Accelerating Adoption of Climate Technologies in Kazakhstan's Agrifood Sector

Astana
7th November 2018
Agenda

8:30 COFFEE AND REGISTRATION

9:00 OPENING REMARKS
Kairat Nazhmidenov, Head of FAO partnership and Liaison Office in the Republic of Kazakhstan
Anar Omarova, Head of Astana Office, EBRD

Video “Tackling climate change with the EBRD’s FINTECC programme”

9:25 SESSION 1
Country priorities and key study results
Moderator: Kairat Nazhmidenov, Head of FAO partnership and Liaison Office in the Republic of Kazakhstan

Policies for promotion of modern technology in Kazakhstan’s agricultural sector
Ministry of Agriculture (tbc)

Financing mechanisms and technical support for technology adoption: lessons from the EBRD experience
Astrid Motta, Principal, Energy Efficiency and Climate Change, EBRD

Priorities for climate change mitigation and adaptation in Kazakhstan
Giulia Conchedda, Agri-environmental Data Analyst, FAO

Accelerating adoption of climate technologies in the agrifood sector — key results from the FAO-EBRD study
Nuno Santos, Economist, FAO

10:45 SESSION 2
Technology sessions — barriers and opportunities
Moderator: Nuno Santos, Economist, FAO

Part 1 — Crop farming technologies
Presentation: Mar Polo, Economist, FAO
Panel members:
Aigerim Agubayeva, Eurasia Group
Kintal Islamov, Atameken Agro
Pavel Lushak, Naidarovskoe
Yerlan Toktushakov, SPK Ertis Agro
Zhumagali Ospanbekov, Kazakh Crops Institute

11:45 COFFEE BREAK

12:00 Part 2 — Crop farming technologies
Presentation: Mar Polo, Economist, FAO
Panel members:
Arsen Kerimbekov, Center for Agricompetence
Dauren Maktabayev, Republican Chamber of Herefords
Dauren Oshakbeyev, Applied research center TALAP
Guzel Sagintayeva, KezBeef Serygazy Isembayev, Eurasia ArgoHolding

Part 3 — Renewable and energy efficient technologies
Presentation: Yerlan Syzdykov, Economist, FAO
Panel members:
Alma Zhukanova, Ministry of Energy
Saltanat Rakhimbekova, Coalition for green economy and development of G-Global
Svetlana Chaplinskaya, Egg producers’ association
Vera Mustafina, KazWaste Association

13:45 SUMMARY OF KEY MESSAGES AND CLOSING REMARKS
Astrid Motta, Principal, Climate Change and Energy Efficiency, EBRD
Nuno Santos, Economist, FAO

14:00 LUNCH
Agrifood systems are under increasing pressure to adapt to a changing climate while simultaneously reducing their environmental footprint. Agrifood systems play an important role in greenhouse gas emissions (GHG) and are therefore coming under increasing pressure to make efficiency improvements. The sector is directly exposed to climate change because of its dependence on environmental resources. It is thus urgent to increase the sector’s resilience through targeted investments that address key vulnerabilities in a country and/or regional context. Accelerating adoption of climate technologies is an essential step towards addressing these challenges.

With this in mind, the European Bank for Reconstruction and Development (EBRD) and the Food and Agriculture Organization of the United Nations (FAO) will hold the Workshop on “Accelerating adoption of climate technologies” in Astana, Kazakhstan, to discuss the opportunities and challenges in fostering deployment of modern agrifood technologies. Specifically, the Workshop in Astana will be an excellent opportunity to discuss:

- key trends in adopting climate technologies in Kazakhstan’s agrifood sector;
- challenges and opportunities for private sector investments in modern agrifood technologies;
- possible areas for public support and cooperation with donors and international financial institutions to accelerate technology deployment;
- strategic alliances and ways to strengthen collaboration among stakeholders to achieve the UN Sustainable Development Goals by 2030;
- experiences and suggestions to overcome constraints and encourage an enabling environment for private investments.
Methodology to assess climate technologies

Background

• The EBRD and FAO recognize that addressing climate change mitigation and adaptation challenges in the agrifood sector will require radical changes in food production systems. Greater adoption of climate technologies is a core element of this transition towards more sustainable food systems;
• In this context the EBRD and FAO, within the Finance and Technology Transfer Centre for Climate Change (FINTECC) program, have engaged to develop a practical tool to inform policy makers and to orient public and private institutions interested in investments that foster the greening of the agrifood sector.

Objective and key elements

• Develop a prioritised list of climate technologies that contribute to climate change mitigation (reduction of greenhouse gas emissions) and climate change adaptation (enhancement of climate change resilience);
• The methodology consists of 5-steps and uses a Multi-Criteria Analysis (MCA) to undertake the assessment of climate technologies from various perspectives; it draws on a wealth of existing data sources including FAOSTAT, World Bank Development Indicators, UNSD, INDC, National Communications to the UNFCCC, studies and interviews with local stakeholders;
• The methodology is usually implemented by a core, dedicated team and incorporates stakeholder consultations at the various stages;
• The methodology builds on other conceptual frameworks and tools that contribute to the assessment of mitigation and adaptation benefits, i.e. EX-Ante Carbon balance Tool (Ex-ACT); FAO's Water, Energy and Food Nexus, Global Livestock Environmental Assessment Model (GLEAM) and the EBRD's Green Economy Transition approach (GET);
• A first pilot study was carried out in Morocco in 2015–16 and the results are detailed in the respective FAO-EBRD publication: Morocco. Adoption of Climate Technologies in the Agrifood Sector;
• Between 2017 and 2018, the methodology was applied in the Kyrgyz Republic and Kazakhstan.

Summary of the 5 steps

<table>
<thead>
<tr>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
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<tbody>
<tr>
<td><strong>OBJECTIVES</strong></td>
<td><strong>ECONOMIC AND ENVIRONMENTAL</strong></td>
<td><strong>INSTITUTIONAL</strong></td>
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<tr>
<td>Technical and financial</td>
<td>To identify the most technically efficient and supported technology and to maximise the returns to individual investors.</td>
<td>To pursue technologies with the lowest reform threshold.</td>
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<tr>
<td>Performance compared to best practice</td>
<td>Potential to reduce annual GHG emissions</td>
<td>Policy reform requirements</td>
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<tr>
<td>Maturity of technical support services</td>
<td>Contribution to adaptation</td>
<td></td>
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<td>Current technology adoption rate</td>
<td>Mitigation costs</td>
<td></td>
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<td>Trends in gap between uptake and potential</td>
<td>Negative externalities</td>
<td></td>
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<tr>
<td>Financial returns</td>
<td>Positive externalities</td>
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Challenges

Key findings from analysis of emissions

- Agriculture emissions account for around 7 percent of total emissions in the country currently, while the sector represents approximately 5 percent of total GDP;
- Agriculture sector emissions have increased considerably in last 15 years both in absolute terms and in value intensity: growth of 3 ton of CO2eq per USD 1,000 of Agriculture GDP since 2002;
- Agriculture emissions increased by 4.5 million tCO2eq in 2000–2016 or 26 percent; by 2016 agriculture accounted for around 22 million tCO2eq in emissions;
- Emissions from energy use including the food industry show decreasing trend;
- Increase in emissions over the past 15 years explained by increases in livestock emissions and, in particular, increase in livestock numbers.

Main vulnerabilities of the agriculture sector

- Possible shortages in water resources due to changes in surface water runoff. Surface water flow expected to decrease by around 25 percent until 2030. As a result, water supply to agriculture is at risk. Moreover, the country’s heavy reliance on transboundary rivers for water supply constitutes an additional risk;
- Depletion of water resources and temperature increases will lead to increased aridity and, in particular, a shift of the low arid zone to the north. Areas and productivity of land may be significantly altered with many districts becoming Unprofitable for cereal crops;
- Increase in frequency and intensity of extreme climate events, with 75 percent of the country being subject to increased risk of environmental disruption. More frequent heat stress and droughts especially in South and Central Kazakhstan. The resulting drying up of pastures and reduced water availability for livestock create particularly difficult conditions for livestock related activities and an increase in risks associated with such activities. Changes in weather patterns may result in spring floods, heavy rains in autumn and early frosts, which may result in harvest losses;
- High expected economic losses in absence of timely adaptation in agriculture. According to some estimates the annual economic cost of desertification and poor agricultural practices would reach USD 700 million (Technology Needs Assessment).
Opportunities

Mitigation potential and investment by technology

- By investing USD 2.3 billion in climate technologies, an estimated 7 million tCO2eq or around 30 percent of agrifood sector emissions could be reduced;
- Pasture improvement provides the bulk of mitigation potential (57 percent of total estimated) with only 6 percent of total investment. It is followed by conservation agriculture that represents 34 percent of the total mitigation potential and 11 percent of total estimated investment;
- Field machinery, precision agriculture and fattening units show moderate mitigation potential (7 percent) with around 60 percent of the total investment;
- Interpreting the results of the multi-criteria analysis with a focus on mitigation suggests that the following technologies seem most attractive: pasture improvement, conservation agriculture, field machinery and precision agriculture;
- Renewables rank very low due to weak financial results (cheap alternatives available) and low mitigation potential;
- The same analysis with a focus on adaptation suggests that drip irrigation seems the most interesting through improvements in water availability (especially in areas with water scarcity) and agricultural production. It is followed by pasture improvement and conservation agriculture as they contribute to improved long term soil health, and higher yields and aggregate production in drought years.

Source: Author’s calculations

<table>
<thead>
<tr>
<th>Technology</th>
<th>Mitigation potential, MtCO2eq/year</th>
<th>Investment required, USD million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind water pumps</td>
<td>0-200</td>
<td>0-400</td>
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<tr>
<td>Small dams</td>
<td>200-400</td>
<td>400-800</td>
</tr>
<tr>
<td>Steam boilers</td>
<td>400-800</td>
<td>800-1,000</td>
</tr>
<tr>
<td>Drip irrigation</td>
<td>0</td>
<td>0-500</td>
</tr>
<tr>
<td>Biogas</td>
<td>500-1,000</td>
<td>1,000-1,500</td>
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<tr>
<td>Improved greenhouses</td>
<td>1,000-1,500</td>
<td>1,500-2,000</td>
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<tr>
<td>Fattening units</td>
<td>2,000-2,500</td>
<td>2,500-3,000</td>
</tr>
<tr>
<td>Precision agriculture</td>
<td>2,500-3,000</td>
<td>3,000-3,500</td>
</tr>
<tr>
<td>Field machinery</td>
<td>3,000-3,500</td>
<td>3,500-4,000</td>
</tr>
<tr>
<td>Conservation agriculture</td>
<td>4,000-5,000</td>
<td>5,000-6,000</td>
</tr>
<tr>
<td>Pasture improvement</td>
<td>5,000-6,000</td>
<td>6,000-7,000</td>
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</tbody>
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Source: Author’s compilation

Results of the five-step assessment

- **Biogas from manure**: Very high potential but insufficient government support for a rapid development.
  - Inefficient use of existing tech; premium for electricity generation is not enough to cover investment
  - Servicing companies and manure management are pre-requisites for technology deployment
- **Steam boilers**: Promising but adoption linked to agrifood sector transition.
  - Good returns and moderate mitigation benefits
  - Limited number of food enterprises
- **Small dams**: High demand to prevent floods and irrigate, but requires long-term view.
  - Negative financial returns due to high up-front investment and low level of water tariffs
  - Development of fisheries, tourism, recreational services, biodiversity improvements
- **Improved greenhouses**: Limited market potential but interesting greening benefits.
  - Financially attractive for industrial greenhouses that operate for the entire year
  - Government support and incentives may lead to new investment opportunities
- **Efficient steam boilers**: Tackling livestock productivity issues.
  - Good financial returns; can support sector modernization
  - Capacity utilization is crucial for financial profitability
- **Precision agriculture**: Good potential area served by field machinery equipped with tech.
  - Excellent financial returns due to less wasted seed, fertilizer, fuel and time
  - Demonstration farms and activities on promotion of technology are needed
- **Pasture improvement**: Very high potential for carbon sequestration.
  - High priority for the sustainable development of the livestock sector
  - Setting national targets towards the recovery of degraded pastures can help

DRIP IRRIGATION Only a mitigation technology in specific situations
- Significant adaptation benefits if water scarcity and with appropriate governance
- Water/groundwater regulations, clear targets and incentives for water-saving

FIELD MACHINERY Good potential for fleet renovation
- Moderately good mitigation benefits through diesel savings
- Access to capital and availability of best technology concerns

CONSERVATION AGRICULTURE Very high potential for mitigation and also adaptation
- Good financial returns; best practices dissemination and widespread support services needed
- Despite initial boom, policy reform and financial support needed to foster adoption

Source: Author’s compilation
Crop farming technologies
(ICA, drip irrigation, improved greenhouses, machinery and precision agriculture)

• Estimated adoption rates of improved greenhouses and precision agriculture (13 and 17 percent of potential) are quite low suggesting significant potential for deployment. Moderate adoption rates in CA (36 percent) and drip irrigation (31 percent) are due to conservative assumptions of potential areas for adoption;

• Conservation agriculture, field machinery and precision agriculture are among the best technologies in terms of overall score;

• The analysis indicates very good financial returns on investments in precision agriculture, drip irrigation, conservation agriculture and improved greenhouses. Field machinery presents moderate returns because of limited diesel savings and reduction of harvest losses when investing in regionally produced machinery. Most efficient field machinery technology is available but it is more costly and difficult to maintain;

• Fostering conservation agriculture adoption would require greater knowledge dissemination about this practice and all its benefits among stakeholders. Collective action such as farmers organizing equipment sharing or linkages with livestock production to maintain crop cover, could expand adoption;

• Use of more efficient field machinery could be stimulated by enhancing farmers’ knowledge on practices to reduce fuel consumption, technical support services and improved access to capital (for small scale farmers);

• Promoting precision agriculture adoption would require greater knowledge dissemination, pilots with lead farmers and further development of support services;

• Drip irrigation deployment would benefit from improved institutional arrangements for efficient water governance and greater awareness of the technology and its benefits;

• Adoption of greenhouse technologies such as thermocovers could be supported through sensitization campaigns and capacity development.

Livestock technologies
(pasture improvement and fattening units)

• Both technologies perform reasonably well in the country compared to international best practices;

• The two technologies show room for expanding their current adoption rates of around 30 percent in fattening units and 67 percent in pasture improvement; the analysis applied very conservative assumptions on potential adoption (low share of the full technical adoption).

• Good financial returns on investments for fattening units and pasture improvement make these technologies attractive to private investors. Efficient fattening units present one of the best estimated financial returns of all technologies as a result of Government support programmes;

• Supporting pasture improvement would require improved knowledge and information on pasture management for farmers and technical services. It will also require organizational and institutional development, as well as access to capital for initial investments in equipment (for small-scale farmers).

• Investment in fattening units would benefit from knowledge dissemination of ongoing experiences and best practices to illustrate effective livestock feeding and practice benefits. It would also benefit from technical expertise in improved feeding and veterinary care, local value chain organization and tailored support for small farmers.
Renewables and energy efficiency technologies
(wind pumps, biogas, steam boilers and dams)

- Adoption rates of biogas are very low (less than 4 percent of potential), which suggests opportunities for their promotion. Low adoption rates are estimated for steam boilers (17 percent), mostly because of their limited adoption potential. Higher adoption rates are estimated for wind pumps and small dams (30 and 54 percent respectively);

- Biogas and small dams show considerably low financial returns (below cost of capital). Efficient steam boiler technology presents good financial returns while wind pumps have the highest return on investment due to 80 percent subsidies;

- While national legislation provides higher feed-in tariffs for renewable electricity generated, the lack of efficient implementation mechanisms could have adversely impacted the promotion of renewables. Further policy reforms with clear implementation and financial mechanisms seem to be required;

- Wind pumps can be supported in areas with available pumping water and lack of access to the electric grid through provision of concessional financial resources, awareness and capacity development;

- Promoting biogas expansion would benefit from organizational, logistical and regulatory support for collecting feedstock by small-scale farmers, financial incentives and market development for biogas and digestate. High initial investments and limited knowledge and support services seem to discourage investments in the technology;

- The steam boiler market would develop in parallel with the growth of the country’s food industry and would benefit from the establishment of binding GHG emission regulations;

- Supporting dams and irrigation infrastructure would require intensive policy reform to facilitate efficient water use and pricing. It would also benefit by providing technical and financial capacity to the national water firm responsible for the operation and maintenance of the infrastructure at the farm level.