. Payments by generators will be based upon the average national REC price. Alternatively generators owning their own RES plants authorised to produce certificates may meet their obligation by presenting self generated certificates.

The role of RPA is to manage the renewable energy programme by organizing bidding, carrying out approval of RE projects according to developed national rules and procedures.

If the REC price does not satisfy competitiveness of project the developer can make the choice to seek additional support from the Kyoto mechanisms based on generation of carbon credits. In order to improve the viability of the project the developer may choose to seek additional income from emissions reduction. In this case the developer should be free to carry out whichever procedure (JI or CDM) is available to him. He must however be aware of the additional costs associated with Kyoto and the requirements of the Protocol with respect to Additionality.

1.3. Examination of risks and extra benefits in RE projects relating to Kyoto

In case if the REC price is too low to attract finance to his project in the national tender the developer can make a voluntary choice to follow Kyoto. In this case developer shall bear risks related to accreditation under Kyoto which could be rather high in comparison to expected benefits. Developers should be aware of KP mechanisms implementation and related issues.

The Proposed mechanism may support RES development without accreditation under Kyoto although both mechanisms may be used together to each contribute to the project. The use of Kyoto mechanisms would help to reduce the cost of RECs and therefore the impact on power consumers.

However, as the price of RECs will be established by the bidder and guaranteed for an agreed duration, it seems unfeasible that a bidder would choose to increase the level of complexity, of cost and of risk in the development of his project.

While looking for financing sources related to Kyoto the developer could refer to several surveys[2], implemented recently in Kazakhstan and should remember that ERUs generated during JI project implementation can represent only a small part of project cash flow. The impact on RE project financial internal rates of return (IRRs) for a range of CDM and JI undertaken by the World Bank (WB) at a price of $4 per ton CO_2 equivalent is 0.5–2.5% (hydro, wind) and carbon can contribute about $2.00–3.40 per MWh delivered. Thus, revenues of this order of magnitude will not make renewable energy projects viable unless they are already close to commercial viability.

[2] Available on www.climate.kz; www.sofreco.com/projets c886, authors remark

Project costs associated with carbon value depend on the complexity of the project and are described below, items from (a) to (f). The Up-front development costs[3] of JI projects amount to 40,000-115,000 € (1-15% of ERU value).

The structure of costs related to JI/CDM projects is explained below using as an example benchmark total production costs of US$ 6.00 per ton CO_2 (all cost stages accounted 100%, see Figure1) based on expert assessments of Ingo Pool, ppm.500, 2001. REC costs are not considered in this scheme. For purposes of this analysis, a small project was defined as a project that delivers up to 5,000 carbon credits for six years and a large project as a project that delivers 500,000 carbon credits for ten years.

a) The technical abatement costs are the net added costs to reduce or sequester emissions compared to an alternative baseline investment. These costs include fixed investment as well as variable costs and are largely determined by conditions in the project country and related to factors such as economic growth and development plans in energy and other sectors, including policies for technology import, existing fuel mix in the economy and age and condition of the existing technology inventory. According to this assessment the market would support CDM projects with original net present technical abatement costs of US$1.32 to US$2.55 per ton CO_2 for small projects (at a discount rate of 8%), in comparison: US$2.60 – US$3.67 per ton CO_2 for large projects.

b) Regulatory costs relate to meeting mandatory procedures for JI/CDM, national programs and buyers for project validation or determination, baseline development & approval, emissions monitoring, reporting, verification and certification. Based on existing experience, the consultant estimates that regulatory costs total roughly US$ 50,000 for a small project (US$ 250,000 for a large project). The regulatory costs for a small project include simple baseline document based on standardized elements with low burden of proof requirements, standard monitoring and verification (M&V) protocol for the project-type that can be adopted, low effort project procedures related to registration of carbon credits as described in Section 1.1.

c) Transaction costs relate to the marketing and transfer of carbon credits. This includes costs for i.e. contract development, negotiation and settlement that are borne by the seller and estimates in total US$ 0.10 per carbon credit for small projects (US$ 0.03 per carbon credit for large projects).

d) Mandatory side benefit costs. In addition to emission reductions, projects deliver sustainable development benefits that are required under CDM rules equivalent to or exceeding expected amounts. Failing to do so, could call into question the convertibility of carbon credits generated by a project to CERs and thus the contribution of carbon credits towards buyer emission limitation objectives. Mandatory side benefits increase the value of emission reductions because they increase the likelihood of being eligible under the CDM. The consultant estimates that mandatory side benefits add about US$ 0.70 of value to an emission reduction.

e) The adaptation fee refers only to CDM and is stipulated in Art. 12, Para. 8 of the Kyoto Protocol as "payment of a share of proceeds" from the value of related CER transaction, amounts of 20% of carbon credit transaction value.

f) Delivery risk costs arise to ensure that the contracted amount of carbon credits can be delivered to buyers over the length of carbon credit purchase contracts. Delivery risk costs to the producer are dependent upon project-based non-performance risks, the regulatory environment of JI/CDM projects, as well as the availability of instruments, such as state guarantees, to mitigate such

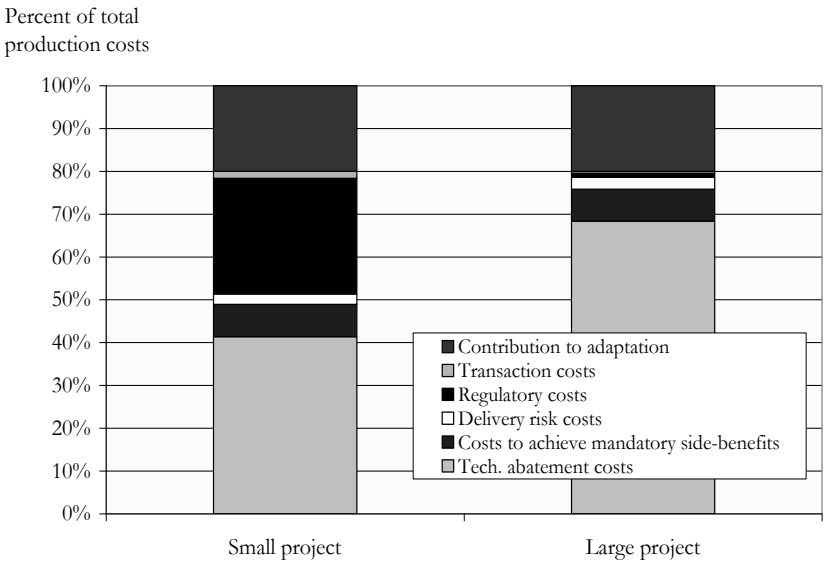
[3] Danish Agency, JI Guidelines,2003

risks. Delivery risks include: *determination/certification risk* related to the absence of clear JI/CDM rules for the verification of emission reductions; *baseline risks related to* external factors that could trigger the need for baseline revision, such as macro-economic policy changes, unexpected price developments in relevant markets, or technology breakthrough, large projects (with longer crediting periods) are more exposed to this risk compared to small projects (with short crediting periods); and *project performance risks related to* non-conform equipment operation & maintenance as well as poor project management.

g) Commissions. Brokers typically receive between one to three percent of the value of a transaction for their services.

Profit. Profit expectations depend on the perceived investment risk and typically lie between 15 to 30 percent (and higher) in investment grade emerging economies.

Figure 1: Relative share of large and small emission reduction projects



1.4. Description of compatibility and/or conflicts of two mechanisms, the ways of harmonization and synergy effect

It is clear that the proposed legislation for the promotion of Renewable Energy in Kazakhstan is valid for the development of RES projects. The Kyoto mechanisms can at best make an additional contribution to the financing of a project. Project developers may choose to pursue additional value under the Kyoto mechanisms or may chose to simplify the development of their project by focusing on RECs alone. In either case it is necessary for the proposed legislation to ensure that the options remain open and that the choice remains with the developer. Nevertheless in some instances it may be possible to structure the legislation in such a way as to optimize opportunities under Kyoto without additional complexity of the legislation.

In this section we shall explore areas of compatibility between the two mechanisms and also seek areas where adherence to one mechanism may imply disqualification from the other.

Additionality

The main issue to be considered if Kyoto and RECs are to be compatible is that of Additionality. It is necessary to demonstrate that funding though Kyoto will create additional projects, and not merely increase the return on projects that would have happened anyway. In this respect it is necessary that the legislation does not prevent this demonstration and it would be advisable to clearly state that finance from the Kyoto Mechanisms would be valid as additional funding.

To demonstrate additionality barriers analyses may provide evidence that the project is additional by demonstrating that the project cannot occur without the intervention proposed. Such barriers may include:

- Investment barrier - a financially more viable project would have been selected that would emit more greenhouse gas;
- Technological barrier - a less advanced technology with lower risks would have been selected and led to higher emissions;
- Barrier to prevailing existing practice-existing regulatory or policy requirements would have led to selecting a technology that emit more; and
- Other barriers - these are left up to the project developer but may include institutional, information, managerial, organizational capacity, financial resources or capacity to absorb new technologies –all of which can lead to higher GHG emissions .

Adaptation of standardized methodologies[4] approved internationally avoid duplication and conserve human and monetary resources, reducing costs and *assisting the transparency of the project's ranking process*. The Developer may apply for Kyoto support after a successful bid, in the instance where the proposed regulation satisfies issues of additionality.

Additionality is critical but in the circumstance where Kyoto support is sought, a barrier analysis must demonstrate the necessity of ERUs. This further analysis on additionality will not contradict with proposed mechanism and should include the following two steps:

(1) Analyze prohibitive barriers to the proposed project:

1.a. Identify the relevant barriers to the proposed project activity;

1.b. Explain how only the approval and registration of the proposed project as a CDM activity would enable the project to overcome the identified barriers and thus be undertaken;

(2) Analyze other activities similar to the proposed project.

It is not necessary to include the above procedure as part of legislation for RES in order to prove additionality, but is advisable to refer to the potential for Kyoto funding in order that developers are not hindered in any future barriers analysis.

Small Scale Renewable Energy Generating Projects under Kyoto. The Protocol defines small scale RE projects as projects with a maximum output capacity equivalent to up to 15 MW_e or an appropriate equivalent[5] These are defined as small-scale scale JI/CDM projects. They follow the basic stages of the regular JI or CDM cycle described in section 1.1 above.

Reduced governance costs and fees. Governance costs refer to the registration of projects: the fee is currently $5,000 per year for projects with less than 15,000 tons of CO_2 emissions. On a national level clearer guidance and streamlined verification processes and also reduced needs for on-site verification will contribute considerably to lower transaction costs. Costs can be reduced by 50% by streamlining project approval procedures, pre-defining baselines and monitoring and

[4] available on http://cdm.unfccc.int/methodologies/approved .

[5] decision 17/CP.7, paragraph 6 (c) (i))

verification protocols for different project types and developing standard delivery risk reduction instruments. This could reduce total production costs by US$ 0.02 (large projects) to US$ 0.83 (small projects) per carbon credit which can be used to increase the profitability of the program or finance projects with higher technical abatement costs.

Bundling. Similar small scale projects can be bundled into one project. This means that baseline estimation, monitoring plan, host country approval and verification/validation will apply to all projects in the bundle, resulting in reduced costs from greater economy scale. Projects could be bundled at the following stages- project design document (PDD), monitoring, determination and verification for JI and plus validation and certification for CDM. The total size of the bundled projects must not exceed 15 MW for small scale ones.

Standardized baselines and simplified PDD. Project developers may save time and effort by using these top down or predefined baselines. The UNFCCC/CDM site on baseline methodologies for small-scale projects[6] may be applicable to the proposed project. Simplified PDD forms could be applied Requirements reduced for a PDD[7].

Role of RPA in light of Kyoto. Once established for the purpose of regulating the proposed REC mechanism, the RPA may also be authorized as national JI focal point for approval Kyoto component of RE project after KP ratification and take additional functions in this regards:

1. Registration of JI projects.
2. Accreditation of specialized companies rendering services on verification of GHG reduction under JI projects.
3. State guarantees for offsets generated by JI project during the first budget period.
4. Registration of ERU's transfer.
5. Accounting and control.
6. Transactions with state reserve of AAU including transactions with AAU's surplus.

The RPA, as a governmental body could sign memorandum of understanding for recognition and approval of RE projects under JI. The RPA may perform the duties of the Accredited Independent Entity as authorized by the Joint Implementation Supervisory Committee.

None of these issues will impact on the establishment of the RPA under the proposed legislation. It is advised that the legislation is compiled as proposed with no reference to this possible future role for the RPA.

Other necessary findings are the following:

1. Proposed mechanism with Renewable Energy Certificates and the Kyoto Protocol market mechanisms may both serve to promote the generation of electricity from Renewable energy sources (RES). There is nothing to prevent the mechanisms being used together as long as the developer is aware of and prepared to accept the additional risks of seeking accreditation of the project under Kyoto.
2. KP will be valid for the support of RES Kazakhstan on ratification. It will be of use to future accreditation of RES projects to clearly state in the legislation that RECs will provide guarantees of origin of electricity generated from RES.
3. Nevertheless, in the short term it is better to focus on proposed REC mechanism and not to refer directly to KP as there is no guarantee of ratification by Kazakhstan.

[6] http://cdm.unfccc.int/pac/howto/SmallScalePA/ssclistmeth.pdf
[7] This form can be found on the UNFCCC JI website under <http://ji.unfccc.int/Ref/Forms.html>.

4. Given that the proposed legislation allows the developer to define the scale of the income stream from RECs, it seems inconceivable that a developer will choose to add to the complexity of the project by seeking support under Kyoto when so little is to be gained.
5. Nevertheless, the project developer can apply to Kyoto on a voluntary basis to seek additional financing and provide adequate viability of RE projects and increase the competitiveness of the certificate bid price.
6. The proposed legislation will define the role of the RPA as regulating the RECs cycle by organizing bidding, carrying out approval of RE projects, screening projects upon priorities and criteria, and coordinating with parties and stakeholders involved. It should also develop transparent procedures for project registration, streamline the process of approval and where appropriate apply elements of the Kyoto Protocol for pilot projects to be accredited to assist the activities of both mechanisms without the need for the legislation to be drafted accordingly.

Section II

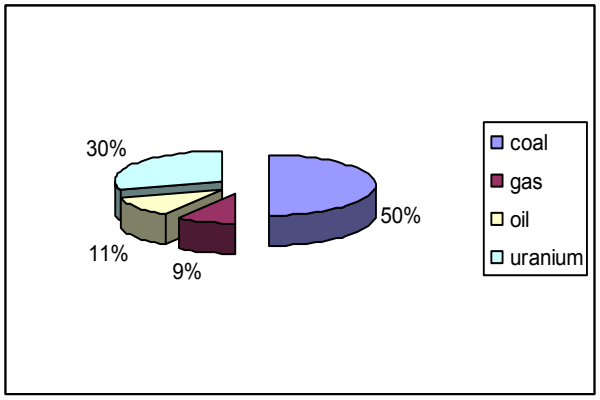
2.1. Characteristic of power sector as part of energy system of Kazakhstan

Kazakhstan has significant fuel resources, the Figure 2.1 below represents some indicators of power sector of Kazakhstan including share of them.

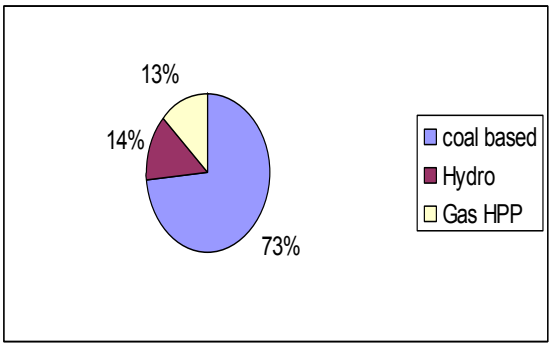
The consumption of primary energy per capita is about 3.3 toe, of which 2600 kWh is net electricity. Coal is the main energy consumed (55% of the primary consumption), followed by oil (18%). The energy intensity of GDP has been decreasing by half compared to 1992; it is almost 3 times higher than in the European Union: 0.65 kgoe/US$ 95 (at purchasing power parity) compared to 0.18 kgoe/US$ 95 purchase power parity (ppp). Total primary supply of energy per unit of GDP is about 3.5 times higher than in Western Europe but the supply per capita is about 28 per cent lower. Intensity of power consumption is 3 times higher in Kazakhstan than in traditional market economies[8].

Figure 2.1. Representation of power sector of Kazakhstan

The structure of primary fuel energy resources28 Bil. toe

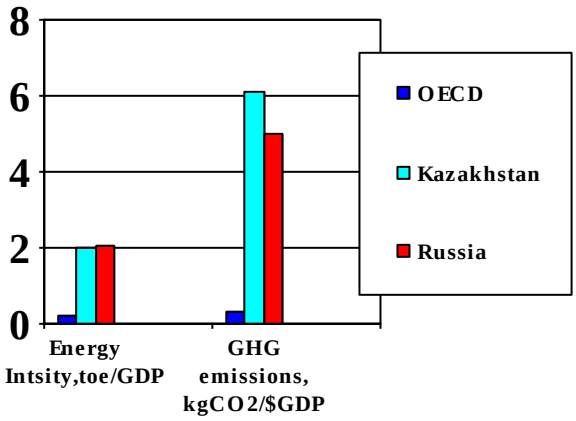


The structure of generating capacities(total 18500 MW)

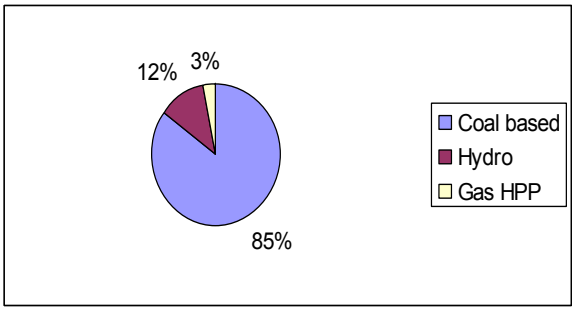


[8] [ECE, 2000] [Enerdata, 2005]

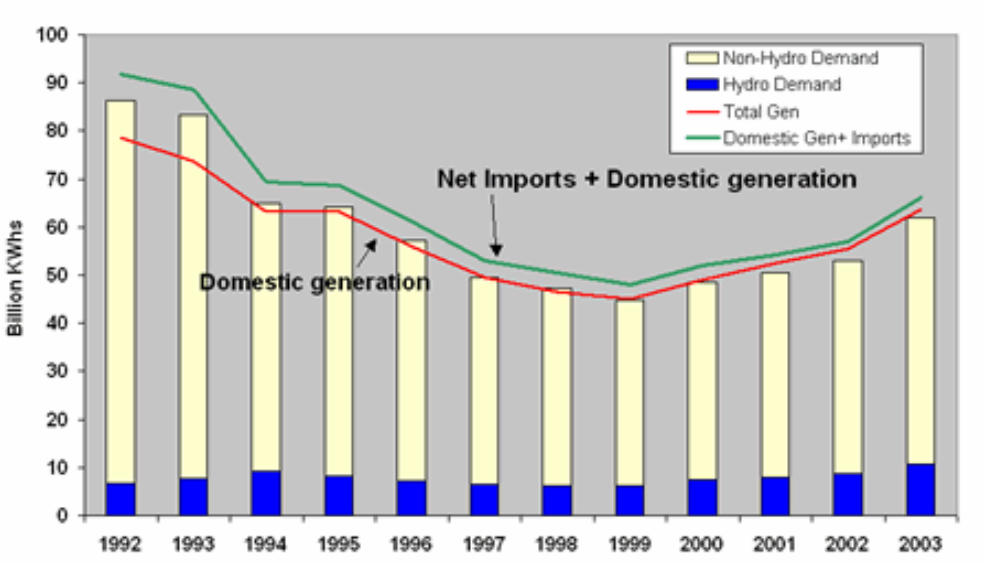
Energy intensity and GHG emissions in Kazakhstan (2,0 toe/GDP; GHG emissions 6,11kg CO2/GDP)



The structure of annual electricity generation in Kazakhstan (67Bil.kWh)



Electricity production and consumption is presented by Figure 2.2. The production and consumption of electricity in Kazakhstan fell significantly following independence (see Figure 2.2), the total energy consumption fell between 1992 and 1999 (-47%). Electricity demand and supply are balanced in the north, which actually even has some surplus to share. In the west, 40 per cent of the needs are produced locally, and 70 per cent in the south.



Source: IEA, DOE/IEA (2003 figures incorporate Kazakh Government's estimates)

Figure 2.2. Electricity production and consumption in Kazakhstan (1992-2003)

Most of the capacity is obsolete needing to be refurbished or replaced and the transport and distribution network is inefficient. Although Kazakhstan technically generates almost enough electricity to meet its demand, the country has suffered from frequent power shortages since 1992 due to the sector's deteriorating infrastructure.

Power sector of Kazakhstan has 71 power plants, including five hydroelectric power stations, giving the country an overall installed generating capacity of 19-17 gigawatts (GW), 80 percent of which are coal fired, and 12 percent of which are hydroelectric. Almost 85 percent of the country's power generation comes from coal-fired plants, mostly producing heat in combination to electricity (CHP), located in the northern coal producing regions. The main coal power plants are Ekibastuz Gres I (4000 MW), purchased in 1996 and owned by AES and Ekibastuz Gres II (2000MW) owned by the Kazakhstan Electricity Grid Operating Company (KEGOC). Two thermal power plants exceed 1000 MW, one coal fired and the other dual fired gas/fuel. Four plants exceed 500 MW, two of which are dual fired gas/fuel. Eight plants exceed 200 MW and one of them is dual fired gas/fuel. Eight smaller plants are dual fired gas/fuel as well. The industrialized north-eastern region of the country includes the major part of the installed capacity and consumes around 70 per cent of the electricity produced.

Electricity supply industry is characterized by privatization of all of power plants, but the sale of regional electricity distribution companies has proceeded more slowly.

Transmission and distribution. Kazakhstan maintains 460,000 km of distribution lines (figure 2.3) with voltages of 10, 35, 220 and 500 KV and is characterized by large electricity losses during transmission and distribution. According to data of the Ministry of Energy and Mineral Resources (MEMR), an average of 15 percent of the electricity generated in Kazakhstan is lost before it reaches consumers due to the widespread deterioration of Kazakhstan's power infrastructure. Kazakhstan's electricity transmission and distribution system (see figure 2.3) is divided into three networks: two in the north are connected to Russia, and the one in the south is connected to the Unified Energy System of Central Asia. However, these transmission systems are not well integrated, and they remain owned by the government. The northern networks have recently begun exporting electricity to Russia; the southern network is forced to import electricity from neighbouring Kyrgyzstan and Uzbekistan because of its lack of installed generating capacity. Because Kazakhstan's southern regions are largely dependent on expensive imported electricity supplies, in 2004 the Kazakhstan Electricity Grid Operating Company (KEGOC) proposed a project to construct a second North-South power line to complement the existing, 600-MW-capacity line, thereby making it possible to supply the country's southern regions fully with energy generated in Kazakhstan.

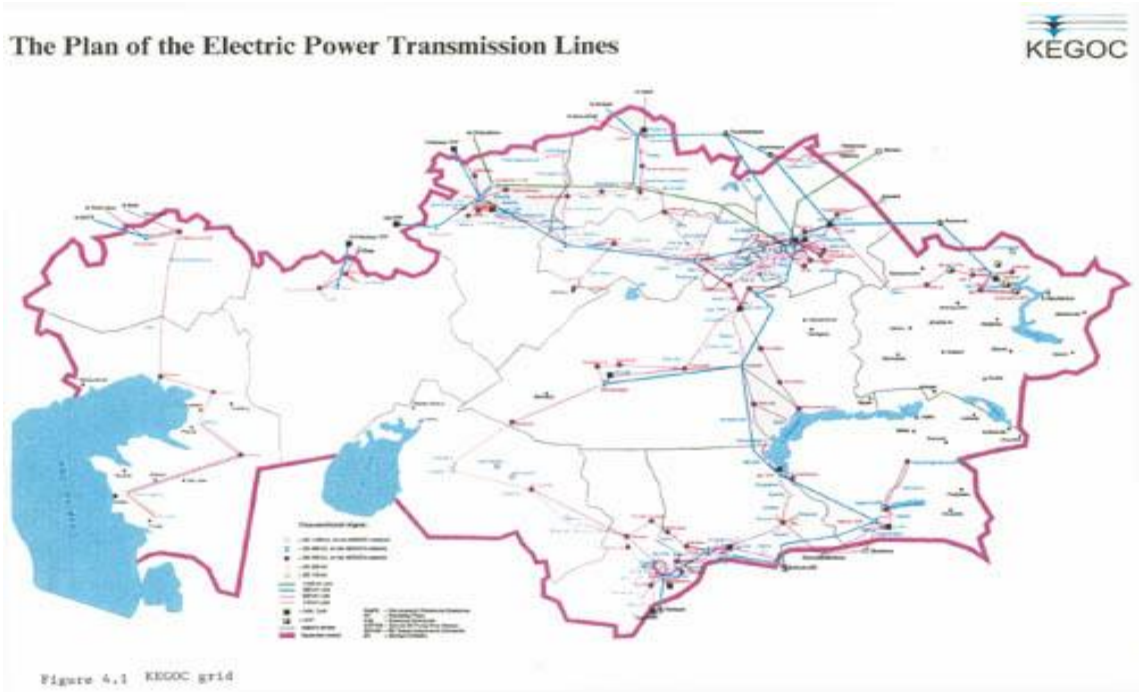


Figure 2.3: Approximate scheme of Kazakh electric grid

The majority of the 11 distribution networks have not yet been privatized. KEGOC has granted management rights to several private companies, but KEGOC maintains control over high-voltage transmission lines, substations, and the central dispatching apparatus. Ninety percent of electricity sales are made in the bilateral forward market, and there is also a day-ahead spot market and a real-time balancing market. Generators and load submit schedules for balancing energy three hours ahead and the system operator controls the settlement.

Renewable energy sources (RES).RES in Kazakhstan include hydro, wind, solar, biomass and geothermal. **Hydro** presents 12% of electricity generation. Cheap coal and its prevailing for generation (more than 80%) is one of the serious barriers for RES development. The *Program for Electric Power Development up to 2015* approved by the Government of the Republic of Kazakhstan stipulates construction of small-size hydroelectric plants and wind power plants. The *Program for Energy Development in Kazakhstan by 2030* includes the 11 best projects of medium sized hydroelectric power (50 to 300 MW) and the11 projects of small sized hydroelectric power (up to 30 MW). According to it perspectives of RES development include: (i) introduction of 1460 MW hydro capacity in Southern and Eastern regions, including 300 MW to 2015; (ii) introduction of wind farms 520 MW capacity, including construction of pilot Wind Farm in Jungar Gates in to 2010; and (iii) use of solar collectors for hot water supply. The real objects of new hydro-construction in the prospect till 2010 are Maynakskaya HPP (300 MW) on the Charyn river, its construction has been started in 2006, and Kerbulakskaya HPP (50 MW) on the Ily river, used as counter-regulator of Kapchagaysk HPP, they will allow reducing the deficit on electric power in the Southern Kazakhstan for 900 mln. kW/h.

No indication has been found of any government financial support for the development of small hydroelectric projects(less than 30 MW) whether by tax credits and more favorable depreciation or by higher generation tariffs. Nevertheless, RES development is in compliance with KP (Art.4.2) and

is one of priorities due to concept of Sustainable Development of Kazakhstan, approved in November 2006 by President. Development of RES could indicate national policies and measures to reduce GHG emissions for the purpose of UNFCCC and could be used for the purpose of Kyoto Protocol (Art. 3.2) in case of eligibility as mentioned in Section 1 of the report.

Currently, there are at least 453 potential small HPPs with the total available capacity of 1380 MW and the average annual production of electric power about 6 W/h. Some of them are expected to use existing irrigation channels that will require less expenses, resources and time for their realization. Private sector in Kazakhstan build small HPPs and provide pilot projects with consideration of gaining benefits from carbon credits though KP is not ratified yet. Several programs in Kazakhstan during 2001-2003 related to promotion of Kyoto confirm high interest of private sector and NGOs to such kind of projects. Such projects related to small hydro or wind farms have perspective for rural settlements development.

As a whole the capacity of the currently existing hydro in Kazakhstan is 2068 MW with annual production of electric power of 8,32 mlrd. kW/h.

Kazakhstan offers excellent opportunities for massive development of **wind power**, especially at the Djungar Gate, and Chillik corridors, as mentioned above, where annual average wind speed range from 7 to 9 metres per second and 5 to 9 m/s respectively. These wind resources are better than those in other locations in the world where wind generation has been developed to unprecedented levels. Additional factors, such as proximity to an existing high-voltage transmission line or to a local market (village not or poorly connected to the main grid), and good correlation of the wind seasonality with the power demand of the system, make development of this resource attractive. There are not less than 10 areas with great wind capacity, with the average wind speed of 8-10 m/sec, while European wind stations work with the average speed of 4-5 m/sec. The estimated technically available wind energy capacity in Kazakhstan is 3 Bil.kW/h.

Despite Kazakhstan's high latitude, **solar energy** resources in the country are stable and adequate owing to its favorable climate conditions. Sunshine hours are 2200-3000 hr/yr and radiation energy 1300-1800 kWh/m2/yr, making it possible to consider Photo-Voltaic (PV) panels for rural areas. Based on this radiation intensity, Solar Water Heaters (SWH), particularly in remote areas without access to gas pipelines, should be also viable in Kazakhstan. The technology is commercially available and capabilities to undertake local production are good.

Geothermal and biomass resources are available but of much lesser quality and potential for electric power production. Two 3-kelemeters geothermal wells near Zharkent have the highest temperature potential, the temperature there approximately is 960C. Remaining sources usually have water temperature below 550C and are concentrated in the areas of the Arys and Irtysh rivers. Identified territories have inconsiderable perspectives due to low temperature for energy supply on large scale. However geothermal basin in Zharkent may have the potential required for heat supply of the area.

Specialized small scale cases, such as biogas for cooking and fertilizer production, and geothermal for heating purposes, are suitable to investigate for local government or entrepreneurs.

2.2. Analysis of BaU scenario and marginal prices in light of KP

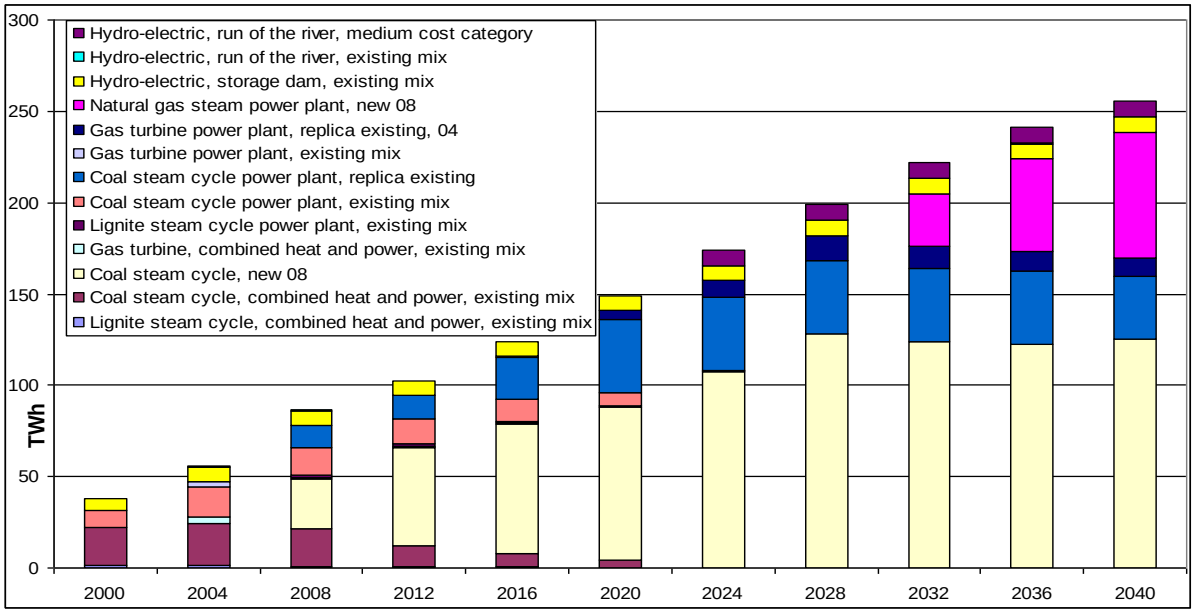
This subsection refers to analysis of conditions if Kazakhstan ratifies KP as Annex 1of UNFCCC as it is expected. In this case Kazakhstan will have to estimate and approve the quantified commitments to reduce GHG emissions towards a base year emissions, probably 1992. Level of

emissions of the base year, or baseline, is defined by GHG emissions inventory[9] and corresponds to ***252.9 MtCO2*** in Kazakhstan.

The obligation is not to exceed this threshold. Baseline scenario or "business as usual" (BaU) scenario is based on existing economic parameters, existing statistics, data gathered from the companies, Akimats with assistance of the ministries, especially Ministry of Environment Protection, strategic documents and programs, etc.; in our case BaU scenario refers to 2000. BAU scenario (or A-MK-BAU[10]) developed with MARKAL-Kazakhstan model, in which no limits on releases and fuel use are introduced.

CO2 emissions and energy consumption, mitigation scenarios were explored with the help of projection calculated by the model in the base case.

Analysis of projection of electricity supplied by power plants (PP) and combined heat& power plants (CHP) in the base case (see Figure 2.4) shows that hydro technologies are survival and there is increase in use of hydro, but the largest increase refers to the use of coal in the power sector and without additional constraint, coal generated electricity increases, from present level of about 70% in 2024, this affects CO2 emissions in the power sector correspondently.



Source "Energy system and CO2 emissions scenarios fro Kazakhstan, prepared with the technical economic MARKAL-Macro modeling tool", G.C.Tosato, 2006

Figure 2.4. Electricity supplied by PP and CHP in BAU

According to analysis of CO2 emissions by sector (see Figure 2.5) in the base case done with the model, the power sector[11] (for instance 96,9 MtCO2 in 2004) includes public electricity and heat

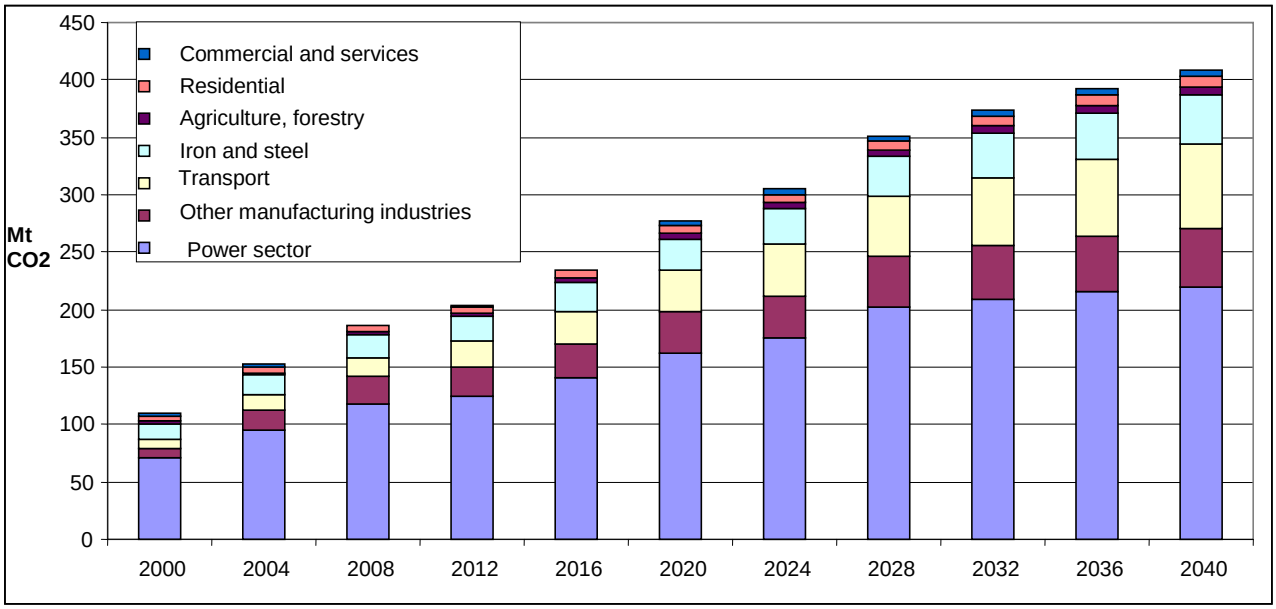
[9] Report on " Inventory of GHG Emissions and Sinks: 2000", KazNIIMOSK

[10] MARKAL-Kazakhstan model, especially A-MK-BAU was created by MARKAL expert G.C. Tosato in cooperation and assistance of a team of Kazakhstan experts in 2006, MARKAL software installed in KazNIIEK, see report "Energy system and CO2 emission scenarios for Kazakhstan, prepared with the technical economic MARKAL-MACRO modeling", G.C. Tosato, 2006, p.9.

[11] Because of lack and not comprehensive data gathered for the model's database electricity and heat could not be separated, author's remark.

production (65,09 Mt CO2), petroleum refining (20,0 Mt CO2), other energy industries(10,09 Mt CO2) that corresponds with table 1 of "GHG Inventories and Sinks-2004, KAZNIIEK (Sectoral report).Due to analysis the level of releases of GHG in the energy sector will reach 1990 in 2016 and **1992 in 2018** (see Figure 2.5), where CO2 emissions could grow from 152 MtCO2 in 2004 (not far from the value of 150.45 of emissions for fuel combustion given by the inventory to 203 in 2012, 277 in 2020, and 352 in 2028.

RES development as one of priorities in policy and measures on national level could contribute to emissions level, but the solely RES development does not cover significant decrease of CO2 emissions for the purpose of KP obligations due to the model. Higher mitigation are possible only by displacing considerable amount of coal and natural gas. The cost of mitigation potential was explored with the model, which helps to find out the no-regret options, that is the low cost alternative technologies for a better resources management, see in subsection 2.3.



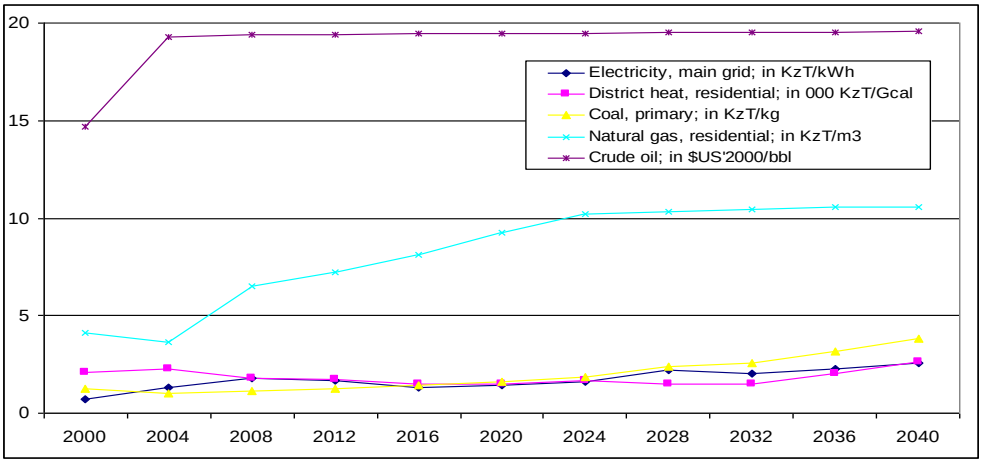
Source: "Energy system and CO2 emissions scenarios fro Kazakhstan, prepared with the technical economic MARKAL-Macro modeling tool", G.C.Tosato, 2006

Figure 2. 5. Total CO2 emissions by sector in the base case scenario, MARKAL-Kazakhstan model (A-MK-BAU)

Average cost hydro is exploited as much as possible while construction BaU. If the demand on energy increases two times and there are limits for releases of CO2 the model builds new hydropower plants as a source of most cheap kind of energy .However the technically possible hydro energy capacity for industrial use accounts for only 62 Bln. KW/h, including small hydropower stations (capacity 10 MW or less).

Marginal prices of key energy carriers examined with the model are represented on Figure 2.6. T*he marginal price of electricity*, including peak, is mainly determined by the production cost of large coal fired combined heat and power plants up to 2020; and only after 2020, and more so after 2028, the cost is determined by the price of natural gas and the production cost of more efficient gas

turbines power plants



Source: *Energy system and CO2 emissions scenarios fro Kazakhstan, prepared with the technical economic MARKAL-Macro modeling tool", G.C.Tosato, 2006*

Figure 2.6. Marginal price of key energy carriers in the base case (A-MK-BAU)

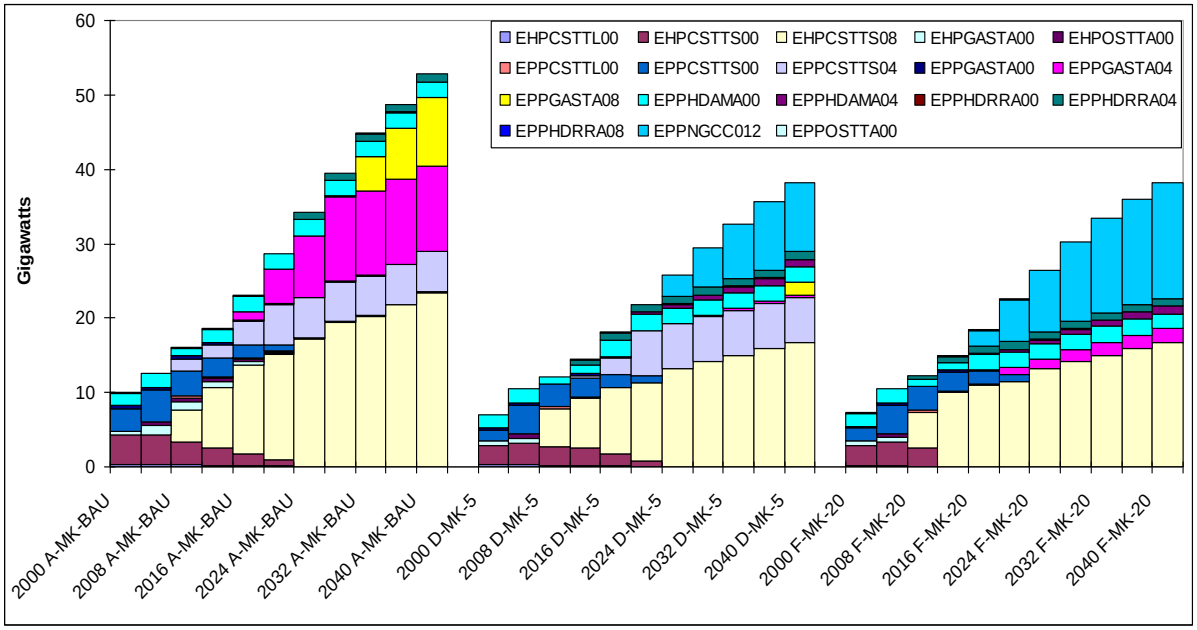
According to BaU replacing existing plants with new and more efficient models (mainly of coal combined heat and power plants) can reduces fuel use for electricity and heat production of about 20 Mtoe in 2016, 30 Mtoe in 2024 and 40 in 2040 with improvements of average energy efficiency of the system of about one percent per year, contribution of RES in BaU remains low, up to 0.2 Mtoe in 2040 (biomass plus solar water heating). In this regards additional potential to reduce emissions by introduction of small hydro power plants, wind farms and etc. into energy balance will contribute to implementation of obligations as explained below.

If Kazakhstan is emitting less than the baseline (for instance, 1992 level), it will be able to sell credits, if it is emitting more that the baseline it will be obliged either to reduce emissions or to buy carbon credits. Only in this case, but only if it does not exceed the baseline, it will be able to draw value from the Joint Implementation mechanism for project finance.

If Kazakhstan ratifies KP as non-Annex 1 (the current status), then it will not be eligible for JI or EIT as explained in Section 1, but will be still eligible for CDM to cell carbon credits under CDM-CERs, less reliable because of time factor to satisfy the projects' preparation and validation and certification of CERs.

2.3. Assessment of mitigation potential due to RE development policy

The MARKAL-Kazakhstan model chooses the least cost options accepting mitigation options, thus the mitigation options for 5USD/tCO2 in the power sector allows the hydro be up to 2020, and in case of cost for mitigation 20 USD/tCO2 the RE capacity higher in comparison to BAU or cost option 5USD/tCO2, but for the shorter period (up to 2008) due to the model (see Figures 2.7). Wind farms become competitive in the extreme cases, some more solar water heaters enter into use according to the model.



Source: *Energy system and CO2 emissions scenarios fro Kazakhstan, prepared with the technical economic MARKAL-Macro modeling tool", G.C.Tosato, 2006*

Figure 2.7. Electric capacity by plant and mitigation level

Estimation of potential to reduce GHG emissions from RES done by leading Kazakh institutes and organizations is presented in table below, for comparison.

In non-energy sector the most effective are biogases and biomass technologies. The annual output of wastes in agricultural sector amounts the 40 mln.ton. The waste treatment with biogas technologies will allow getting 18 billion of m3 of biogas, contained 55-80% of CH4 and 20-45% of CO2. If 5% of the existing resources to get biogas will be used up to 2008 , and increase this share up to 10% in 2012 then decrease of CH4 emissions will amount 0,9 billion m3 or 0,7-0,75 mln. ton CO2, and in 2012 will amount 1,8 billion m3 or 1,4-1,5 mln. ton CO2.

Table 2.3.1. GHG emission reductions in energy sector of Kazakhstan during 2006-2015, thousand ton CO2

Resources of CO2 reductions, expressed in 1000 ton CO2	Period	
	2006-2010	2011-2015
Wind farms	809,2	971,1
Hydro Power	3131,0	4422,0
Solar water heating	0,3	0,3
Solar electric stations	270,0	540,0
Geotermal energy	1150,0	1150,0
Total emission reduction	5360,5	7083,4

Source: book7 of "Program of Electricity Development of the Republic of Kazakhstan up to 2015", approved by the Ministry of Energy and Mineral Resources

Main findings of this section are:

- BaU scenario defined with the help of MARKAL-Kazakhstan model estimates that threshold of the base year emission level (probably 1992, corresponds to 252.9 MtCO2 in Kazakhstan) will be achieved in 2018. Obligation is not to exceed this threshold; otherwise Kazakhstan should buy carbon credits to implement commitments under KP.
- If Kazakhstan ratifies KP as Annex 1 then RES can contribute to the obligation taken on
    - RECs could be converted into emission reduction units which could be sold on international market either under EIT or through JI projects. In this case eligibility requirements should be satisfied.
    - RES development could be introduced as a mitigation option, but if emissions will grow rapidly, then other options should be added for the purpose of obligation, these impacts should be taken into consideration by policy makers.
- If Kazakhstan ratifies KP as non-Annex 1 then,
    - There is potential to sell carbon credits (CERs) under CDM, but time factor should be taken into consideration; and
    - RES will contribute to UNFCCC. Certificates will verify about policies and measures to reduce emissions on national level for reporting to UNFCCC and assisting Sustainable Development.

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