

Sustainable Bioenergy Value Chain Innovations

Part I: Project Information

GEF ID

10110

Project Type

FSP

Type of Trust Fund

GET

Project Title

Sustainable Bioenergy Value Chain Innovations

Countries

Ukraine,

Agency(ies)

EBRD,

Other Executing Partner(s):

Executing Partner Type

GEF Focal Area

Climate Change

Taxonomy

Focal Areas, Climate Change, Climate Change Mitigation, Financing, Technology Transfer, Agriculture, Forestry, and Other Land Use, Renewable Energy, Influencing models, Transform policy and regulatory environments, Strengthen institutional capacity and decision-making, Convene multi-stakeholder alliances, Demonstrate innovative approaches, Deploy innovative financial instruments, Stakeholders, Beneficiaries, Type of Engagement, Information Dissemination, Consultation, Partnership, Civil Society, Academia, Private Sector, Individuals/Entrepreneurs, SMEs, Large corporations, Communications, Education, Awareness Raising, Gender Equality, Gender results areas, Capacity Development, Participation and leadership, Gender Mainstreaming, Sex-disaggregated indicators, Capacity, Knowledge and Research, Knowledge Generation, Professional Development, Seminar, Training, Workshop, Course, Knowledge Exchange, Conference, Peer-to-Peer, Innovation, Climate Finance (Rio Markers), Climate Change Mitigation 2, Climate Change Adaptation 0

Duration

48

In Months

Agency Fee(\$)

432,000

Submission Date

10/5/2018

A. Indicative Focal/Non-Focal Area Elements

Programming Directions	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
CCM-1_P4	GET	4,800,000	51,000,000
Total Project Cost (\$)		4,800,000	51,000,000

B. Indicative Project description summary

Project Objective

The Project will promote investment in innovative bioenergy technologies and practices associated with the use of agricultural residues and waste by enabling and developing sustainable bioenergy value chains leading to significant greenhouse gas emissions reductions and in support of Ukraine's target to increase the renewable share of total power production in the country.

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
Supportive regulatory and policy framework for bioenergy value chains	Technical Assistance	Enabling environment for development of bioenergy innovations and technology deployment	1.1 Regulations for sustainable bioenergy value chains 1.2 Biomass certification system 1.3 Strategic roadmap for supporting bioenergy contribution to national renewable energy targets	GET	500,000	
Technical support for technology	Technical Assistance	Technical resources and capacity in place	2.1 Bioenergy technical resources available to support the private sector assessments	GET	500,000	300,000

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
deployment for bioenergy value chains		to support the development of the bioenergy value chain	with technological roadmaps 2.2. Up to 20 bioenergy value chain investment projects supported with targeted technical assistance			
Deployment of financing products for bioenergy innovations	Investment	Increased investment in innovative climate technologies along the bioenergy value chain	3.1 At least 10 commissioned bioenergy value chain investment projects, with a total investment of US\$53.5 million	GET	3,500,000	50,000,000
Enhanced networking, knowledge-sharing and visibility	Technical Assistance	Awareness and knowledge of sustainable bioenergy technologies and value chain leading to replication and scaling up throughout Ukraine	4.1 “Sustainable Agribusiness Forum” operational 4.2 Instruments in place to promote the dissemination of key results and business models 4.3 Dedicated educational programme, with a specialized course on innovation in agribusiness and bioenergy practices, launched in	GET	220,000	160,000

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
			cooperation with an Ukrainian university			
Monitoring and evaluation	Technical Assistance	Project monitoring and evaluation to ensure effective achievement of intended results	5.1 Project monitoring and evaluation	GET	80,000	40,000
Sub Total (\$)					4,800,000	50,500,000
Project Management Cost (PMC)				GET	0	500,000
Total Project Cost (\$)					4,800,000	51,000,000

For multi-trust fund projects, provide the total amount of PMC in Table B and indicate the list of PMC among the different trust funds here:

C. Indicative sources of Co-financing for the Project by name and by type

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount(\$)
GEF Agency	EBRD	Loans	Investment mobilized	50,000,000
GEF Agency	EBRD	Grant	Investment mobilized	500,000
GEF Agency	EBRD	In-kind	Recurrent expenditures	500,000
			Total Project Cost(\$)	51,000,000

Describe how any "Investment Mobilized" was identified

EBRD loans related to bioenergy investments will be mobilized. For grants, the EBRD will mobilize through Special Shareholders Fund (SSF), confirmed in detail during the PPG phase.

D. Indicative Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)
EBRD	GET		Climate Change		4,800,000	432,000
					Total Project Cost(\$)	432,000

E. Project Preparation Grant (PPG)

PPG Amount (\$)
75,000
PPG Agency Fee (\$)
6,750

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)
EBRD	GET	Ukraine	Climate Change		75,000	6,750
				Total Project Costs(\$)	75,000	6,750

Core Indicators at Project Identification Form (PIF)

Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(Expected at PIF)	(Expected at CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO ₂ e (direct)	1,500,000.00	0.00	0.00	0.00
Expected metric tons of CO ₂ e (indirect)	4,500,000.00	0.00	0.00	0.00

Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

Total Target Benefit	(Expected at PIF)	(Expected at CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO ₂ e (direct)				
Expected metric tons of CO ₂ e (indirect)				
Anticipated year				

Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

Total Target Benefit	(Expected at PIF)	(Expected at CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO ₂ e (direct)	1,500,000.00			
Expected metric tons of CO ₂ e (indirect)	4,500,000.00			
Anticipated year	2024			

Indicator 6.3 Energy Saved

Total Target Benefit	Energy (MJ) (Expected at PIF)	Energy (MJ) (Expected at CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)
Target Energy Saved (MJ)				

Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)

Part II. Project Justification

1a. Project Description

Briefly Describe

- a. The global environmental and/or adaptation problems, root causes and barriers that need to be addressed;
- b. The baseline scenario or any associated baseline Programs;
- c. The proposed alternative scenario with a brief description of expected outcomes and components of the Program;
- d. alignment with GEF Focal Area and/or Impact Program Strategies
- e. Incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF, CBIT and co-financing;
- f. global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF); and
- g. Innovation, sustainability and potential for scaling up.

a) The global environmental and/or adaptation problems, root causes and barriers that need to be addressed

Ukraine is one of the largest countries in Europe with rich natural resources, including non-renewable energy sources such as coal and large mineral deposits. Fossil fuels dominate the country's total primary energy supply (TPES), with natural gas's share in 2015 standing at 31%, followed by coal at 29%, nuclear at 25% and oil at 12%.^[1] Renewable energy sources (RES) barely feature at 3% of TPES.

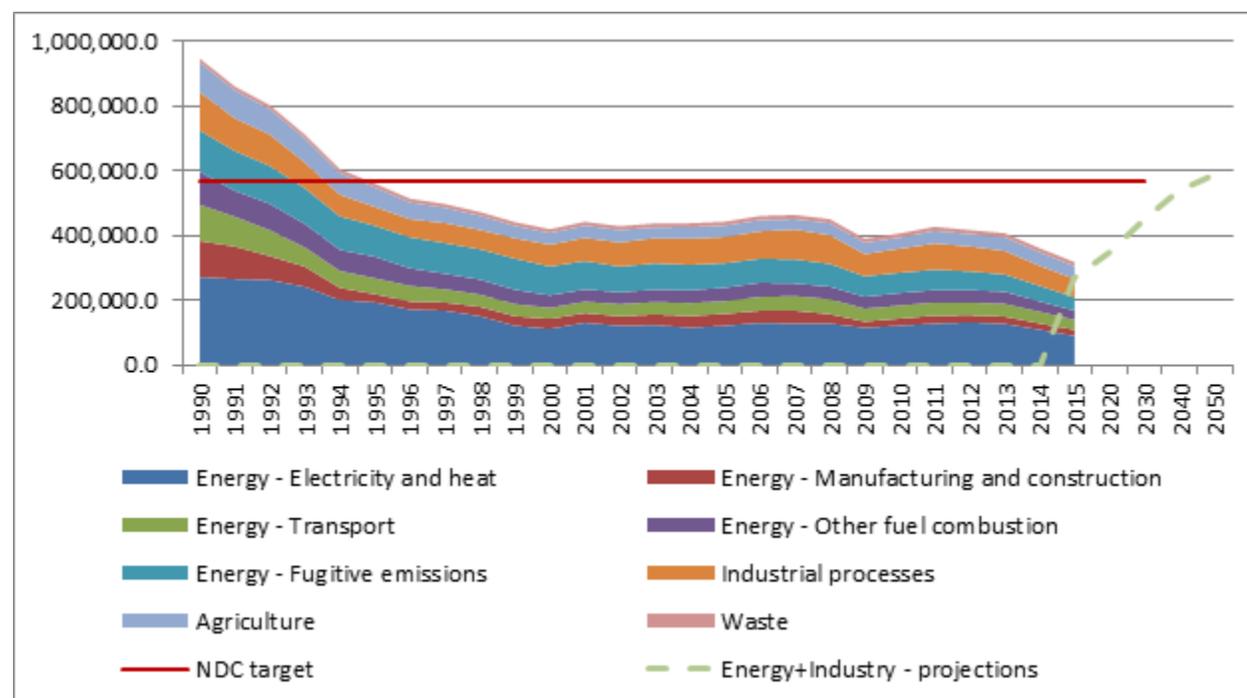
Ukraine's economy consumes 2.6 times more energy per unit of GDP (at PPP) than the OECD developed member states^[2], making it the least energy efficient country within the EBRD's region of operation. These factors render the country's economy highly sensitive to energy imports volatility and highlight the importance of alternative energy solutions to enhance the country's energy security and contribute to global efforts to combat climate change.

The key driving forces of high level energy consumption – and correspondingly high greenhouse gas (GHG) intensity – in all of Ukraine’s economic sectors have been continued reliance on obsolete and out-dated Soviet-era fossil fuel-based capital stock in the power generation and industrial processing sectors, as well as old and out-dated building stock.

The absolute level of Ukraine’s GHG emissions fluctuated around 430 million tons (Mt) CO₂ per year between 2000 to 2013. A substantial “dip” in emissions occurred in 2014-2015, which can clearly be attributed to the ongoing economic recession experienced by Ukraine, with GDP declining by 30% between 2010 and 2015[3]. These dynamics signify that that the Ukrainian economy has not decoupled economic growth from energy use – a trait shared by many developing and early-transition countries in the EBRD region of operation. As Ukraine’s economy recovers, restoration and growth of industrial output under the business-as-usual scenario is projected to drive up GHG emissions in the energy and industrial sectors, combined, to around 50% of the 1990 baseline level by 2030[4]. Adding emissions from other sectors will leave little room for the country to meet the goal expressed in Ukraine’s Nationally Determined Contribution (NDC) of staying below 60% of the 1990 level.

The largest share of Ukraine’s total GHG emissions is attributed to energy-related emissions which account for 66% (or 210 MtCO₂), while electricity and heat generation represents 43% (or 90 MtCO₂) of GHG emissions from fuel combustion. The existing energy sector emissions profile is underpinned by the heavy reliance on fossil fuels: coal accounts for 35% of electricity generation, natural gas is used for 71% of heat generation, with coal contributing a further 16%.

Figure 1. Ukraine GHG dynamics, 2000-2015 (Source: UNFCCC, Ukraine NDC, Ukraine LCDS)



The agricultural sector is important to the Ukraine economy, generating 12% of the national GDP, providing employment to 17% of the population and involving over 40,000 enterprises in farming across the country.[5][6] The agricultural sector is also an important source of GHG emissions, responsible for around 12% of overall GHG emissions, and the only sector that has seen an increase in emissions (by 13%) in 2015 compared to 2000. This sector is a source of a large amount of waste, agricultural residues and by-products that could be made available for energy purposes. The main types of agricultural residues are straw from grain crops and rapeseed, stalks and cobs of maize, and stalks and heads of sunflower.

Shifting to renewable energy technologies has been recognised as a key component in the global strategy to reduce GHG emissions and address climate change. At the same time, it is recognized that the use of agricultural biomass[7] that includes various organic residues and waste, such as manure, for bioenergy[8] production has significant environmental benefits. As a result of their

decentralised nature and the regional investment structure, bioenergy installations can also contribute significantly to sustainable development.

According to Ukraine's Energy Strategy to 2035, development of renewable energy sources (RES) is a key priority for Ukraine's energy independence and sustainability of the energy system. It is expected that the share of RES in the TPES will grow substantially – from 4% in 2015 (3.6 million tons of oil equivalent (Mtoe)) to 25% in 2035, or by more than 6 times. The National Renewable Energy Action Plan (NREAP) approved in 2014 estimates that 73% of renewable energy potential in 2030 is to go toward addressing heat demand, with 20% for electricity generation and 7% for transport. Nearly 80% of the total final renewable energy potential is represented by bioenergy, including for heating buildings and industrial plants (including district heating), power generation and as transport fuels.

Building on the results of previous studies on bioenergy in Ukraine[9], the Bioenergy Association of Ukraine in its latest (2017)[10] work has estimated the economically feasible bioenergy potential of the currently available biomass residues feedstock at over 12 Mtoe (Table 1), which represents over 13% of the current TPES and equivalent to about two thirds of the annual energy consumption of Bulgaria or Hungary. Of the above, the potential of agricultural residues alone (highlighted in Table 1 below) available for energy generation is estimated at 8.1 Mtoe per year, which is 65% of the total current agribiomass potential.

Table 1: Potential and current use of biomass for energy generation in Ukraine

Type of biomass	Theoretical potential, Mt		Share available for energy, %		Potential available for energy, Mtoe		Current use (share of potential)	
	2015	2050	2015	2050	2015	2050	Mtoe	%
Straw of grain crops	35.14	52.71	30	30	3.65	5.48	0.098	2
Straw of rapeseed	3.1	4.65	40	40	0.43	0.65		
By-products of grain maize production (stalks, cobs)	30.3	45.45	40	40	2.32	3.48		
By-products of sunflower production (stalks, heads)	21.2	21.2	40	40	1.22	1,22		
Secondary agricultural residues (sunflower husk)	1.90	1.90	74	74	0.50	0.50	0.462	83
Wood biomass (firewood, felling residues, wood processing waste)	6.0	9.0	94	94	1.39	2.08		
Wood biomass (dead wood, etc)	8.8	8.8	41	41	1.03	1.03		
Biodiesel (rapeseed)	-	-	-	-	0.19	0.19		
Bioethanol (maize and sugar beet)	-	-	-	-	0.54	0.54		
Biogas from waste and byproducts of agriculture and food processing industry	1.6*	11.2*	50	100	0.68	2.38	0.022	3
Landfill gas	0.6*	5.8*	34	100	0.18	0.60		
Sewage gas (industrial and municipal wastewater)	1.0*	9.0*	23	100	0.19	0.39		
TOTAL	-	-	-	-	12.32	17.32	0.58	4.7

* billion m³ CH₄

Source: Bioenergy Association of Ukraine

Despite the very high potential, just less than 7% of the available agricultural residues and waste is currently used for energy purposes. The remaining biomass is usually disposed or, sometimes, even burned in the fields. Of the more than 2,300 large-scale agricultural enterprises in Ukraine (that own over 2000 ha of land), only 11% use their own agricultural residues to meet their own thermal energy needs.[11] In contrast, smaller size companies (with less than 100 ha under management), despite being far more numerous at 25,000

(or over 63% of the entire agricultural company registry) have just 4.4% of the total agricultural land stock, which significantly limits the scale of their operation and their ability to enter into the bioenergy sector as a reliable feedstock supplier.

Few companies are currently involved in the supply of biomass as their core business activity and nearly 90% of these companies deal with wood or peat pellets. A study commissioned under the EBRD-GEF FINTECC programme (refer below for details on the initiative)[12] found that there is only one large-scale factory and two small factories producing pellets from straw. Nearly 95% of pellets are exported to the EU-27 (mainly Poland, Germany, Denmark, and Italy) and the USA. Other market actors were found to be grouped into three main categories:

- 1) Companies, owned by or connected with biomass production enterprises where biomass is a by-product or residue (e.g., local wood processing enterprises with own trucks, farms with own vehicles for biomass transporting). These enterprises supply biomass on a batch basis and usually cannot guarantee continuity of supply due to variations in their core business, or seasonality of harvesting operations.
- 2) Large logistics companies, which are starting to include biomass transportation in their portfolio. Logistics companies act as intermediaries between owners of feedstocks and the end user, and do not have their own resource of biomass.
- 3) Very limited amount of dedicated companies, belonging to vertically integrated holdings involved in biomass-to-energy generation. Such enterprises have their own vehicles, warehouses, biomass quality control departments, batch stocks, etc. Usually such companies supply biomass for their own energy generation projects, however, they can also sell limited quantities of biomass to other clients.

Thus, even though sustainable use of agricultural residues brings undoubted environmental (by reducing emissions) and economic (by creating local value and diversifying energy supplies) benefits, agribiomass use for energy production in Ukraine is not seeing meaningful uptake. While there is some progress on developing the demand side (e.g. Feed-in-Tariff (FiT) for power production from biomass; simplified regulations for biomass-fired plants etc.), biomass supply chains are generally overlooked and remain underdeveloped. A number of barriers remain on both the supply and demand sides, as summarized and briefly described in Table 2.

Table 2: Barrier analysis: summary and description

Barrier category	Barrier description
<p>Policy, legal and regulator barriers</p>	<p><i>Lack of regulatory frameworks to incentivise development of bioenergy supply chains</i> – The existing regulatory framework does not provide policies with the dedicated incentive structure necessary to facilitate investment in upstream bioenergy supply chain elements, but also in downstream conversion technologies. For example, unlike the FiT for other renewable energy sources (e.g. wind), the FiT for biomass does not differentiate by plant size, thereby making small- to medium-sized plants marginally viable. There is also a lack of specific incentive mechanisms and tax structures along the bioenergy value chain that can support the establishment of bio-cooperatives and the development of feedstock for bioenergy processing, logistics and storage; in addition to energy production.</p> <p><i>Lack of standards concerning quality of bioenergy products</i> – Standards essential to ensuring the quality of the bioenergy products and thereby the development of the value chain, such as a sustainable biomass certification scheme, do not exist.</p> <p><i>Lack of clarity on pathways for bioenergy contribution to national energy and mitigation targets</i> – Though an overall vision for bioenergy contribution toward national energy goals has been formulated (e.g. as part of the National Energy Strategy to 2035), this has not been codified in concrete action plans and technology roadmaps that would enable the vision to become a reality.</p>
<p>Capacity and technical barriers</p>	<p><i>Lack of reliable baseline and market information</i> – Technical barriers associated with transfer of technologies with low market penetration hamper market development. In particular, there is limited availability of reliable technical and market information, and baseline data on market penetration of different technologies required along the bioenergy value chain, thereby constraining the ability of both the private sector and policy makers to make well-informed decisions and weakening the investment case for prospective climate mitigation projects.</p> <p><i>Weak experience among the private sector on key supply chain elements</i> – Agribusinesses have low capacity and minimal relevant experience in key supply chain elements: harvest/collection, pre-processing, quality control and storage, which is recognized as a key barrier to the development of a sustainable agri-biomass industry in Ukraine.</p> <p><i>Weak technical capacity to identify and develop bankable bioenergy value chain projects</i> – Generally, project developers lack the expertise and understanding of bioenergy value chains and their potential. Specifically the</p>

Barrier category	Barrier description
	private sector – especially SMEs – has insufficient technical capacity to identify and develop bioenergy projects as they lack in-house technical and financial expertise to identify and develop bankable projects (including access to financing). The complexity of bioenergy value chain projects requires a comprehensive understanding of the market, legal issues, financing and technology. The overall lack of capacity distorts the view of the viability of bioenergy value chain projects, which may be seen as inherently risky or incommensurate financial returns.
Financial barriers	<i>Limited availability of suitable financing mechanisms</i> – Conventional finance sources and financial instruments are often unsuitable for the bioenergy supply chain. Lack of access to capital for these projects is due in part to high perceived level of risk and credit default potential. The result is higher interest rates and unfavourable investment conditions for project developers. Technology projects are usually capital intensive investments with high up-front costs, which is especially problematic for SMEs.
Awareness and knowledge barriers	<p><i>Lack of awareness of sustainable agriculture potential and opportunities in agrisector, information asymmetry among stakeholders</i> –The nascent state of bioenergy value chains is hampered by information asymmetry, lack of reliable baseline information, and effective and supportive knowledge transfer mechanisms.</p> <p><i>Lack of supportive sectoral cooperation and partnerships</i> – There is insufficient partnerships and networking, especially among SMEs, necessary to develop bioenergy value chains. Further there is a lack of cross sectoral, institutional and national cooperation and partnerships.</p> <p><i>Lack of sustainable knowledge transfer embedded in local institutions</i> – Knowledge is not transferred effectively and through sustainable models to key stakeholders. These include players lacking technical skills, and sufficient understanding of the market.</p>

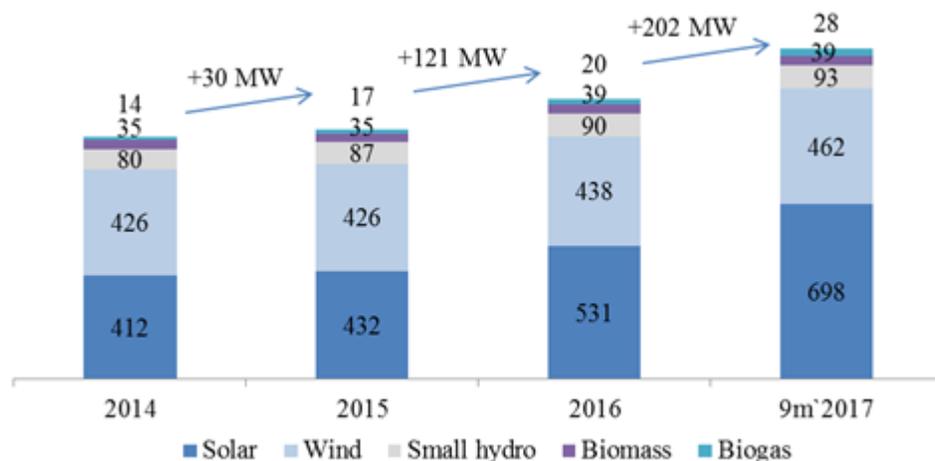
2) The baseline scenario and any associated baseline projects

Ukraine already meets several prerequisites for the “energy transition” and investments in renewable energy are increasing. There are economic incentives (“feed-in tariff”, cost recovery programs for implementation of energy efficiency measures) and the State Agency on Energy Efficiency of Ukraine promotes active development of renewable energy. As a member of the European Energy Community, Ukraine has signed and ratified the Association Agreement with the EU, undertaking the commitment to increase energy efficiency, to develop renewable energy, to reduce emissions of GHGs and pollutants. According to the Energy Strategy of Ukraine

until 2035, development of RES is a key priority in the framework of ensuring energy independence, and enhancing reliability and sustainability of the energy system. It is expected that the share of RES in the total primary energy supply will grow substantially, as noted in the previous section.

Despite that the FiT legislation has been in place for nine years, the share of renewables in power production is still negligible – around 1%. In 2017, Ukrainian power generation reached 155 TWh, of which nuclear power plants accounted to 55%, thermal power plants – 29%, CHPs – 7%, hydro power plants – 7%, renewables – 1% and 1.5% from other sources. Within renewable power supply, the share of bioenergy projects is below 10%. Biomass-to-electricity projects in Ukraine have been struggling to take off, underscoring their inherently more complex nature due to dependence on complex supply chains to ensure reliable and stable-quality supply of feedstock.

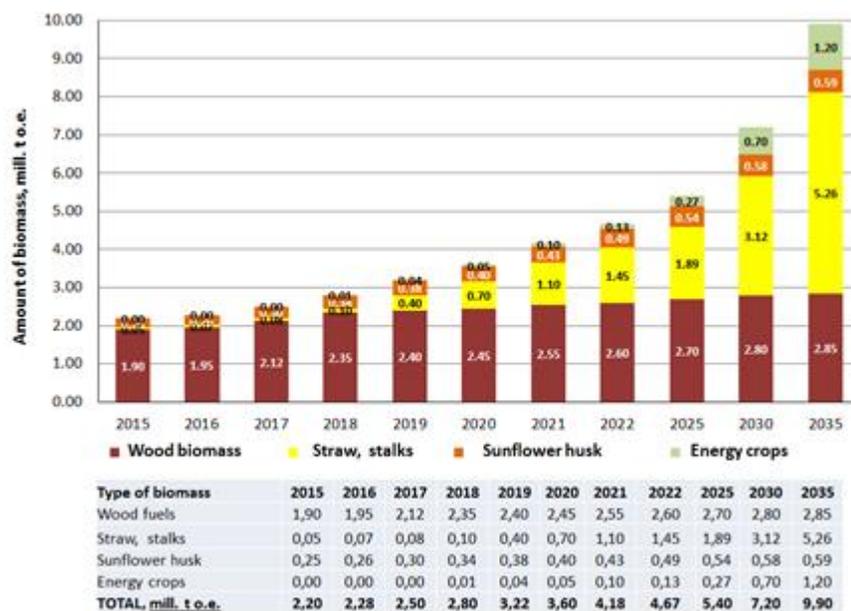
Figure 2. Installed RES generation capacity with feed-in-tariff (MW) (Source: State Agency on Energy Efficiency and Energy Saving of Ukraine)



By adopting the *Energy Strategy of Ukraine until 2035*, approved in August 2017, the government has committed to increasing the share of renewables in its total primary energy supply to 25% by 2035. A substantial part of the increase is expected to be achieved by

use of agricultural residues. Figure 3 below shows the projected distribution of biomass types to be used to achieve goals of the Energy Strategy of Ukraine, according to Bioenergy Association of Ukraine estimates.

Figure 3. Projected distribution of biomass types to be used to achieve goals of the Energy Strategy of Ukraine: 2015(actual) to 2035(target) Mtoe) (Source: Bioenergy Association of Ukraine)



The government of Ukraine has recognized that to achieve its goals would require development and implementation of efficient and effective policies, significant financial investments as well as technical assistance. Currently, there are several MDB-led development projects in Ukraine with a focus on renewable energy and bioenergy, including:

- **EBRD Ukraine Sustainable Energy Lending Facility (USELF):** The EBRD has been actively assisting the Ukrainian Government with the law on Feed-in-tariff for renewable energy and the secondary legislation since 2008. Recently, the EBRD's engagement with the National Regulator resulted in the adoption of a new long-term PPA in March 2018. Under USELF, the Bank will continue its policy dialogue and technical assistance mainly on the overall transition towards an auction-based support scheme for renewable energy that relies on competitive bidding processes. This change is expected to concern only solar and wind projects while

a new support system for biomass and biomass projects is still overlooked in the current policy-makers discussions and in the new draft laws.

- **EBRD-GEF project Finance and Technology Transfer Centre for Climate Change (FINTECC) in Ukraine:** Established in 2015, the EBRD's FINTECC Ukraine framework combines project financing, technical assistance, policy dialogue, and technical and incentive grants to support the development of an enabling environment for technology transfer. At the national level, the project addresses country-specific policy, financial, technical, and institutional barriers to technology transfer to create the conditions necessary for successful investment and technology deployment. As a result of FINTECC Ukraine, the ecolabeling regulations for some types of equipment and associated green procurement rules were introduced in Ukraine; 12 projects already financed and 10 projects are at the pipeline aiming to reduce emissions by 1.5 million tons of CO₂e; knowledge sharing activities on climate technologies were conducted.
- **EBRD-CTF project FINTECC: Ukraine Agribusiness Waste Residues Window:** This recently approved program will focus on accelerating investment in sustainable energy projects in the agribusiness sector in Ukraine, in particular biomass/biogas technology associated with the use of residues and agricultural waste. Projects are expected to support agribusinesses to introduce biomass and biogas technologies which generate heat and/or energy predominantly for their own consumption. The focus of the program is on large-scale agricultural companies (eight in total), which will benefit from concessional climate finance from CTF. However, the program does not target barrier-removal measures involving the agribiomass supply chain.
- **UNDP-GEF project Development and Commercialization of Bioenergy Technologies in the Municipal Sector in Ukraine:** aims to accelerate sustainable agricultural biomass utilization for municipal heat and hot water services in Ukraine. The project has been under implementation since 2014, primarily focusing on developing municipal biomass programs in seven regions and supporting pilot projects at the municipal heating end-use side (12 small-scale biomass-fired boilers). A Financial Support Mechanism (FSM) is envisaged to be developed in partnership with the IFC. While the UNDP-GEF project largely deals with end-use biomass application by supporting installation of biomass boilers for municipal heating application, relying on existing biomass supplies (which are predominantly based on woody-biomass pellets), the proposed EBRD-GEF project will specifically target the whole of biomass supply side by stimulating technology and business process innovations in agribiomass value chain. The established municipal biomass heating programs will form an important entry point for the proposed project to ensure off-take of the agricultural residues-based bioenergy.
- **UNIDO-GEF Global Cleantech Innovation Programme for SMEs in Ukraine:** Approved in 2017, this medium-sized GEF project aims to promote an innovation ecosystem in Ukraine by: (i) identifying and nurturing Cleantech innovators and entrepreneurs; (ii) building capacity within national institutions and partner organizations for the sustainable implementation of the Cleantech ecosystem and accelerator approach; and (iii) supporting and working with national and sub-regional policy makers to strengthen the supportive policy framework for SMEs and entrepreneurs through south-south collaboration. As such, the project does not target bioenergy sector specifically; and collaboration options will be investigated during the PPG stage of the proposed Project.

- **USAID Competitive Energy Markets Program:** a five-year USAID program started in August 2018 that aims to increase the resilience of energy supplies in Ukraine and to improve the legal and regulatory environment of the energy sector. The program will provide technical services to support private sector-led energy investments to increase renewable energy generation in Ukraine. Specific tasks will include completing renewable generation energy assessments, and developing financial incentives to facilitate private sector investment in renewable energy production. The initiative does not specifically target the bioenergy sector.
- ***3) The proposed alternative scenario with a brief description of expected outcomes and components of the project***

Ukraine targets a 25% renewables share in the total power production by 2035, with the ‘Energy Strategy of Ukraine’ emphasising the importance of using agricultural waste and residues. Currently, the energy potential of agricultural residues and wastes is scarcely used, with the majority of agricultural residues left to decay after harvest. The proposed alternative scenario is that of a fully-functioning market for bioenergy products derived from agricultural residues and waste. Transforming agricultural residues and waste into bioenergy products for power and energy production, however, requires a fully enabled bioenergy supply chain with each element fully functioning (marked green in Figure 4):

- Harvesting, collection, handling, treatment, logistics and storage of agricultural residues and waste
- Production of feedstock for bioenergy (biomass, biomethane, bioliquids) and by-products (bio-fertilizers)
- Logistics of bioenergy feedstock
- Bioenergy product certification and storage, and establishing bioenergy cooperatives and marketplaces
- Use of bioenergy products for heat and power.

The proposed Project will focus uniquely on developing sustainable bioenergy value chains by supporting interventions by the private sector, particularly SMEs. In particular, the Project will build agribusinesses’ capacity in key supply chain elements: harvest/collection, pre-processing, quality control and storage. Their lack of experience in these activities is seen as a key barrier to the development of a sustainable agri-biomass industry in Ukraine. Development of necessary regulations and standards (e.g. certification to ensure that the bioenergy products have the necessary quality in terms of contaminants, water content, etc.) will enable bioenergy value chains to be supported. Bioenergy value chain investment projects will be identified and developed through targeted technical assistance. New financing products will be established and deployed to support the implementation of bioenergy innovations. Awareness and knowledge initiatives will facilitate sustainability and scale up of bioenergy solutions and lessons learned.

The proposed Project will build on the findings and leverage approaches of all relevant existing initiatives to maximize efficient use of resources and use of existing knowledge. In particular, “FINTECC Ukraine”, which is a GEF-funded EBRD-led project established in 2015, provides a framework that combines project financing, technical assistance, policy dialogue, and technical and incentive grants to support the development of an enabling environment for technology transfer of low market penetration technologies.

Overall, by fostering innovative technology deployment along the bioenergy value chain, the Project will unlock the use of agricultural residues and waste for bioenergy, and thereby lead to significant GHG emissions reductions in support of Ukraine’s target to increase the renewable share of total power production in the country.

The proposed Project components will systematically address the identified barriers and will contribute to increasing the competitiveness of local businesses through changes in the legislation and standards, technical assistance, investment support, and knowledge sharing, all of which are needed together to stimulate the bioenergy value chain and introduce sustainable agribusiness innovations. To address these barriers with the proposed measures and outcomes, the proposed Project will be composed of four main components, each of them addressing a major category of barriers. The Table below outlines the relevant Project components that are intended to address the identified barriers.

Figure 4. Proposed areas of project intervention to insure sustainability of biomass and establishing sustainable value chain

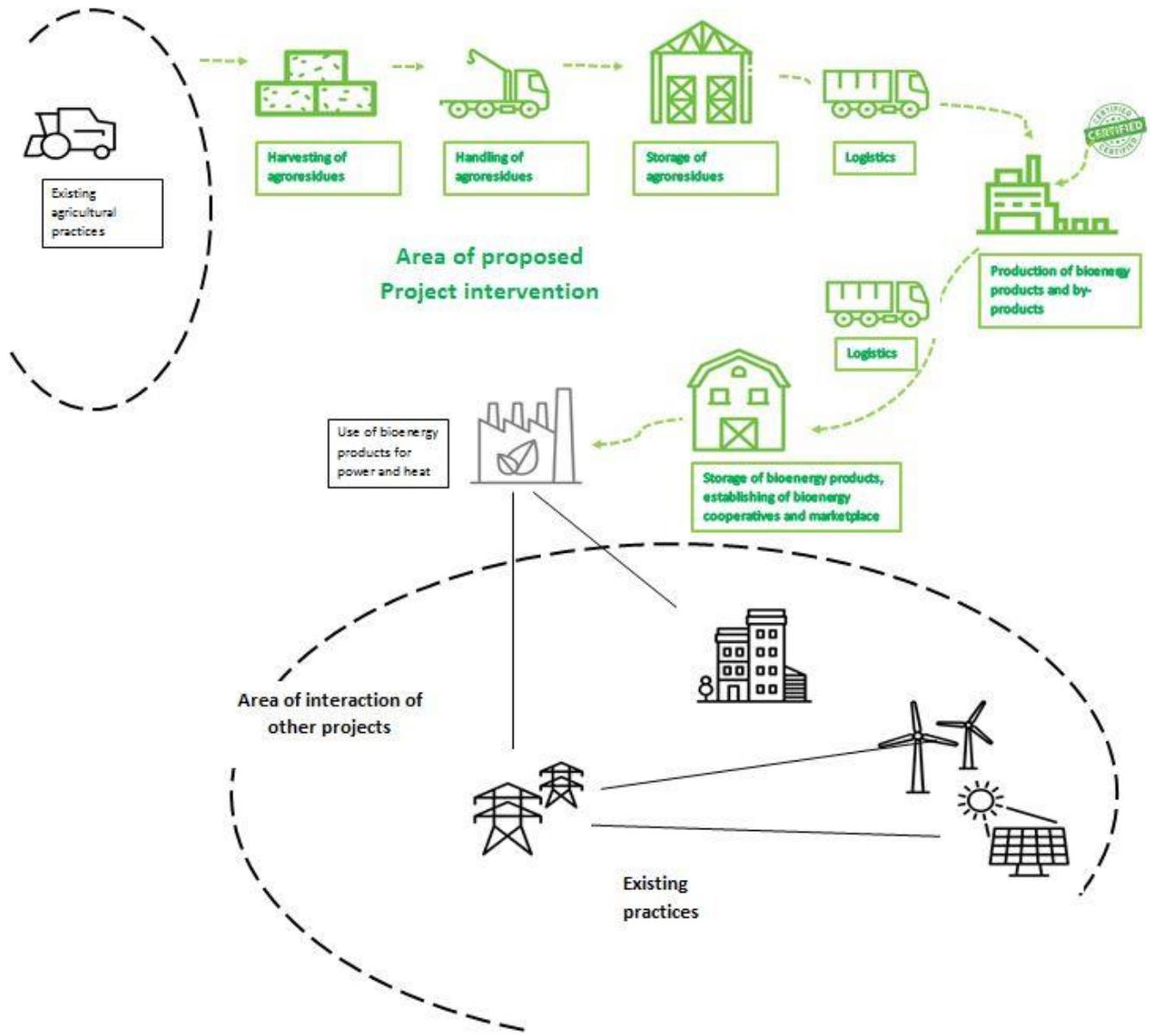


Table 3: Project design: removal of barriers by project component

Barrier category	Barrier description	Relevant Components and Outputs
Policy, legal and regulator barriers	<p><i>Lack of regulatory frameworks to incentivise development of bioenergy supply chains</i></p> <p><i>Lack of standards concerning quality of bioenergy products</i></p> <p><i>Lack of clarity on pathways for bioenergy contribution to national energy and mitigation targets</i></p>	<p>Component 1. Supportive regulatory and policy framework for bioenergy value chains</p> <p>Output 1.1 Regulations for sustainable biomass value chains</p> <p>Output 1.2 Biomass certification system</p> <p>Output 1.3 Strategic roadmap for supporting bioenergy contribution to national renewable energy targets</p>
Capacity and technical barriers	<p><i>Lack of reliable baseline and market information</i></p> <p><i>Weak experience among the private sector on key supply chain elements</i></p> <p><i>Weak technical capacity to identify and develop bankable bioenergy value chain</i></p>	<p>Component 2. Technical support for technology deployment for bioenergy supply value chains</p> <p>Output 2.1 Bioenergy technical resources available to support the private sector assessments with technological roadmaps</p> <p>Output 2.2 Up to 20 bioenergy value chain investment projects supported with targeted technical assistance</p> <p>See Component 4 for related knowledge and awareness activities.</p>
Financial barriers	<p><i>Limited availability of suitable financing mechanisms</i></p>	<p>Component 3. Deployment of financing products for bioenergy innovations</p> <p>Output 3.1 Up to 10 commissioned bioenergy investment projects</p>

Barrier category	Barrier description	Relevant Components and Outputs
		supported
Awareness and knowledge barriers	<p><i>Lack of awareness of sustainable agriculture potential and opportunities in agrisector, information asymmetry among stakeholders</i></p> <p><i>Lack of supportive sectoral cooperation and partnerships</i></p> <p><i>Lack of sustainable knowledge transfer embedded in local institutions</i></p>	<p>Component 4. Enhanced networking, knowledge-sharing and visibility</p> <p>Output 4.1 “Sustainable Agribusiness Forum” operational</p> <p>Output 4.2 Instruments in place to promote the dissemination of key results and business models (website, workshops, trainings)</p> <p>Output 4.3 Dedicated educational programme, with a specialized course on innovation in agribusiness and bioenergy practices, launched in cooperation with a Ukrainian university</p> <p>Output 4.4 Monitoring and Evaluation</p>

Brief description of expected outcomes and components of the project

The proposed Project has four expected outcomes:

1. Enabling policy environment established for development of bioenergy innovations and technology deployment
2. Technical resources and capacity in place to support the development of the bioenergy value chain
3. Increased investment in innovative climate technologies along the bioenergy value chain
4. Awareness and knowledge of sustainable bioenergy technologies and value chain leading to replication and scaling up.

The Project requests USD 1.3 million for technical assistance related to policy and regulations, capacity development, and awareness and knowledge raising; and USD 3.5 million for investment (non-technical assistance) in GEF funds, to be matched with EBRD co-financing of USD 1 million in-kind and USD 50 million in loans.

The indicative breakdown of the four Project Components, with outputs, tentative activities and proposed funding requirements, are described below.

Component 1: Supportive legislative, regulatory framework for bioenergy value chains

(USD 500,000 requested from the GEF)

Component 1 will support institutional, policy and regulatory policy dialogue to assist the government in Ukraine to design innovative policy support package for development of sustainable agribiomass supply chains. This Component will seek to improve existing legislative frameworks to create enabling environments for the adoption, innovation and increased capabilities for manufacturing and deployment of climate technologies in agribusiness and extensive development of sustainable bioenergy supply chains. With a focus on legislation, regulation and procedures, Component 1's objective is the removal of policy, legal and regulatory barriers.

Policy dialogue aims to promote the development and adoption of policies supportive of developing the bioenergy market. Policy dialogue activities may include development of strategies for FiT reform taking into account needs of bioenergy; and suggesting tax (customs) exemptions for bioenergy and related (handling, processing and storage) equipment. Together, these policy reforms will strengthen the enabling environment for the development of sustainable bioenergy value chains in Ukraine.

To support the quality of bioenergy products, the proposed Project will promote and develop a certification system for upgraded biomass. To ensure that the bioenergy contributions align with national renewable energy targets, a strategic roadmap for supporting bioenergy will be developed in coordination with key Ministries, industry associations and the private sector.

Output 1.1 Regulations for sustainable biomass value chains

- Revised feed-in tariff structure for bioenergy projects, including incentives for biomethane production.
- Tax (customs) exemptions for bioenergy and related (handling, processing and storage) equipment.

Output 1.2 Biomass certification system

- Certification system (aligned with standards) for upgraded biomass products. This certification may be expanded to include assistance with biofuel and bioethanol certification, pending additional studies to be made during the PPG phase.

Output 1.3 Strategic roadmap for supporting bioenergy contribution to national renewable energy targets

- Strategic document providing clarity on pathways for bioenergy contribution to the National Energy Strategy to 2035 and mitigation targets, including concrete action plans and linked to technology roadmaps. This may include consideration of issues such as bioenergy exports, cross-border cooperation and implications on emissions reductions; and establishment of a bioenergy marketplace.

Component 2: Technical support for technology deployment for bioenergy value chains

(USD 500,000 requested from the GEF, USD 300,000 EBRD)

Capacity support will be provided, including through market assessments, as well as tailored information packages and guidelines to assist companies in evaluating opportunities for bioenergy investments along the value chain.

The project will make available a range of information on technologies. To strengthen the information baseline and investment case for prospective BAT and technology projects with low market penetration in Ukraine, the project will link with the EBRD's FINTECC project, and other regional and global bioenergy projects. Information will be made available in local language and formats appropriate for industry sectors (see also Component 4).

A technical assistance facility will coordinate and fund targeted packages of technical support to the private sector through project development support teams. Eligible technical support areas will include feasibility studies, energy audits, technology audits, legal support, project preparation, due diligence, and results monitoring and reporting. Focus will be along the entire bioenergy supply chain including trading, collection, manipulation, storage and logistics.

Output 2.1 Bioenergy technical resources available to support the private sector assessments with technological roadmaps

- Market assessments, information packages and guidelines will be developed and made available to increase capacity of private sector actors to develop projects along the bioenergy value chain.
- Comprehensive resource assessments, technology identification, and supply chain modelling.

Output 2.2 Up to 20 bioenergy value chain investment projects supported with targeted technical assistance

- Support provided for pre-feasibility studies, feasibility studies, energy audits, technology audits, legal support, project preparation, due diligence, and results monitoring and reporting. This dedicated technical assistance window is targeted at individual companies including SMEs to provide support for project development, including: identifying bi-products and analysing market potential; understanding and addressing permitting issues (e.g., land allocation); developing energy off-take agreements; reporting on bioenergy outputs being generated.
- Implementation and post-implementation support may be provided. Post-implementation support such as funding for third party technical monitoring of the system's performance (and recommendations to the project sponsor to improve yield) would also mitigate the impact of underperformance of the technology on the company's ability to service its debt.

See also Component 4 for related knowledge and awareness activities, where a general biomass resource and technology guide developed under Component 2 would be made available and promoted.

Component 3: Deployment of financing products for bioenergy innovations

(USD 50,000,000 from EBRD co-financing, USD 3,500,000 requested from the GEF)

Dedicated financing mechanisms are needed to enable investment in bioenergy projects. These financing mechanisms need to be targeted at and appropriate for the private sector (including SMEs), provide concessional support as necessary, incentivize performance, and be supported by technical assistance to ensure projects are bankable (Component 2).

The Project proposes to pilot a performance-based technology transfer financing mechanism to promote accelerated investment in climate change mitigation technologies agrisector and in particular in bioenergy. The financing mechanism will be structured based on the EBRD's extensive experience in financing technology modernization and innovation, developing market based mechanism for the provision of services, leveraging private sector finance and promoting the introduction of best practice, and will complement other EBRD products in the market. The EBRD has developed a wide range of financial and operational instruments to support technology transfer that combine finance with targeted technical assistance funding. These instruments can be further expanded and leveraged by introducing innovative features to optimize the allocation of credit and implementation risks and reduce the overall transaction costs.

Output 3.1 Up to 10 commissioned bioenergy investment projects supported by US\$53,500,000

- Develop and deploy financing products for bioenergy investment to foster uptake of innovative technology.
- Investments in up to 10 bioenergy projects.

The grants will be provided to support technologies with low market penetration. The criteria to define grant size will be based on technical complexity, length of supported supply chain, replication potential, other co-benefits.

A combination of instruments may be implemented to cater to the broad range of private sector operations in Ukraine. The instruments are likely to vary in particular with the size of the company (i.e. the final beneficiary of the EBRD financing), and scale and scope of the overall investment.

The EBRD will prepare dedicated risks assessments, and impact and monitoring plans for the finance mechanism to be developed.

Component 4: Enhanced Networking, coordination, knowledge-sharing and visibility

(USD 220,000 requested from the GEF, USD 160,000 EBRD)

The primary goal is to support development of the bioenergy value chain by developing the collaborative network of market players and equip them with necessary information and communication tools. The proposed Project will establish a central platform for knowledge exchange under the Sustainable Agribusiness Forum (saf.net.ua) to encourage the sharing of information and best practices across sectors. To communicate with the governmental organizations on setting the right policy incentives to support sustainable value chains through establishing Sustainable Agribusiness Forum (SAF) platform, which is under development as part of the FINTECC Ukraine Knowledge Management activity. SAF Ukraine will act as a voluntary collaboration platform for stakeholders involved into the development of sustainable bioenergy value chains in Ukraine. The initial objective will be development of agri-biomass value chains focusing on the valorisation of primary and secondary agricultural residues. SAF Ukraine will build a broad network, connecting stakeholders that are developing, implementing or supporting innovative technologies related to bioenergy value chains, and later on, innovations in sustainable agriculture systems.

Information (technical, market and financial) developed by the project will be made available. Access to market information and training for Ukrainian service providers will encourage the development of a new range of bioenergy services and develop the

capacity for in house teams within industry sectors. In-country training programs, online resource and technical assistance will be provided to private sector companies and technical experts/local consultants in the field of technical service of selected sustainable agri business models.

As a part of the “agri-network” partnership it is proposed to design and implement specialized courses in cooperation with Ukrainian and International University related to sustainable Agribusiness practices. It is expected that relevant course will be self sufficient after finalisation of the Project.

Output 4.1 “Sustainable Agribusiness Forum” operational

- Support of a network of sectoral partnerships and value chains through Sustainable Agribusiness Forum (saf.net.ua).

Output 4.2 Instruments in place to promote the dissemination of key results and business models (website, workshops, trainings)

- Online information (including market assessments, guidelines, and sector roadmap) to encourage dissemination of studies conducted.
- Workshops and informational seminars to encourage information transfer, including on application of guidelines and certification of bioenergy products.

Output 4.3 Dedicated educational programme, with a specialized course on innovation in agribusiness and bioenergy practices, launched in cooperation with a Ukrainian university

- Develop a specialized course for professionals on sustainable agribusiness in partnership with key sector players and universities.
- Programme embedding knowledge gained through the project into national university-level curriculum.

Component 5: Monitoring and evaluation

(USD 80,000 requested from the GEF, USD 40,000 EBRD)

To ensure that the Project is effective in achieving its intended results, monitoring will be conducted at the mid-term and an independent evaluation held near the end of the Project's lifetime. These activities will be in addition to the regular annual reporting requirements of the GEF and the monitoring cycle of the EBRD.

Output 5.1 Project monitoring and evaluation

Conduct mid-term review and independent final evaluation.

Proposed components, outputs and activities will be elaborated during PPG stage and informed by stakeholder consultations.

4) Alignment with GEF focal area and/or Impact Program strategies

The Project is aligned with the GEF climate change focal area strategy's *Objective 1 on promotion of innovation and technology transfer for sustainable energy breakthroughs*, aiming to address the barriers to wider-scale application of bioenergy technology through the *cleantech innovation* window. The Project will contribute to the development and implementation of innovative business models in establishing and operating bioenergy supply chains in Ukraine, supporting innovation, transferring and disseminating technologies along the bioenergy value chain. The Project will enhance the value of sizable amounts of the currently unused agriwastes and residues, which will off-set fossil-fuel based energy use in different sectors of the economy.

Private sector companies and individual entrepreneurs operating in agribusiness and associated sectors (e.g. logistics) will be the driving forces and agents of change within the Project. These stakeholder, in particular SME, will bring technology innovations to the market, help create a sustainable market for bioenergy and bi-products (e.g. biofertilizes), generate new jobs and foster economic growth. These benefits will be particularly in rural areas, which have relatively higher unemployment rates than elsewhere in the country. Supportive government policies and regulations that encourage positive "behaviours" (e.g. use of the currently wasted agricultural residues for energy generation), and those that discouragement of negative behaviours (e.g. burning of agricultural residues in the field), will be instrumental in bringing the necessary change and unlocking the substantial potential of agribiomass-to-energy projects in Ukraine as a significant source of mitigation benefits.

5) incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF, and co-financing

In absence of the requested GEF support, the development of the bioenergy market in Ukraine will be impeded by the presence of the financial, technical and policy barriers outlined above. The economic potential of agribiomass for energy purposes at scale would not be tapped into efficiently within a reasonable timeframe. The market is likely to continue to be largely fragmented, with limited sustainable links between the various players most notably SMEs. Investments in agribiomass projects are likely to be limited to larger agricultural companies that have solid balance sheets to borrow against and sizeable operations yielding sufficient agricultural residues streams to meet in-house energy needs. While the EBRD will continue its climate finance investments in Ukraine under its Country Strategy, barrier removal specifically targeting agribiomass supply chains will not be systematically addressed, thereby constraining market transformation and potential mitigation impacts.

The present GEF project will jump-start the bioenergy market for many small- to medium-scale farms and entrepreneurs who will be effectively connected to contribute to biomass supply chains that end users can rely on for consistent bioenergy supply (both quality- and quantity-wise). Technology and business process innovations will be facilitated through targeted policy dialogue, dedicated technical assistance and financial packages, backed by information outreach and knowledge exchange to improve developers' confidence and reduce perceived risks associated with agribiomass projects. The ultimate result will be a sustained market transformation for bioenergy in Ukraine, thereby contributing to economic and social development of the regions, national energy security, and global mitigation efforts.

Consistent with the EBRD's mandate to support transition, the Project will offer significant socioeconomic benefits across the country, including those associated with resource savings and efficiency gains. These will contribute to increasing the competitiveness of local agribusiness, and assist in future-proofing these against climate change risks through both investments in sustainable agribusiness and the awareness these will raise about the importance of climate change.

6) global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF)

Direct GHG emission reductions associated with this project have been estimated at 150,000 tCO₂e per year, equal to 1,500,000 tCO₂e over the average 10-year investment lifetime. The expected emission reductions will come as a result of sustainable bioenergy supply chains, supported by the present project, producing and delivering to the market bioenergy products of consistent quality and quantity to ensure off-take and substitution of fossil fuels in generation of heat and/or electricity to meet end-users' energy needs across Ukraine.

The above estimate is based on the EBRD's experience in Ukraine and in the broader EBRD region, and general assumptions made regarding the type of projects and technologies to be supported. While annual emission reductions generated by EBRD-supported biomass-to-energy projects in the region have ranged from 15 ktCO₂ to 200 ktCO₂ (per project per year), the lower end of the spectrum has been assumed in the estimate for the present Project to be conservative.

Indirect emission reductions attributable to the present project have been estimated in the range of 4.5 MtCO₂ to 45 MtCO₂ under two approaches, as per GEF guidelines. Under the GEF bottom-up approach (yielding the lower bound of the impacts range), consequential emission savings have been estimated at 4.5 MtCO₂ assuming direct emissions reductions assessed above (i.e. 1.5 MtCO₂) and GEF replication factor of 3 (i.e. at least three similar sets of investment projects are expected to be implemented within 10 years following project closure). Under the GEF top-down methodology (yielding the upper bound of the impacts range), consequential emission reductions have been estimated at 45 MtCO₂, assuming the total realizable market potential of savings from bioenergy application in Ukraine within 10 years after the project completion of 90 MtCO₂ (based on cumulative energy potential of biomass of 39 Mtoe, equal to off-setting around 49 billion m³ in natural gas use for energy generation) and 50% GEF causality factor for a substantial contribution from the GEF intervention.

The above initial estimation of the direct and consequential global environmental benefits will be further reviewed and refined, as needed, during the PPG process.

7) Innovation, sustainability and potential for scaling up

Innovation: The introduction of innovative technological and business solutions throughout bioenergy value chains is at the heart of the proposed Project. The Project will focus on accelerating investment in sustainable bioenergy technologies and practices with the intent to demonstrate how new investments to support the transfer of low-carbon technology and practices will result in emissions reductions. Overall participating private sector companies will expect to decrease their environmental footprint, increase resource use efficiency, in addition to the uptake of new technologies and innovation.

Sustainability: The Project introduces technologies and practices incentivised through a performance-based technology transfer financing mechanism. Capital expenditure on innovative technologies and the introduction of new business solutions will be made at the outset of the pilot sub-projects, which will continue for the lifetime of those sub-projects (estimated at a minimum of 10 years, which is well beyond the Project lifetime). Operation and maintenance costs are covered by the private sector partner (project owner) as an equity contribution, even for complex projects. Note that the sub-projects are selected based on bankability considerations, and the ability to finance O&M is part of that consideration.

Scaling up: Scaling-up is embedded in the proposed Project's design, which is fundamentally a market transformation initiative. By identifying and working with the early movers, this Project provides entry points to developing the market and establishing the underlying biomass value chains essential for the market to develop. The Project will make important contributions to identifying and demonstrating sustainable ways of turning agricultural residues in Ukraine into energy.

The investment is anticipated in at least 10 commissioned bioenergy value chain investment projects, with a total investment of US\$53.5 million including of USD 3.5 million from the GEF. Initially this will produce a portfolio of successful and diverse bioenergy projects and lay a strong foundation for future investment activity. The scale of the sub-projects to be supported under the Project is consistent with other pilot initiatives involving green technologies supported by the EBRD in the energy sector in Ukraine in the past.

After the Project lifetime, in and beyond the next five to ten years, it is anticipated that similar bioenergy projects will be continually invested in and deployed in the country as it moves to achieve its Energy Strategy targets. Other financiers, including commercial banks, are expected to come in and finance similar projects. We anticipate at least three times the number of investment projects to be implemented within 10 years following Project closure. The total realizable market potential of savings from bioenergy application in Ukraine within 10 years after the Project completion is 90 MtCO₂ (based on cumulative energy potential of biomass of 39 Mtoe, equal to off-setting around 49 billion m³ in natural gas use for energy generation) out of which 45 MtCO₂ (600 MW biomass-based power generation capacity) is estimated to be scaled-up from the proposed Project.

To support scaling up, the Project's central platform for knowledge exchange under the SAF will encourage the sharing of information and best practices across sectors. The SAF will act as a voluntary collaboration platform for a broad network of stakeholders involved into the development of sustainable bioenergy value chains in Ukraine. Training materials, information resources and technical materials developed under the project will be made available after the project ends, both online and with a national entity to ensure availability post-project.

Beyond the initial impacts of the GEF Project, the proposed package of investment support, technical assistance, and knowledge sharing activities is envisaged to have a significant impact on the bioenergy market in agri-sector of Ukraine in terms of demonstrating financially sustainable bioenergy technology solutions. While reaching a critical mass will clearly require additional efforts from all the players involved, the proposed Project is a significant step in developing a whole-of-industry, self-sustaining biomass market that will enable the Ukrainian agribusiness sector to reach its full renewable energy potential.

[1] World Bank statistics

[2] Ibid

[3] The 2015 UNFCCC inventory reports annual GHG emissions at 320 MtCO₂ or some 25% lower than the 2000 level (refer to Figure 1)

[4] Ukraine 2050 Low Emission Development Strategy

[5] World Bank statistics

[6] Around half of Ukraine's territory is covered with exceptionally fertile chernozem ("black earth") soil, which supports extensive agricultural operations.

[7] IEA defines biomass as "any organic matter, i.e. biological material, available on a renewable basis. Includes feedstock derived from animals or plants, such as wood and agricultural crops, and organic waste from municipal and industrial sources."

[8] IEA defines bioenergy as "energy generated from the conversion of solid, liquid and gaseous products derived from biomass."

[9] Egypt, Turkey and Ukraine: Sustainable bioenergy options from crop and livestock residues, FAO, EBRD, 2017 (<http://www.fao.org/3/a-i8150e.pdf>)

[10] Utilization of production residues in the primary agriculture and food processing sectors, Bioenergy Association of Ukraine, 2017

[11] Market conditions for biomass-to-energy projects in Ukraine. Survey findings, IFC, 2015

[12] FINTECC - Market study: Analysis of incremental costs and barriers of selected climate technologies, Larive International, 2015

1b. Project Map and Coordinates

Please provide geo-referenced information and map where the project interventions will take place.

Pilot projects are anticipated in the following locations (geolocation ID number from geonames.org database):

710735, 698740, 703448, 700567, 689559, 702569, 696634, 706482, 709930, 695592

The following is short description of each site (with latitude and longitude of one point in each of the project areas):

- Chernigiv (51.50551, 31.28487)
- Odesa (46.47747, 30.73262)
- Kyiv (50.45466, 30.5238)
- Mykolaiv Oblast (47.41667, 31.83333)
- Vinnytsia Oblast (48.91667, 28.66667)
- Lutsk (50.75932, 25.34244)
- Poltava Oblast (49.47705, 33.81866)
- Kharkiv Oblast (49.5, 36.5)
- Dnipro (48.4593, 35.03865)
- Rivne Oblast (51.0, 26.5)

2. Stakeholders

Select the stakeholders that have participated in consultations during the project identification phase:

Indigenous Peoples and Local Communities

Civil Society Organizations

Private Sector Entities

If none of the above, please explain why:

In addition, provide indicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the project preparation, and their respective roles and means of engagement.

The proposed Project has resulted from ongoing dialogue between the EBRD and some of the key stakeholders outlined below, including the private sector and the Ministry of Natural Resources of Ukraine. The draft concept has been presented and discussed at the GEF National Dialog in Kiev, Ukraine, and feedback received has been incorporated into the PIF.

The key stakeholders in this Project will be the private sector agricultural enterprises and farms that will implement bioenergy investments across the different segments of the bioenergy value chain; in addition to the Ministry of Agrarian Policy, the State Agency of Ukraine on Energy Efficient Use, the Ministry of Natural Resources, and the Ministry of Economic Development and Trade.

Other government agencies, business associations, NGOs, research institutes/universities, will be identified and engaged during a thorough review at the PPG phase/during the course of the development of the Project, and based upon the plans to implement demonstration projects or to be involved in specific activities. The project development process will be largely demand-driven and will reflect insights based on findings of the PPG stage and open stakeholder consultations that will take place prior to finalization of the proposal and submission for GEF endorsement.

3. Gender Equality and Women's Empowerment

Briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis).

Based on the EBRD's internal policy promoting gender equality of opportunities across its full range of investment and donor-funded activities, all Project activities and Components will be fully gender inclusive. Gender equality is considered an integral part of sound business management and also key in the EBRD's activities to advance sustainable growth in its countries of operations. The EBRD's Strategy for the Promotion of Gender Equality 2016-2020 sets out how the Bank will continue to work to prevent gender discrimination, and to promote gender equality within its mandate. (Note: the EBRD's Gender Strategy is available from: <https://www.ebrd.com/gender-strategy.html>)

All investment projects financed by the EBRD are subject to the EBRD's internal procedures, which include an Environmental and Social Action Plan (ESAP) that ensures that all environmental, social, gender and other issues are taken into consideration prior to or during their implementation. Relevant studies, assessments, consultations and approvals will be undertaken during the PPG phase.

Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment? Yes

closing gender gaps in access to and control over natural resources;

improving women's participation and decision-making; and/or

generating socio-economic benefits or services for women.

Will the project's results framework or logical framework include gender-sensitive indicators?

Yes

4. Private sector engagement

Will there be private sector engagement in the project?

Yes

Please briefly explain the rationale behind your answer.

The proposed Project has a two-pillar strategy for private sector engagement with a view that this project will address financial barriers by offering greater access to blended finance while explicitly creating opportunities to involve the private sector in sustainable agribusiness. The first pillar is to expand the use of financial instruments and blended finance; and the second pillar is working with the private sector as an agent for market transformation.

It is expected that grants will be used together with other financial instruments provided by the EBRD. The EBRD has developed a wide range of financial and operational instruments to support technology transfer that combine finance with targeted technical assistance funding. The proposed interventions will address the private sector through a dedicated financing mechanism to accelerate investment in climate change mitigation technologies agrisector. It is expected that the supported projects will create a demonstration effect for other market participants to invest in sustainable agribusiness on regular bases without GEF-financed grants.

Consistent with the EBRD's comparative advantage as a GEF Agency, the financing instruments will be structured based on the EBRD's extensive experience in financing technology modernization and innovation, developing market based mechanism for the provision of services, leveraging private sector finance and promoting the introduction of best practice, and will complement other EBRD products in the market. Incentives as part of the project will be smart, will aim to not introduce market distortion and will be blended with EBRD financing. These instruments can be further expanded and leveraged by introducing innovative features to optimize the allocation of credit and implementation risks, and ultimately reduce the overall transaction costs.

The Project offers enhanced opportunities to work with the private sector as an agent for market transformation. In particular the proposed Project seeks to enable the private sector as a primary movers of bioenergy innovation through targeted capacity support, and network and knowledge enhancement through the proposed Sustainable Agribusiness Forum (SAF) platform.

5. Risks

Indicate risks, including climate change, potential social and environmental risks that might prevent the Project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the Project design (table format acceptable)

Risk	Rating (probability / impact)	Mitigation approach
Macroeconomic/ country risk	Medium	<p>Deterioration in the macroeconomic and political situation in Ukraine which can adversely affect the project. However:</p> <ul style="list-style-type: none"> · In 2017, Ukraine's real GDP increased by 2.5%, supported by domestic demand thanks investment demand and robust consumption growth. Growth in Ukraine is set to accelerate further to 3.1% in 2018 and implementation of reforms under the IMF EFF could further improve Ukraine's growth potential and usher in stronger foreign direct investment inflows. · Ukraine's official reserve assets increased from US\$ 5.6 billion (covering approximately 1 month of imports) to US\$ 18.1 billion (covering approximately 3.3 months of imports) as of May 2018 as a result of post-crisis macroeconomic stabilisation and international assistance including from the IMF. · Rating agencies have confirmed their ratings on Ukraine and hold a stable or positive outlook. Moody's rating was affirmed at Caa2/positive in March 2018, Fitch's rating is B-/Stable as of May 2018 and S&P's rating was affirmed in April 2018 at B-/Stable.
Lack of government commitment	Low	<p>A new government may change priorities, however commitment to energy independence and a reduction on energy intensity remains high on government agenda:</p> <ul style="list-style-type: none"> · The government has remained committed to its green tariff regime. · In June 2017, Ukrainian authorities reconfirmed the renewable support

Risk	Rating (probability / impact)	Mitigation approach
		<p>mechanism and introduced adoption of the revised Electricity Market Law of Ukraine in line with recommendations of the EC and the Energy Community Secretariat.</p> <ul style="list-style-type: none"> · in October 2017, Ukrainian authorities adopted the new long-term PPA, providing for the possibility for renewable projects to conclude a preliminary PPA prior to the project construction phase, step-in rights for the lenders as well as an international arbitration clause. · The EBRD is actively participating to the next round of efforts to support the development and implementation of the competitive bidding schemes for renewable energy in Ukraine. The Bank, jointly with the EnCS and in cooperation with the IRENA, prepared the “Policy Guidelines on the Competitive Selection and Support for Renewable Energy,” published on 26 March 2018. These guidelines aim to help Ukrainian authorities design and implement competitive bidding processes for renewable energy.
Little incentive to reduce GHG emissions and increase energy efficiency	Low	The International Monetary Fund requires Ukraine to phase out domestic subsidies for oil and gas as a requirement of the IMF grant support scheme.
Lack of interest in private sector to invest in climate technology	Low-Medium	The risk of low private sector activity in adoption of climate change mitigation and adaptation technologies will be addressed by the project. The project specifically targets technology transfer in private sector by enabling policy environments, creating knowledge and awareness of climate technologies. Providing a blended finance mechanism, which combines the development finance and grant funds aims to mobilize private sector.
Climate change	Low-Medium	The agricultural sector is identified in the latest National Communication of Ukraine as one of the most vulnerable (along with the energy sector) to expected climatic changes, which include increased mean annual temperatures, increased frequency of droughts and other extreme weather events (like torrential rains, hail etc.). At the same time, it is concluded that the changing climatic conditions are likely to have an overall positive

Risk	Rating (probability / impact)	Mitigation approach
		<p>impact on crop yields across the country. Mitigation measures include: agribiomass supply chain investment projects will take into account in their design decision - to the extent feasible - projected changes in the availability of feedstocks; overall resilience of bioenergy supply chains will be ensured through careful design and engagement of multiple market players to spread potential risks of crop failures leading to reduced availability of feedstocks.</p>

6. Coordination

Outline the institutional structure of the project including monitoring and evaluation coordination at the project level. Describe possible coordination with other relevant GEF-financed projects and other initiatives.

The EBRD will act as the GEF Agency responsible for the overall management, monitoring and reporting on the project. The Project will be led jointly by the Energy Efficiency and Climate Change department in EBRD headquarters and the EBRD Regional Office in Ukraine. A dedicated project team, based at EBRD Headquarters and in the EBRD Regional Office in Ukraine, will be formed of experts with a track record of supporting and implementing mitigation projects in Ukraine and the Region, including experts in policy dialogue, on sustainable energy financing tools, and technical experts on climate change mitigation technologies.

Monitoring and evaluation of the project will follow the EBRD's Results Based Management approach which uses the project

results framework (to be fully developed with relevant indicators and targets at the PPG stage) as the basis for planning and adaptive management. The performance indicators will be monitored at regular intervals throughout the project lifetime. To assess project progress toward targets, identify necessary corrective measures and lessons learned, a mid-term review and a final evaluation will be carried out by an independent party at the mid-point and at the end of intervention, respectively.

The proposed EBRD-GEF project will coordinate closely with several ongoing initiatives that have been identified as being relevant to the bioenergy value chain development: USAID Competitive Energy Markets Program, EBRD Ukraine Sustainable Energy Lending Facility (USELF), EBRD-GEF project Finance and Technology Transfer Centre for Climate Change (FINTEC) in Ukraine, EBRD-CTF project FINTECC: Ukraine Agribusiness Waste Residues Window, UNIDO-GEF Global Cleantech Innovation Programme for SMEs in Ukraine, and UNDP-GEF project Development and Commercialization of Bioenergy Technologies in the Municipal Sector in Ukraine (see section 2 "the baseline scenario and any associated baseline projects").

The above projects and interventions address different aspects related to climate change mitigation policies and technologies application in Ukraine, and do not target the barriers described above for the proposed Project, which prevent sustainable agribiomass supply chains from getting established in support of the national renewable energy agenda. More specifically, the above initiatives (e.g. UNDP-GEF project) focus on developing municipal biomass programs in regions and support pilot projects at the municipal heating end-use side; or support (e.g. EBRD-CTF project) a few larger agricultural companies that are prepared to invest in biomass energy to meet their own needs. Thus, the proposed Project has full complementarity with ongoing initiatives and projects, and will coordinate with and build on the ongoing efforts of others to generate substantial mitigation gains beyond the baseline.

Further assessment of potential synergies and identification of suitable coordination options (including, e.g., by mutual participation in coordination bodies or networks) will be undertaken during the PPG stage, with a view to avoiding duplication and maximizing complementarity of efforts. In addition, the EBRD participates regularly (every quarter) in a national working group of MDBs and development agencies to ensure synergies and coordination of programming in Ukraine.

7. Consistency with National Priorities

Is the Project consistent with the National Strategies and plans or reports and assessments under relevant conventions

Yes

If yes, which ones and how: NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc

The proposed project is highly aligned with the national priorities of Ukraine as elaborated in a number of strategies and plans and will provide a solid contribution toward helping Ukraine move onto a low carbon development path.

The Government of Ukraine sets a high priority for strengthening the country's energy independence by replacing imported energy resources, primarily natural gas, with alternative and local fuels and energy, in particular by introducing renewable energy sources (RES). These are set in the following documents:

- Strategy of the Low Carbon Development of Ukraine until 2050
- Strategy for Sustainable Development "Ukraine-2020"
- Energy Strategy of Ukraine until 2035
- National Action Plan for Renewable Energy for the period up to 2020.

Decarbonisation of the economy is one of the priority areas of Ukraine under the Strategy of the Low Carbon Development of Ukraine up to 2050 approved by Cabinet of Ministers of Ukraine on 18 July 2018, as part of implementation of its Nationally Determined Contribution (NDC) under the Paris Agreements, which sets an overall target of keeping its country-wide emissions below 60% of the 1990 by 2030. The strategy recognizes importance of use and further development of RES by providing appropriate regulatory and economic conditions as one of the priority areas. The strategy further prioritizes wider use of biomass for energy, including through promotion of biomass co-firing with fossil fuels, acceleration of technological innovations in biomass conversion, and integration of wider feedstock streams into energy production. The strategy also puts a priority on grid improvements, to increase stability, efficiency and reduce transmission and distribution losses.

According to the Strategy for Sustainable Development "Ukraine-2020", one of the reforms priorities is Ukraine's energy independence to ensure energy security and transition to energy-efficient consumption with the introduction of innovative technologies. Renewable energy is a key to achieve this goal.

According to the Energy Strategy of Ukraine until 2035, development of RES is a key priority in the framework of ensuring energy independence, enhancing reliability and sustainability of the energy system. It is assumed that the share of RES in the total primary energy supply will grow substantially – from 4% in 2015 (3.6 million toe) to 25% in 2035 – in large part by primary energy production from biomass.

The National Action Plan for Renewable Energy for the period up to 2020 (NAPRE) sets the goal of implementing the Energy Community's Decision D/2012/04/MC-EnC, under which Ukraine has committed to reach the level of 11% of energy produced using RES by 2020 in the overall energy consumption structure of the country (compared with 5.3 % in 2015), which will serve as a powerful incentive for further growth of the specific weight of RES in Ukraine.

8. Knowledge Management

Outline the Knowledge management approach for the Project, including, if any, plans for the Project to learn from other relevant Projects and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.

Existing lessons and best practices informing the Project: The proposed project builds strongly on the experience and lessons of the GEF-funded FINTECC Ukraine Project and the GEF-funded regional FINTECC initiative, which have produced a number of market assessments, methodologies and guidelines; and demonstrated successful approaches to knowledge sharing. The methodologies applicable to sustainable agriculture sector already developed within FINTECC Ukraine will be tailored and applied within the

proposed Project. Existing networks will be used to the greatest extent possible, including the virtual networks setup under FINTECC Ukraine. Key lessons learned from FINTECC have been incorporated including tailoring the financial mechanism to reflect the regulatory environment, institutional frameworks and market setting for climate technologies.

The Project has also been informed by other related initiatives in Ukraine, including the work by the EBRD with FAO on sustainable bioenergy feedstocks, which identified that crop residues have the most significant potential of all agricultural residues. Further lessons have been noted for the GEF-funded UNDP-led “Development of Commercialization of Bioenergy Technologies in the Municipal Sector in Ukraine (which focuses on municipalities rather than the private sector and addresses different feedstock) including the challenges related to mobilizing co-financing for investments; the need to develop standard products for potential clients; the need for appropriate technical assistance to complement investment in new markets; and the need to intensify outreach and document lessons.

Plans to learn from relevant projects, programs, initiatives & evaluations: The proposed Project seeks to maximise leverage therefore activities will, where possible, use support mechanisms and information from other initiatives, and link to other events and networks. In addition to leveraging learning from the EBRD-led projects in Ukraine (notably USELF and FINTECC), the proposed Project will liaise with ongoing associations (specifically the Ukraine Biomass Association) and project-based initiatives (e.g. UNIDO Cleantech). The intent is to encourage rapid development of networks through raising awareness via established channels in the country, before developing and offering a focused venue (virtual forum) dedicated to support the proposed Project’s key stakeholders.

Processes to capture, assess and document info, lessons, best practice & expertise generated during implementation: Knowledge management will be carried out throughout the proposed Project with the intent of generating and supporting interest from stakeholders in biomass supply chain investments. The Sustainable Agribusiness Forum website will be established as the virtual platform or knowledge marketplace for housing information, lesson and best practise; and also providing information and sources of expertise. A knowledge management consultant will support the execution of the knowledge management delivery model that is described below.

The Project will also explore opportunities to disseminate success stories through the UNFCCC Climate Technology Centre & Network. The Project will be assessed and evaluated through the regular monitoring and evaluation cycle of the GEF and the EBRD, including annual reports, mid-term review and final evaluation.

Proposed tools and methods for knowledge exchange, learning & collaboration: The following delivery model will be used for knowledge capture and exchange, learning and collaboration:

- Bioenergy success stories and case studies: to be prepared for each of the 10 commissioned bioenergy value chain investment projects. These will be made available on the SAF as they are produced, and stakeholder will be notified (through regular electronic circulars).
- Workshops and information seminars: To encourage information transfer, workshops and trainings/information seminars will be held periodically. The Project will link to existing /planned conferences to the greatest extent possible.
- Network: To support the identification and development of expertise related to sustainable agribusiness supply chain, an online network of biomass market players will be established and promoted. This will be supported blogs and social media. The primary purpose of the network is to foster policies and practices that support climate technology transfer.
- Course: To support and transfer project-generated expertise and best practices, a specialized course for professionals on sustainable agribusiness will be developed in partnership with key sector players and universities. This course will highlight best practices, technical expertise developed in Ukraine, and lessons learned during the Project's implementation. The course will embed knowledge gained through the project into national university-level curriculum. The bioenergy success stories and case studies will be inputs to the course.
- Related online information products: including Project-generated market assessments, guidelines, and sector roadmap, will be posted to encourage wide dissemination

Proposed knowledge outputs to be produced and shared with stakeholders: The key knowledge outputs will be:

- “Sustainable Agribusiness Forum” operational, which will be the main hub for engaging with stakeholders
- Instruments in place to promote the dissemination of key results and business models, including workshops and information seminars; online network; online information (case studies, market assessments, guidelines, and sector roadmap); and social media

and blogs that focus on demonstrating successful case studies and increasing awareness of the economic and other benefits of bioenergy production

- Dedicated educational programme, with a specialized course on innovation in agribusiness and bioenergy practices, launched in cooperation with an Ukrainian university.

How knowledge and learning will contribute to overall project impact and sustainability: Preliminary work on developing the knowledge network activities indicates that up to 70% of market players in agri-sector potentially available to implement agriwaste-to-energy projects will be reached through knowledge and outreach initiatives. Engaging these market players in knowledge and learning related on climate technology transfer will build professional capacity, publicize new developments in the field, and allowing stakeholders (both individuals and organizations) to exchange information and experiences. The network will also provide a forum for business leaders to discuss barriers to investing in bioenergy technologies. Overall, the Project's knowledge and learning activities will increase the level of attention on sustainable biomass value chains thereby enhance the Project's impact by create business opportunities and ensure its sustainability by enabling the scale up of the similar projects in Ukraine.

Plans for strategic communications: The Project's strategic communications will focus on key stakeholders in the biomass energy supply chain in Ukraine. A social media campaign will be undertaken to communicate: latest knowledge products; videos produced (short film promoted on the EBRD's and other websites); project milestones and key events (social, knowledge, networking). All strategic communication will be overseen by the EBRD Communications unit to ensure consistency with EBRD and donor requirements.

Part III: Approval/Endorsement By GEF Operational Focal Point(S) And Gef Agency(ies)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the Operational Focal Point endorsement letter with this template).

Name	Position	Ministry	Date
Vladyslav Marushevskyi	Head of International Project Coordination Division	Ministry of Ecology and Natural Resources of Ukraine	10/5/2018
PIF - new			11/16/2018
PIF			11/5/2018

ANNEX A: Project Map and Geographic Coordinates

Please provide geo-referenced information and map where the project intervention takes place

Pilot projects are anticipated in the following locations (geolocation ID number from geonames.org database):

710735, 698740, 703448, 700567, 689559, 702569, 696634, 706482, 709930, 695592

The following is short description of each site (with latitude and longitude of one point in each of the project areas):

- Chernigiv (51.50551, 31.28487)
- Odesa (46.47747, 30.73262)
- Kyiv (50.45466, 30.5238)
- Mykolaiv Oblast (47.41667, 31.83333)
- Vinnytsia Oblast (48.91667, 28.66667)
- Lutsk (50.75932, 25.34244)
- Poltava Oblast (49.47705, 33.81866)
- Kharkiv Oblast (49.5, 36.5)
- Dnipro (48.4593, 35.03865)
- Rivne Oblast (51.0, 26.5)

ANNEX B: GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, Table F to the extent applicable to your proposed project. Progress in programming against these targets for the program will be aggregated and reported at any time during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Core Indicator 6	Greenhouse gas emission mitigated				(Tons)
	Entered		Tons (6.1+6.2)		
	PIF stage	Endorsement	MTR	Entered	TE
	Expected CO ₂ e (direct)				
	Expected CO ₂ e (indirect)				
Indicator 6.1	Carbon sequestered or emissions avoided in the AFOLU sector				
	Tons				
	PIF stage	Endorsement	MTR	Entered	TE
	Expected CO ₂ e (direct)				
	Expected CO ₂ e (indirect)				
	Anticipated Year				
Indicator 6.2	Emissions avoided				
	Hectares				
	PIF stage	Endorsement	MTR	Achieved	TE
	Expected CO ₂ e (direct)				
	Expected CO ₂ e (indirect)				
	Anticipated Year				
Indicator 6.3	Energy saved				
	MJ				
	PIF stage	Endorsement	MTR	Achieved	TE
	Expected				
	PIF stage	Endorsement	MTR	Achieved	TE
	Expected				
Indicator 6.4	Increase in installed renewable energy capacity per technology				
	Capacity (MW)				
	Technology	Expected		Achieved	
	Biomass (select)	Endorsement	MTR		
Core Indicator 7	Number of shared water ecosystems (fresh or marine) under new or improved cooperative management				(Number)
Indicator 7.1	Level of Transboundary Diagnostic Analysis and Strategic Action Program (TDA/SAP) formulation and implementation				
	Shared water ecosystem	Rating (scale 1-4)			
		Endorsement	MTR		TE
Indicator 7.2	Level of Regional Legal Agreements and Regional Management Institutions to support its implementation				
	Shared water ecosystem	Rating (scale 1-4)			
		Endorsement	MTR		TE
Indicator 7.3	Level of National/Local reforms and active participation of Inter-Ministerial Committees				
	Shared water ecosystem	Rating (scale 1-4)			
		Endorsement	MTR		TE
Indicator 7.4	Level of engagement in IWLE ARN through participation and delivery of key products				
	Shared water ecosystem	Rating (scale 1-4)			
		Endorsement	MTR		TE
Core	Globally over-exploited fisheries Moved to more sustainable levels				(Tons)

ANNEX C: Project Taxonomy Worksheet

Use this Worksheet to list down the taxonomic information required under Part1 by ticking the most relevant keywords/topics//themes that best describes the project

		<input checked="" type="checkbox"/> Innovation	
		<input checked="" type="checkbox"/> Capacity Development	
		<input checked="" type="checkbox"/> Learning	
	<input checked="" type="checkbox"/> Stakeholder Engagement Plan		
<input checked="" type="checkbox"/> Gender Equality	<input checked="" type="checkbox"/> Gender Mainstreaming		
		<input checked="" type="checkbox"/> Beneficiaries	
		<input type="checkbox"/> Women groups	
		<input checked="" type="checkbox"/> Sex-disaggregated indicators	
		<input type="checkbox"/> Gender-sensitive indicators	
	<input checked="" type="checkbox"/> Gender results areas		
		<input type="checkbox"/> Access and control over natural resources	
		<input checked="" type="checkbox"/> Participation and leadership	
		<input type="checkbox"/> Access to benefits and services	
		<input checked="" type="checkbox"/> Capacity development	
		<input checked="" type="checkbox"/> Awareness raising	
		<input type="checkbox"/> Knowledge generation	
<input type="checkbox"/> Focal Areas/Theme			
	<input type="checkbox"/> Integrated Programs		
		<input type="checkbox"/> Commodity Supply Chains (i-Good Growth Partnership)	
			<input type="checkbox"/> Sustainable Commodities Production
			<input type="checkbox"/> Deforestation-free Sourcing
			<input type="checkbox"/> Financial Screening Tools
			<input type="checkbox"/> High Conservation Value Forests
			<input type="checkbox"/> High Carbon Stocks Forests
			<input type="checkbox"/> Soybean Supply Chain
			<input type="checkbox"/> Oil Palm Supply Chain
			<input type="checkbox"/> Beef Supply Chain
			<input type="checkbox"/> Smallholder Farmers
			<input type="checkbox"/> Adaptive Management
		<input type="checkbox"/> Food Security in Sub-Saharan Africa	
			<input type="checkbox"/> Resilience (climate and shocks)
			<input type="checkbox"/> Sustainable Production Systems
			<input type="checkbox"/> Agroecosystems
			<input type="checkbox"/> Land and Soil Health
			<input type="checkbox"/> Diversified Farming
			<input type="checkbox"/> Integrated Land and Water Management
			<input type="checkbox"/> Smallholder Farming
			<input type="checkbox"/> Small and Medium Enterprises
			<input type="checkbox"/> Crop Genetic Diversity
			<input type="checkbox"/> Food Value Chains
			<input type="checkbox"/> Gender Dimensions
			<input type="checkbox"/> Multi-stakeholder Platforms
		<input type="checkbox"/> Food Systems, Land Use and Restoration	
			<input type="checkbox"/> Sustainable Food Systems
			<input type="checkbox"/> Landscape Restoration
			<input type="checkbox"/> Sustainable Commodity Production
			<input type="checkbox"/> Comprehensive Land Use Planning
			<input type="checkbox"/> Integrated Landscapes
			<input type="checkbox"/> Food Value Chains
			<input type="checkbox"/> Deforestation-free Sourcing
			<input type="checkbox"/> Smallholder Farmers

<input checked="" type="checkbox"/> Climate Change	<input type="checkbox"/> Climate Change Adaptation	
		<input type="checkbox"/> Climate Finance
		<input type="checkbox"/> Least Developed Countries
		<input type="checkbox"/> Small Island Developing States
		<input type="checkbox"/> Disaster Risk Management
		<input type="checkbox"/> Sea-level rise
		<input type="checkbox"/> Climate Resilience
		<input type="checkbox"/> Climate information
		<input type="checkbox"/> Ecosystem-based Adaptation
		<input type="checkbox"/> Adaptation Tech Transfer
		<input type="checkbox"/> National Adaptation Programme of Action
		<input type="checkbox"/> National Adaptation Plan
		<input type="checkbox"/> Mainstreaming Adaptation
		<input type="checkbox"/> Private Sector
		<input type="checkbox"/> Innovation
		<input type="checkbox"/> Complementarity
		<input type="checkbox"/> Community-based Adaptation
		<input type="checkbox"/> Livelihoods
	<input checked="" type="checkbox"/> Climate Change Mitigation	
		<input type="checkbox"/> Agriculture, Forestry, and other Land Use
		<input type="checkbox"/> Energy Efficiency
		<input type="checkbox"/> Sustainable Urban Systems and Transport
		<input checked="" type="checkbox"/> Technology Transfer
		<input checked="" type="checkbox"/> Renewable Energy
		<input checked="" type="checkbox"/> Financing
		<input type="checkbox"/> Enabling Activities
	<input checked="" type="checkbox"/> Technology Transfer	
		<input type="checkbox"/> Poznan Strategic Programme on Technology Transfer
		<input type="checkbox"/> Climate Technology Centre & Network (CTCN)
		<input type="checkbox"/> Endogenous technology
		<input type="checkbox"/> Technology Needs Assessment
		<input type="checkbox"/> Adaptation Tech Transfer
	<input type="checkbox"/> United Nations Framework on Climate Change	
		<input type="checkbox"/> Nationally Determined Contribution
		<input type="checkbox"/> Paris Agreement
		<input type="checkbox"/> Sustainable Development Goals
	<input checked="" type="checkbox"/> Climate Finance (Rio Markers)	
		<input type="checkbox"/> Climate Change Mitigation 1
		<input checked="" type="checkbox"/> Climate Change Mitigation 2
		<input type="checkbox"/> Climate Change Adaptation 1
		<input type="checkbox"/> Climate Change Adaptation 2